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Secondary School Teachers' Perceptions of the Integration of Laptops in the Classroom

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COLLEGE OF EDUCATION

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Abstract

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MA, Campbell University, 2000

BS, North Carolina Agricultural and Technical State University, 1990

Doctoral Study Submitted in Partial Fulfillment

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Abstract

The district under study performed in the lowest academic growth percentage of the state for 5 consecutive years. Although the district received funding for technology resources, effective technology use in the classroom continued to be lacking. The purpose of this case study was to explore the perceptions of teachers at the middle and high school under study in integrating and enhancing instructional technology practices in a 1-to-1 classroom through professional development. In the 1-to-1 classroom, each student was assigned an individual laptop. The framework guiding the study was constructivist instructional methods that promoted best practices for student-centered technology integrated classrooms. Data were collected from interviews with 8 teachers and 4 nonteaching staff and 8 classroom observations. Data were analyzed using thematic coding to explore and compare teachers' perceptions of technology integration, technology professional development, and technology use. Findings revealed that the teachers believed that professional development played a key role in their positive attitude toward a laptop technology integration and willingness to provide constructivist instructional practices in the classroom. Findings indicated that some teachers continued to show deficiency in effective technology integration after the implementation by regularly demonstrating traditional practices in the classroom opposed to constructivist practices. Technology professional development can transform teaching practices and effective technology integration that can serve as the stimulus for social change through improved quality of education and evolution of instructional practices, not only for the district but also for the local economy.

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Dedication

First, I dedicate this milestone to my Lord and Savior, Jesus Christ who has all power. To Ronnie, my husband, I dedicate this accomplishment. I thank Ronnie for his support, patience, and undying love throughout this challenging and rewarding endeavor. Without his encouragement and belief in me, I would have given up before reaching the finish line. He has always been my biggest cheerleader and for that I truly love him. I thank my mother and father for their prayers and support. Their prayers pushed me up the hill. I thank God for allowing my parents to live to see this moment. It means so much to me just to hear them say one more time, "Alfreda, we are so proud of you." Their prayers, hard work, and upbringing are the reason for all of my accomplishments: past, present, and future.

I also would like to dedicate this study to my grandmother, Ruby Bagley, and to Lois Williams, who passed away before I completed the lengthy process. Lois encouraged me throughout her last and final bout with breast cancer. She was a humorous and encouraging mentor to me throughout my breast cancer ordeal. Thank God, I am an eleven-year breast cancer survivor. Lois would be so proud of me. I wanted so bad to finish this research journey before she left for a better place, but I know she is smiling, looking down on me, and saying, "I know you could do it."

I thank my siblings, Simon, Almeta, Teresa, & Lisa for their support and belief in me. You are the best siblings in the world. I love you. Of course, I cannot leave out Keishia, my niece/daughter/little sister/friend, who have always believed in Auntie. Lastly, I thank Millicent and Felicia, my close friends, for being there for me throughout this ordeal. To God be the Glory for family, friends, instructors, editors, and PRAYER.

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Section 1: Introduction to the Study

Background of Study

Hometown School District (HSD) is located in the county seat of Hometown, North Carolina. This rural county has a land area of 725 square miles with a population of 54,582 (U.S. Census Bureau, 2010). The small county consists of three other school districts. The three other school districts are Hometown-East School District, Hometown-West School District, and the Private/Parochial district (PP). Of the 8,697 students enrolled in school in Hometown County, HSD serves 51%, Hometown-East School District serves 11%, Hometown-West City School District serves 30%, and the PP section serves 8%. PP is defined as private schools, charter schools, magnet schools, or home-schools (Hometown Development Commission, 2010). HSD is comprised of one pre-K-2 primary school, seven elementary schools, four middle schools, and two high schools (North Carolina Report Cards, 2009).

Of 100 counties in North Carolina, Hometown County ranks 95 in poverty among all ages (U.S. Census Bureau, Small Area Income and Poverty Estimates, 2009). Table 1 shows Hometown County's poverty rate comparison (ProPublica, 2015). The high rate of poverty puts HSD at a disadvantage when it comes to business partners and financial community support.

Table 1. Economic Comparisons

Economic Comparisons: Hometown County

Economic source	Year	United States	North Carolina	Hometown
Population		308,745,538	9,535.483	54,562
Total recovery funding		$522,082,377,600	$15,205,543,291	$33,396,445
Funding per capita		$1,691	$1,595	$612
Unemployment	2008	6.2%	6.5%	9.5%
	2009	9.8%	11.1%	13.9%
	2010	9.6%	9.9%	12.4%
	2011	9.0%	10.9%	14.8%
	2012	8.1%	9.8%	14.0%
Median household income		$50,007	$43,867	$29,141
Poverty rate		13.3%	14.8%	26%

Note. Source: From "How much stimulus money is going to your county?" by J. LaFleur, J, Kokenge and D. Nguyen, ProPublica. Updated Oct. 1, 2012. Copyright 2015 by ProPublica, Inc. Retrieved from http://projects.propublica.org/north-carolina/halifax Reprinted with permission.

Hometown Board of Education's mission is to provide all students with a quality education by incorporating educational programs that will give all students an opportunity to achieve at a high level of success. The local board of HSD meets the first Monday of each month. The board strives to integrate technology resources into the educational program in order to enhance instructional opportunities, address differential learning styles, and provide the best education for the success of each student individually (Hometown County Board of Education, personal communication, 2009).

In the North Carolina Teachers Working Condition Survey (2010), 56% of teachers in HSD indicated sufficient training when it comes to using instructional technology in the classrooms. HSD seeks to provide engaging strategies, programs, and partnerships that will continue to improve teaching and learning. The focus of technology integration has increased over the last 5 years in order to prepare students for success in the globalization expansion. The school district's aim is for teachers and students to

readily access digital devices and web-based resources. Strategies that will encumber this goal include the following (a) providing professional training that will enhance digital age teaching and learning, (b) including a blended learning environment, (c) differentiating learning styles, and (d) providing diversity in all areas of teaching and learning (HSD Strategic Technology Plan, 2012).

In 2009, the federal government through stimulus funds awarded HSD more than $50,000 for the Educational Technology State Grant to increase technology integration through upgrading Internet accessibility that would result in positive student achievement. The funding would essentially support teacher training, content instructional practices, and successful research-based methods (ProPublica, 2010).

There have been many financial opportunities awarded to HSD through local and federal funds. In addition to the school improvement grant awarded in 2010 to the two schools in the study, the same two schools were awarded a significant amount of money by the Golden Leaf Foundation in 2009. The Golden Leaf Foundation awarded three local school districts with resources to move them toward innovative skill building (Golden Leaf, 2009). The grant served as collaborative method for bringing the three districts together in order for them to reach technology integration goals faster.

Technology integration comes with many advantages: such as opportunities to address different learning styles, project based learning, student-centered classrooms, higher level thinking, and transformational learning that includes digital literacy, problem solving, analytical, and a wide variety of skills (Teo, 2008). Teo (2008) also suggested teachers face barriers, perceptions, and beliefs that affect integration of technology into

instruction. Until teachers have consistent support and effective professional training, many will remain uncomfortable and ineffective in using technology in the classroom. Hometown District will need to provide a clear shared vision to all stakeholders that includes steps for implementing techniques, strategies, and professional development that will motivate and encourage all teachers to integrate technology into the classroom to improve student outcome.

Through funding sources, Friday Institute, an educational research organization, partners with the school districts to provide support, guidance, and professional development to staff and stakeholders. With the collaboration of the Friday Institute and Golden LEAF, "the three districts will strive to increase achievement, improve computer literacy and enhance student perception of school" (Golden LEAF Foundation, 2009, para 10). The project provided SMART boards for each classroom in the middle schools and one-to-one laptops in the high schools (Golden LEAF Foundation). In addition to the aforementioned funding, two schools in Hometown District received an approximately $5 million school improvement grant over a 3-year period. The grant will cover the 2010-2011, 2011-2012, and 2012-2013 school years. The background on the two selected schools is discussed in the following text.

Hometown High School

Hometown High School (HHS), located in the rural town of Hometown, North Carolina received a comprehensive needs assessment in March 2009 (Hometown High School Improvement Grant Proposal, 2010). HHS had 570 students in Grades 9 to 12 a student population that is approximately 97% Black, 1% White, and 2% Hispanic.

English is the primary language. An estimated 87% of the students qualify for free or reduced lunch (Hometown High School Improvement Grant Proposal, 2010).

According to the School Improvement Grant, HHS has had six principals over the last 5 years. The current principal filled the administrator role in September 2010. The school improvement team meets the third Wednesday of each month. The team is composed of the department heads, counselors, parents, and students. The school improvement team serves as the representative of the school's mission and vision.

The school's common vision is "to promote an environment where highly qualified professionals, parents, and community members work collaboratively to develop a culture of learning that prepares students for the 21st century" (School Improvement Team, Vision Statement, 2010). The school's mission is to "provide quality education in a nurturing environment by promoting 21st century skills" (School Improvement Team, Mission Statement, 2010).

Hometown Middle School

Hometown Middle School (HMS), located in the rural town in Hometown County, North Carolina had a comprehensive needs assessment in March 2008 (Hometown Middle School Improvement Grant Proposal, 2010). At the time of the comprehensive needs assessment, HMS had 243 students (Hometown Middle School Improvement Grant Proposal). As a result of the closing of two other middle schools in the district, HMS currently has 374 students in Grades 6 to 8; approximately 99% Black, 0.5% Hispanic, and 0.5% other. English is the primary language. HMS has had two principals in the last 3 years. The vision of HMS in the next 3 years is to "be vibrant,

active and focused on developing globally competent, life-long learners" (Hometown School Improvement Team, Vision Statement, 2010). The "students will learn to make real-world connections and participate in becoming model citizens in the community." Hometown Middle School is "confident in its ability to rise to the occasion" (Hometown Middle School Improvement Team, 2010).

Over the last 3 years HHS and HMS have had high leadership and teacher turnover rate. In the last 3 years, neither school has had 60% of students proficient in reading or math (HSD Improvement Grant Proposal, 2010). Both schools have had the highest suspension rate in the region. The leadership and teacher turnover rate has also been high. Although these statistics cast undesirable scrutiny on the district, the district's access to technology is compatible to other districts.

For many years prior to the recently awarded grants, HSD had been equipped with computers in every classroom, updated technology labs, and Internet services. In as recent as the last 2 school years, HSD had been awarded over $5 million in grant money, with much of the money allotted for improvement of student achievement through technology integration (Recovery Act, 2010). The Golden Leaf and School Improvement funding have provided all classrooms at HHS and HMS with interactive whiteboards, which allow teachers to deliver engaging lessons, write digital notes, record lessons, and publish work electronically.

The school improvement grant funded HMS and HHS with approximately $5 million dollars between the schools. The majority of the funds were allotted for a one-to-one laptop initiative and salaries for technical and instructional technology positions for

both schools. HMS is the feeder school into HHS and vertical alignment is a component of the grant. With laptops for every student and interactive whiteboards in each classroom, effective technology integration is not only a goal of the district but is necessary for fidelity and implementation of the federal funding sources.

Similar to most schools, the availability of technology is not a problem for HMS and HHS, but changing attitudes and perceptions about technology use still remains a concern. The focus of digital age teaching and learning needs to remain a priority in education or technology integration will lack understanding and direction (Mueller, Wood, Willoughby, Ross, & Specht, 2008). Because of the amount of money budgeted for technology expenditures, district and school leaders are under pressure from stakeholders to promote effective use of technology (Schrum & Levin, 2009).

There are different factors that contribute to understanding the access and use of technology, and this leads to many difficult questions about developing transitional classrooms (An & Reigeluth, 2011; Bellanca & Brandt, 2010; Davidson & Goldberg, 2010; Ertmer & Ottenbreit-Leftwich, 2010). Much research has been conducted on how technology impacts student achievement, but little evidence has shown that technology integration is the primary factor in increased student achievement in these studies (Bebell & Kay, 2010; Denton, 2012; Dunn & Rakes, 2010; Harris, 2010).

With the increased amount of funding in the area of technology provided to the two schools in this study as well as the overwhelming demand for constructivist style teaching and learning, a minimum amount of study has been done in HSD to determine whether the teachers perceive technology integration as a pivotal part of developing

essential skills to compete in global society and how professional development play a role in the implementation.

Problem Statement

Although funds have been allocated for initial technology integration, the problem lies in changing teachers' perceptions on the one-to-one laptop program and other technology integration practices through ongoing professional development. Between 2009 and 2014, the North Carolina Department of Public Instruction (NCDPI) provided a mandated week-long summer professional development session for all of HSD's employees. The professional development covered a wide range of topics from literacy to assessments; however, there was little training for technology integration. The training that focused on technology integration was only available to media specialists and computer technicians.

The HMS and HHS School Improvement Grant (2010) focused on a one-to-one laptop initiative that will play a role in (a) decreasing the drop-out rate among first time ninth graders, (b) increasing the passing rates for first time ninth graders, (c) increasing proficiency levels on the end of course exams, and (d) decreasing the number of discipline referrals that result in short term or long term suspensions. The introduction of the one-to-one laptop initiative comes with mixed beliefs, perceptions, and apprehension from the teachers. Teachers know that technology continues to alter the teaching and learning process. However, in order for technology integration to be successful, there needs to be a plan in place before the technology is introduced to the students (Johnson, 2006).

There are several factors that impact teachers' decisions to support technology integration in their classrooms. It is very clear that teachers play a major role in technology integration. It is important that the district, as well as the school, has a shared vision of transforming teaching and learning from traditional classroom practices to digital age practices. The vision for HHS and HMS supports a strong focus on innovative skills and the impact they have on college and career readiness.

Effective professional development that addresses teachers' perceptions and barriers should be available to teachers. Without buy-in from teachers and students and an effective technology integration training plan, the district and individual schools will not meet the goals that school leaders of HMS and HHS articulated in the school improvement grant. Perceptions, beliefs, and attitudes have been indicated as barriers in effective technology integration (Abbitt, 2011; Hansen, Donovan, & Fitts, 2009; Heo, 2009; Wang, Ertmer, & Newby, 2004; Watson, 2006). Administrators, teachers, and instructional staff need to be involved in the vision and professional development in order to move forward in successful technology integration (Larson, Miller, & Ribble, 2010). Professional development and a common vision among all stakeholders are key factors for successful technology integration. Effective professional development for teachers should not only include changing perceptions, beliefs, and skills of the teachers but should also focus on student outcome (McDonald, 2009).

Although the demand for effective technology integration has grown, supporting and training teachers to transition from traditional classroom instructional methods to technology infused instructional methods continues to be lacking in HSD. Identifying and

addressing the perceptions, beliefs, and attitudes through professional development is the key to changing current teaching and learning styles (Borthwick & Pierson, 2008).

Nature of Study

The objective of this study was to understand the attitudes, perceptions, and barriers among teachers at HMS and HHS regarding effective technology integration supported by professional development and how technology is being used to promote student learning in their classrooms. I used a qualitative case study approach in which data are collected and analyzed to gain understanding of teachers' reluctance when it comes to consistent effective technology integration in student learning. A case study is a prospective or retrospective qualitative approach that intensively explores data collected from a group, person, issue, or program over a period of time with purpose of developing a pattern or theme. In a case study, the person, place, or thing studied has boundaries (Merriam, 2002). The study included data collected by open-ended interviews, classroom observations, and field notes from purposely selected teachers and principals. Data were analyzed to establish patterns from common themes that emerged.

The data were further analyzed to evaluate the current professional development issues and relationships to the teachers' experiences, attitudes, beliefs, and perceptions while attempting to determine the level of technology needs of teachers and provide differentiated professional development to effectively increase technology integration school wide. I chose the case study qualitative method because the objective of the study was to bring some understanding to what is already known through research and add

strength and experience for future research (Shen, 2009). The research approach selected for this study is explored in more detail in Section 3.

Research Questions

The first research question focused on the perceptions of teachers at HMS and HHS about integrating technology in the classroom. The second and third research questions were used to explore and compare the perceptions of teachers, principal, instructional coach, and technology facilitators at HMS and HHS and were used to understand "what" and "how" professional development served as a component of effective technology integration in the classroom:

1. What are the perceptions of teachers at HMS and HHS about effectively integrating technology in a one-to-one classroom?
2. What are the perceptions of teachers at HMS and HHS about professional development and its effect on teaching practices in a one-to-one classroom?
3. How have teachers at HMS and HHS integrated technology in a one-to-one classroom?

Purpose of Study

The purpose of this case study was to explore the perceptions of teachers in HMS and HHS in integrating and enhancing instructional technology practices in a one-to-one classroom through professional development. In the study, I focused on teachers' beliefs, perceptions and professional development and how the administrators of HMS and HHS played a role. I examined the early adopter program that was composed of six teachers from HMS and five teachers from HHS. Each of the schools had one instructional

technology facilitator assigned to it. There was an instructional technology coach shared between the two schools. The facilitators and coach led the early adopter program. The early adopters represented both schools as a part of a piloted one-to-one laptop conversion.

In the current study, I investigated the early adopters' beliefs, perceptions, and attitudes about technology integration and technology related professional development. Through open-ended interviews with the teachers, I investigated teachers' understanding, awareness, and experience of technology integration and the role of technology related professional development in addressing teaching practices. Through open-ended interviews with the principals and instructional technology staff of the two schools, I investigated how technology related professional development prepared, supported, and equipped teachers to effectively integrate technology.

Through classroom observations and transcripts from interviews, I investigated how the teachers used technology when planning lessons; how the students used technology when engaging, collaborating, and completing assignments; and what and how instructional practices addressed effectively integrate technology.

Conceptual Framework

Technology integration is a major factor in transforming traditional classrooms into digital age classrooms that are often defined as classrooms of authentic learning. A relationship between technology and constructivism can prove to be beneficial in teaching students skills needed to be successful in a globalized society, often referred to as 21st century skills. In order to change teachers' attitudes, beliefs, and perception of

technology integration, it is necessary to understand the background, prior experiences, and prior knowledge teachers bring to the classroom. The constructivist theory as a conceptual framework for technology integration can bridge traditional classroom practices to modern classroom practices.

Constructivist theory is based on the concept that knowledge is not merely meant to be transferred but to be built upon (Ben-Ari & Kedem-Friedrich, 2000; Piaget, 1926; Vygotsky, 1962, 1968). Constructivists believe that the learner's perceptions and beliefs are constructed according to his or her own knowledge and experience (Lambert et al., 2002). When a learner is able to bring prior knowledge and experience to a situation, it allows the learner to use critical thinking to relate to the situation. It is important that teachers acknowledge the constructivist concept when transforming traditional classrooms to technology integrated classrooms. Classroom instructional time needs to be filled with activities that expose students to real world experiences through technology integration.

Constructivist teaching practices have become a major teaching method in education programs and successful student learning in public schools across the nation (Gordon, 2009). Constructivism and social constructivism describe learning as socially based and more effectively received in an interactive learning environment. Constructivism asserts that the responsibility of learning is placed on the learner, not the teacher. In contrast, the traditional method of behaviorism believes the teacher has all of the knowledge and the students acquire knowledge from the teacher. Student centered classrooms in which students are active learners engaging socially and authentically

represent the constructivist principle. Teachers who support constructivist principles through collaboration, project based learning, and student centered classrooms through technology integration see technology as an effective tool in motivating students to learn (Vannetta & Beyerbach, 2000). The cultural shift in pedagogy styles from behaviorist learning classrooms to constructivist learning classrooms continues to be a struggle among teachers. A change in teacher professional development is a key factor in changing teachers' instructional practices to include constructivist teaching methods.

A constructivist approach to professional development can assist teachers with effectively managing student-centered learning. Teachers need to possess skills and strategies in order to empower students to build on prior knowledge and experiences. Pitsoe and Malia (2012) stated that "teacher professional development should shift from a behaviorist towards constructivist approach" (p. 318). Adults attempt to comprehend new material by knowledge they already have (Justice, Rice, Roy, Hudspith, & Jenkins, 2009). Teacher knowledge, collaboration among teachers, and consistent assessment of students are the key components of effective professional development (Saxe, Gearheart, & Nasir, 2001).

Training teachers to build on prior knowledge and providing them with current best practices to change instructional methods will ultimately improve students' learning. Improving student learning is the main goal of effective professional development (Wei, Darling-Hammond, Andree, Richardson, & Orphanos, 2009). Therefore, it is necessary to provide teachers with constructivist teaching methods that will guide their students to construct knowledge from real world experiences (Lew, 2010).

Researchers have revealed that constructivist professional development strategies focusing on the integration of teachers' content and pedagogy knowledge with student engagement produced positive results in students understanding concepts in mathematics and science (Garet, Porter, Desimone, Birman & Yoon, 2001; Kriek & Grayson, 2009; Saxe et al., 2001). Researchers have found that other content areas reinforced by technology integration aligned with constructivist teaching practices produce experiences relevant to a globalized world (Ertmer & Ottenbreit-Leftwich, 2013; Overbay, Patterson, Vasu, & Grable, 2010). Constructivist principles implemented with technology integration is a vast part of collaborative teaching and learning.

Operational Definitions

This section will define and clarify how the following terms are used in this study.

Digital divide: Differences in accessibility and skills of the use of technology (Wei & Hindman, 2011).

Innovative culture: An environment that embraces industrial change and modern day things (Spais & Vasileiou, 2008).

One-to-one digital conversion: An educational process in which each student is assigned a laptop for educational use for the entire school year (Golden Leaf Foundation, 2009).

Technology integration: The process of incorporating technology resources and technology-based practices into daily usage, schools, and work management to enhance learning (National Center for Educational Statistics, 2003).

Assumptions

Prior to conducting the study, I assumed there are several reasons why teachers have certain attitudes, beliefs, and perceptions about technology integration. I believed that change is inevitable in education but teachers need to be assisted and guided through the transition period. I considered that quality and ongoing training produces confidence, and confidence results in a willingness to take part in technology professional development and other professional growth that yields improvement. I had faith that the participants would answer all questions truthfully based on knowledge and desire to increase technology integration school wide. I expected participants would answer questions and provide feedback based on their perceptions and willingness to improve professional development that could improve classroom instruction using technology. I presumed the participants' responses would represent the attitudes, feelings, and perceptions of the majority of the teachers in HMS and HHS.

Scope and Delimitations

This study was limited to two schools located in Hometown District. The study was restricted to in depth interviews with a purposeful selected sample that included a principal, an instructional coach (representing both schools), two instructional technology facilitators (one from each school), and eight teachers (three from HMS and five from HHS). Data from classroom observations were limited to three teachers from HMS and five teachers from HHS. The two schools involved in the study were demographically and academically similar to other schools in the district while currently very different financially as a result of the school improvement grant. The financial difference may or

may not have reflected the validity of long term aspects in technology integration. There were little to no historical data in HSD on technology integration to make comparisons.

Limitations

The study was limited to only two schools in a small rural demographic area that only represented schools with a short term financial advantage over nine other schools in the district. Results may not have represented schools in other districts in North Carolina or other states. Another limitation of the study was the sustainability of the technology integration, technology professional development, and the technology support that were funded through the school improvement grant. The participants were purposely selected to represent different levels of technology integration and each grade level of secondary education to avoid limitations.

Significance of the Study

There were many barriers that interfered with effectively integrating technology into classrooms. Such barriers as lack of time, lack of support, lack of resources, lack of professional development, and teachers' attitudes, beliefs, and perceptions about technology integration needed to be acknowledged and understood before technology can be used to enhance student learning. Professional development that focused on changing teachers' instructional practices was a main catalyst for effective technology integration.

In this study, I explored how professional development affected teachers' beliefs, perceptions, and attitudes toward technology integration. Professional development played a key factor in increasing technology integration at HMS and HHS. The study was significant because there were no historical data that addressed perceptions, beliefs, and

professional development in relationship to technology integration. The study served as a base line for future studies. The data collected from the study served as a foundation for eliminating barriers and providing professional development that will prepare teachers to integrate technology with confidence and purpose across HSD. Preparing students to compete in a globalized society was the district's primary goal.

Millions of dollars had been invested in technology in the district over the last 5 years. A study that revealed some indication of how student learning has changed as a result of technology integration was significant to all stakeholders. This plan has increased teacher knowledge district-wide and improved student-centered learning. The study assisted in understanding how teachers readily use technology in their classrooms after receiving professional development, different learning style strategies based on constructivism, student-led classrooms, and how the environment shaped the learning process.

The study provided teachers with an understanding of perceptions, attitudes, and beliefs that enabled them to seek out strategies and professional development opportunities that met their needs. As a result of effective professional development, teachers became more confident and comfortable with using technology in their classrooms and students reaped the benefits. The two schools in the study served as models for other schools in the district as they embarked on technology integration through one-to-one iPad implementation, student-centered learning, and other constructivist teaching practices. This chain reaction can have an impact on social change by providing society with future workers and citizens who can compete globally.

Summary

Teaching has taken on a new meaning. Teachers need to learn how to reach the students in their classrooms through technology integration. Students are living in a global society and teachers have to take steps in providing students with technology literacy that is needed to survive and compete. The purpose of this case study was to explore the perceptions of teachers in HMS and HHS in integrating and enhancing instructional technology practices in a one-to-one classroom through professional development. The study pinpointed actions school leaders and technology teams must take to successfully implement technology use into the schools and effectively maximize its use. It is not the technology itself that will prepare students to be competitive in the 21st century; it is how technology is effectively used.

Professional development in technology instruction was a key topic of the study. Although professional development was a heavily funded resource provided to HSD, a lack of technology professional development seemed prevalent. Teachers needed proper training and constant support to be highly qualified in technology use. There were many teachers who faced several obstacles when trying to use technological teaching techniques. Providing an effective professional development plan is a major part of removing these obstacles.

Section 2 provides review of literature surrounding the different aspects of technology integration, such as the history of the one-to-one laptop programs, the digital age, visionary leadership, digital learning culture, instructional strategies, and systemic improvement. Section 3 addresses the methodology of the study. Section 4 shows

findings and Section 5 concludes with summary and recommendations for future research.

Section 2: Literature Review

Review of Literature

This review of literature provided the historical progression of one-to-one computer programs followed by recent information, practical lessons learned, and guidelines for successful technology integration in 21st century schools. The research addressed effective technology professional development and technology integration of a one-to-one mobile initiative; a main component of a recently awarded school improvement grant (SIG) to the two schools studied.

The information was gathered from journal articles, books, eBooks, dissertations, and peer reviews obtained through Walden University Library and EBSCO database. I used terms such as *technology integration, technology professional development, constructivism, instructional technology, technology planning, technology transfer, technology uses in education,* and *one-to-one laptops*. I used a research database template where I listed all of the education databases I could find in the first column of the template, the second column contained the search terms I used to find peer journal articles, the third column listed the number of results, and the last column allowed me to make notes. I started my search with the databases with the highest number of results and worked my way through the remaining ones. This method provided literature that I downloaded and annotated for later compilation. I searched the reference pages of literature to find more recent works. This literature was broken into sections that made up this section.

This section is divided into several factors that can successfully contribute to an effective one-to-one mobile integration. Research revealed the history of the one-to-one implementation and how technology integration should align with the national technology standards outlined by the largest nonprofit professional organization, the International Society for Technology in Education (ISTE). The study was guided by the conceptual framework that constructivist instructional methods contributed to effective technology integration. The subtopics for this section are Conceptual Framework, History of One-to-One Laptop Programs, Visionary Leadership, Digital Age Culture Learning, Professional Development, Systemic Improvement, and Digital Citizenship. These subtopics addressed relevant challenges of this study, such as teachers' perceptions, beliefs, and barriers; effective professional development; changes in the learning culture; and practices used by master teachers of technology integration.

Conceptual Framework

Constructivist teaching practices and how they relate to effective technology integration was the framework that guided this qualitative case study. Constructivist teaching practices are based on the theory of constructivism. Constructivism is defined as the concept of basing one's knowledge on what he or she knows or has experienced (von Glasersfeld, 1995). Constructivist learning uses prior experiences and actions to build on and gain more knowledge (Lambert et al., 2002). Technology provides information that is easily and quickly accessible. Therefore, technology literacy has changed the way students gain and interpret knowledge. Educators are faced with the challenge of teaching students how to develop and use digital learning skills to promote individual prior

knowledge (Sherman & Kurshan, 2005). Digital literacy and social constructivism are key components in developing and applying skills that are needed to compete in a global economy.

Technology has opened a different gateway to constructing knowledge for teachers and students. Teachers require training in effectively transitioning from the traditional teaching and learning approach to the new globalized teaching and learning approach. Education reforms struggle with the onset of effectively using technology to construct learning (Collins & Halverson, 2009; U.S. Department of Education, 2010). The concept of constructivist learning theory can provide best practices for effective technology integration because it reinforces student-centered learning.

In a study of elementary students and teachers from four schools in Dallas, Texas, Rosen and Beck-Hill (2012) provided an overview of a constructivist based one-to-one laptop program. The researchers evaluated the level of constructivist learning from data collected by 55 one-hour observations of controlled and experimental math and reading classrooms. Data were also collected from standardized test scores, student attendance records, student discipline records, and student questionnaires. The researchers found that a constructivist approach with technology integration of laptops produced higher teacher-student interaction, higher student engagement, more collaboration, and more differentiated teaching and learning than traditional classrooms (Rosen & Beck-Hill, 2012).

Similar studies linked technology integration and constructivist teaching styles to independent learning, collaboration, student-centered classrooms, and meaningful

learning (Chai & Lim, 2011; Teo, Chai, Hung, & Lee, 2008; Wetzel, Foulger, & Williams, 2008). Likewise, Liu and Chen (2010) stated Web 2.0 tools, such as wikis, podcasts, blogs, and other web-based collaboration tools support constructivist learning because these tools encourage and allow learners to construct their own learning through their own creation. Rosen (2009) agreed technology integration contributes to constructivist and relevant learning; however, Meyer (2009) argued the constructivist approach has received pessimist views and has been a challenge to get teachers to transform from the more traditional approach to constructivism.

The 21st century has often been referred to as the information age. The skills for accessing and processing information have become survival skills for a globalized society. Therefore, 21st century classrooms should represent teaching and learning through developing skills such as information and digital literacy, communication and collaboration, problem-solving and decision making, and innovation and critical thinking (Griffin, McGaw, & Care, 2012). In order for classrooms to transition to digital age teaching and learning, teachers have to change their beliefs and attitudes about technology use (Bai & Ertmer, 2008). Ongoing professional development is necessary to provide teachers with training and confidence when using technology in the classroom. The importance of professional development and its impact on teachers' perceptions, beliefs, and attitudes about technology integration will be discussed later.

The section began with the history of technology integration in education, specifically, the one-to-one laptop programs. The summary of the section will describe the alignment of National Educational Technology Standards (NETS) and the

implementation of technology integration of the one-to-one mobile initiative of HHS and HMS. The summary will entail the findings of the review of the literature and the conceptual framework of constructivist learning and how it can guide the implementation of the one-to-one initiative.

History of One-to-One Laptops

Research revealed the first one-to-one laptop program originated in 1989 at the Ladies' Methodist College in Australia (Johnstone, 2003). Soon after there were reports of one-to-one laptop programs spreading to Spain, France, Germany, and North Ireland. Schools in the United States started one-to-one laptop initiatives over a decade ago, with the goal of anywhere, anytime teaching and learning accessibility (Dawson, Cavanaugh, & Ritzhaupt, 2008; Grimes & Warchauer, 2008; Lei & Zhao, 2008). A one-to-one laptop program is described as each teacher and student having access to an individual laptop or other mobile device for learning purposes (Learning Cultures Consulting, Inc., 2006).

Ubiquitous laptop programs are more specific because each teacher and student is assigned his or her individual laptop. In ubiquitous laptop programs, the students are almost always able to take laptops home and keep the laptop throughout the entire school year (Greaves & Hayes, 2006). Mobile devices were predicted to increase from 19% in 2006 to 50% by 2011 (Greaves & Hayes, 2006). In support of this prediction, the National Center for Education Statistics (2010) reported statistics from 2009 revealed 97% of United States public schools had at least one computer located in the classroom every day and 58% of public schools had access to laptop carts. Although research on one-to-one laptop implementations has become increasingly available in digital learning

initiatives, statistics showing significant changes in student outcomes remain augmentative.

One-to-one Programs – Success or failure?

Comparisons among schools with laptop programs and schools without laptop programs continue to be a debatable issue on technology integration effectiveness. Studies have revealed different outcomes from several one-to-one laptop implementations. For example, Bebell and Kay (2010) reported a middle school in western Massachusetts participating in a one-to-one laptop program did not integrate technology any more than schools that did not participate in a one-to-one program. Likewise, it was found that Maine's public school laptop program, one of the largest one-to-one laptop implementation programs in the United States, resulted in little to no significant impact on student achievement, showing only a 3.44 point increase in writing over the 5-year study span (Silvernail & Gritter, 2007).

Results from a one-to-one laptop study of middle school students in Texas revealed a decrease in writing scores of students in the laptop group but a slight increase in mathematics (Shapley et al., 2009). Various findings in research suggested technology integration with laptops can be beneficial in certain instructional activities while showing no benefits in others. In a qualitative case study, Dunleavy, Dexter, & Heinecke, (2007) reported that the one-to-one laptop classrooms provided added value to communication, productivity, research, and basic skills, but management of laptops presented new challenges in other areas. An ineffective one-to-one laptop implementation plan can be costly and more challenging than a school can endure (Dunleavy et al., 2007).

Some districts that previously implemented one-to-one programs discontinued the laptop implementation because of maintenance and repair cost, misuse of the laptops, and budget cuts (Lemagie, 2010). A school district in New York ended the one-to-one laptop program after 7 years. The district reported misuse of the laptops by the students, time and cost spent on repairing laptops, students hacking into the network, infrastructure inadequacy, and no impact on student outcome as factors for ending the one-to-one program. School districts in Virginia, California, Massachusetts, and Florida followed the path of eliminating one-to-one laptop programs after several years of implementation because the laptops revealed no significant impact on student achievement (Hu, 2007). Although districts discontinued laptop programs as a result of expense, misuse, and other challenges, there are many studies of laptop programs that reported positive results.

Multiple studies linked one-to-one laptop programs to positive instructional student outcomes and instructional practices. A study of 364 leaders of large school districts revealed that laptops have some impact on student achievement (Greaves & Hayes, 2008). Findings from the study noted 33% of the leaders believed laptops had a significant impact on student achievement and 45% believed the impact of the laptop implementation was moderate (Greaves & Hayes, 2008). Regardless of the amount of impact, there has been evidence of student improvement with the use of laptops for homework and learning games (Shapley, Sheehan, Maloney, & Caranikas-Walker, 2010). Researchers have agreed that laptop programs have improved technology skills of teachers and students (Dawson et al., 2008; Lei & Zhao, 2008; Murphy, King, & Brown, 2007).

In a multimethod case study, Grimes and Warschauer (2008) compared classrooms with one-to-one laptops to classrooms before one-to-one laptops. The researchers used interviews, observations, surveys, and student work data to determine that laptops improved writing and student-centered instruction. The study revealed that students with the laptops did not perform as well as students without laptops in English and mathematics but that group showed growth in the second year (Grimes & Warschauer, 2008). More positive findings revealed the laptops contributed to an increase in students' interest in class, an increase in collaboration among students, a significant change in delivery method, and a more in-depth search for information on research topics (Grimes & Warschauer, 2008).

The change in delivery method or instructional practices allowed students to take ownership of their learning by providing a gateway of information, communication, and collaboration. One-to-one programs offer opportunities for students to use prior knowledge and experiences to explore the type of learning that could be common to them. Students' attitudes toward technology can motivate students to attend school and learn. In a study of various schools in Texas, Holcomb (2009) found that one-to-one programs can have a compelling impact on student achievement and attendance.

In more recent research, Inan and Lowther (2010) studied 379 elementary, middle, and high school teachers from private and public schools across the state of Michigan. The schools in the study received Freedom to Learn grants focusing on creating one-to-one laptop environments to provide Michigan students with access to technology. Findings revealed teachers' beliefs and willingness directly affected the

laptop integration. Inan and Lowther (2010) believed that ongoing professional development assisted in evolving the teachers' beliefs and willingness to effectively integrate technology. The study concluded that positive school factors also contributed to teachers' effectiveness with the laptop implementation.

Other studies have found that a one-to-one laptop program can have positive results when the implementation is effectively planned (Donovan, Green, & Hartley, 2010; Spires, Oliver, & Corn, 2012; Suhr, Hernandez, Tedre, Hansson, Mozelius, & Lind, 2010; Weston & Bain, 2010). According to data collected from surveys and interviews of 231 students, 28 teachers, and 44 parents in a middle school in northwestern United States, Lei and Zhao (2008) found that 81.4% of the students used their laptops for homework, 71.4% of the students used their laptops to find resources for school work, and 65.8% used their laptops for emailing. Student surveys revealed that students like their laptops and thought the laptop made them more organized.

Students used the laptops for researching class related topics and stated that the laptops allowed them to explore the world from their desks. Moreover, students showed significant gains in technology efficiency as a result of the laptops (Lei & Zhao, 2008). Student achievement also showed a marginally significant increase. The increase in student achievement cannot accurately be contributed to the laptops alone because other factors had to be considered (Lei & Zhao, 2008). Measuring student learning with laptops was difficult because the methods used for grade point average were from traditional assessments (Lei & Zhao, 2008).

In reports that indicated some positive findings, it was clear that increase in student achievement or student engagement was not a result of the laptops themselves, but other factors played a part (Grimes & Warchauer, 2010; Lowther, Inan, Ross, & Strahl, 2012; Suhr et al., 2010). In other words, laptops and other devices are only tools. How the device is effectively used is what counts.

In studies where one-to-one technology integration was successful, ongoing professional development that focused on instructional practices was a key factor (Mouza, 2011; Ottenbreit-Leftwich, Glazewski, Newby, & Ertmer, 2010). In expansive studies, one-to-one laptop programs were more successful when the training focused on how the technology is used instead of what technology is used and how it can be a valuable resource in developing and sharpening critical thinking and other 21st century skills (Lowther et al., 2008; Zucker & Hug, 2007).

Laptops and other computer devices have become more accessible in the last decade than ever before. The advantage of accessibility can serve as an opportunity to make learning more enticing and meaningful to students (Holmes, 2008). Students have more chances to take ownership of their learning when teachers move away from teaching and become the facilitator of the classroom. Other researchers have identified one-to-one computing as an indicator of increasing constructivist learning strategies (Denton, 2012, Smart, Witt, & Scott, 2012). The conceptual framework of constructivist instructional methods guiding laptop integration will be reviewed later in this section.

Although some researchers reported little to no significant advantage of one-to-one laptop initiatives in areas such as student achievement, teacher instructional changes,

and student practices, other researchers found positive outcomes as a result of laptop integration. Teachers and administrators noted increased writing output as a result of the one-to-one initiative (Grimes & Warschauer, 2008). Teachers also found there was increased collaboration in their classes (Maninger & Holden, 2009). This increased collaboration supports the theory of constructivism, which indicates collaboration as one of its core principles. Furthermore, teachers have found that one-to-one programs have increased student motivation and engagement (Lei & Zhao, 2008) resulting in less off task behavior and fewer in-class distractions (Maninger & Holden, 2009).

Certain factors are prevalent for a successful one-to-one laptop implementation. Greaves, Hayes, Wilson, Gielniak, and Peterson (2010) studied 997 schools in the United States that implemented one-to-one laptop programs in the last decade. Findings revealed three key factors of a successful one-to-one laptop program include (a) teacher collaboration, (b) daily use of technology, and (c) uniform integration school and district wide. Schools that did not include the three key factors had a less successful implementation laptop program. Some schools discontinued the one-to-one laptop implementation because of little to no buy-in from teachers. Although there are several barriers that could affect the success of a one-to-one laptop implementation, training and teacher buy-in can significantly reduce failure of a laptop implementation (Clausen, Britten, & Ring, 2008).

Although several studies revealed a positive impact on student achievement and other positive effects of one-to-one mobile devices (Dunleavy et al., 2007; Grimes & Warchauer, 2008; Maninger & Holden, 2009; Schrum & Levin, 2009; & Zucker & Hug,

2008), the challenge of widespread technology integration still remained (Hixon & Buckenmeyer, 2009). Although external barriers such as lack of resources, lack of support, inadequate infrastructure, and lack of professional development contribute to constraints in technology integration in schools, internal barriers such as fear, attitudes, beliefs, and perceptions concerning change tend to play a more significant role in the challenge of widespread technology integration (Inan & Lowther, 2010; Kopcha, 2012).

Digital Divide - Laptop Programs

In a recent One Laptop per Child study, there were implications that students with a high socioeconomic background are more likely than students with a low socioeconomic background to have the necessary support and guidance for technology use (Warschauer, Cotton, & Ames, 2010). As stated by Warschauer et al. (2010), "it is not the computer itself that brings benefit, but rather the social and technical support that surrounds the computer that makes the difference" (p. 44). Willingham (2009) supported this statement by emphasizing those students who already had prior technology background knowledge and advanced literacy skills adapted faster than students who did not have prior knowledge or advanced literacy skills to unstructured learning environments, such as a one-to-one laptop programs.

Although Warschauer et al. (2010) implied students from higher socioeconomic backgrounds have an advantage over students from lower socioeconomic backgrounds, Harris (2010) differed in a mixed-method study that found low socioeconomic students showed a higher level of learning with a laptop program than students who were from a higher socioeconomic background. Findings showed how the laptops addressed the

digital divide with a positive outcome on learning, environment, and responsibility. The study also revealed other positive outcomes for low socioeconomic students, such as global exposure, empowerment among families and communities through technology, and a broader view of career opportunities. Low socioeconomic students tended to benefit from a one-to-one program (Harris, 2010). This suggestion displayed similarities to a prior study of three schools in California: a largely Hispanic low socioeconomic junior high school, a largely Asian American high socioeconomic K-8 school, and an academically gifted program in a medium socioeconomic elementary school (Grimes & Warshchaer, 2008). The findings revealed the first year of a one-to-one laptop implementation was less effective in the low socioeconomic schools whereas student achievement declined in mathematics the first year and caught back up the second year. The researchers recommended further analysis in support of closing the achievement gap between socio-economic statuses (Grimes & Warshchaer, 2008).

Studies revealed different approaches of the digital divide as it relates to socioeconomic status and technology integration. Howley, Wood, and Hough (2011) studied 500 Ohio elementary teachers from rural and nonrural schools. An analysis of variance and covariance instruments identified the rural schools as higher socioeconomic than the nonrural schools based on free and reduced lunch. Although the free and reduced rates between the rural and nonrural schools varied significantly, the difference in the impact of technology integration on socioeconomic status was non-significant (Howley et al., 2011). Moreover, the study suggested adequate technology and training, positive

attitudes, and administrator support were key factors in the level of effective technology use (Howley et al., 2011).

Although research on digital divide among socioeconomic backgrounds have been scarce in recent years, studies on a digital divide between digital natives and digital immigrants have increased (Lei, 2009; Waycott, Bennett, Kennedy, Dalgarno, & Gray, 2010). Teachers' attitudes and perception about technology integration have an influence on student engagement. To eliminate the digital divide in technology integration a change in perceptions and instructional practices needs to occur.

Transitioning to the Digital Age

The need to maintain a competitive edge in a globalized society is a key focus in education reform and addressing students' need for technical and critical thinking skills. In a report on global competiveness, West (2012) explained how other countries regardless of socioeconomic status are surpassing the United States in producing globally competitive students. A Nation at Risk (1983) implied students are not prepared for future jobs that require problem solving, critical thinking, analytical, and interpersonal skills. These skills are considered essential components of 21st century skills development (Partnership for 21st Century Skills, 2009; Silva, 2008; Wagner, 2008).

Transforming schools into 21stcentury schools requires leaders who can accept changes and challenges by embracing new opportunities. The success of technology integration heavily relies on leaders who can readily implement systemic reform in schools (ISTE, 2012). The National Educational Technology Standards for Administrators (NETS-A) were developed to provide knowledge and guidelines that are

necessary for school leaders to successfully implement technology into their building, but many administrators lack knowledge of the standards. If the national educational technology standards serve as a framework for successful technology integration, the leaders have to be knowledgeable and supportive of instructional technology use (Clausen et al., 2008). The five NETS-A (Appendix A) are as follows:

1. Visionary Leadership
2. Digital Age Learning Culture
3. Excellence in Professional Practice
4. Systemic Improvement
5. Digital Citizenship

Visionary Leadership

In order to teach instructional technology skills students, teachers, school leaders, and district leaders should know and possess many skills (Schrum & Levin, 2009). Support from district and school leaders is crucial in integrating technology into classroom instruction. Effective leadership is the core of a one-to-one initiative in schools. Leadership that supports and promotes a shared vision for technology use greatly influences the outcome of a one-to-one initiative (Peck, Clausen, Vilberg, Meidi, & Murray, 2008). One-to-one leadership involves support, vision, and implementation of digital learning tools and learning is available to each student every day all day (Livingston, 2009).

A one-to-one environment is a noticeable change from the traditional classroom. Administrative and technical support on all levels are crucial in order for this type of

teaching and learning to be successful. Although professional development is a mean of support for teachers, incorporating transitional skills and teaching the content using technology can be a pedagogical nightmare. Since the goals of NCLB continue to focus on mandated standardized tests, digital literacy skills are not receiving the necessary attention for job and career readiness (Wagner, 2008). Principals are already doing so much, especially in low socioeconomic areas and it is important to realize what principals are doing and what is necessary for principals to do for students' preparation for career and college readiness in modern time (Darling-Hammond, 2010). A shared vision is key to professional excellence and a productive learning environment for students (Darling-Hammond, 2010).

To assist teachers and students with integrating technology in the classrooms, it is suggested school leaders model technology use, support professional development, consistently provide resources and support, openly share and communicate expectations and vision of a one-to-one program to stakeholders (Corn, 2009). Synergy is recommended among all stakeholders for a successful one-to-one teaching and learning environment (North Carolina Teacher Evaluation Process, 2009). Shared vision, support, and adjustability are important components of short and long term goals of a successful one-to-one implementation. It is important that instructional staff including principals have the time and professional training to effectively transition from a centralized role to a decentralized role in order to maximize the benefits of technology integration (Drayton, Falk, Stroud, Hobbs, & Hammerman, 2010).

A one-to-one program has the potential to be more effective when there is a shared vision among the leader and the rest of the school. An effective vision will include communication of clear expectations, development of an appropriate infrastructure, and implementing modeling technology consistently. A culture and climate change for all stakeholders is another important objective for a leader of a school. Strong leadership with a shared vision supported by clearly communicated goals is a primary factor in a successful one-to-one program (Bebell & Kay, 2010).

Although technology staff plays an important role in technology integration, principals and other school leaders have the responsibility for effective technology integration throughout the school. It is the responsibility of the building administrators, district personnel, and all educational leaders to move education reform into the digital age (ISTE, 2009-10). In order to experience effective technology use in schools, it is necessary for leaders to be both knowledgeable and supportive of essentials that are crucial for teachers to integrate technology into their instructional practice. A one-to-one program is more effective when a group of individuals take on the role of early adopters to provide support, leadership, and guidance during the laptop implementation (Silvernail & Lane, 2007).

A 4 year quasi-experimental mixed method study of 42 Texas middle schools' one-to-one laptop programs reported that successful schools credited supportive leaders, effective planning, professional development, and buy-in from stakeholders (Shapley et al., 2009). School leaders that had high expectations of teachers' outcomes and ongoing professional development were more successful with teachers' willingness to change

instructional practice. Schools that were not successful in the laptop implementation identified leadership turnover, lack of professional development, improper infrastructure, and lack of commitment as deterrents to the laptop immersion (Shapley et al., 2009).

Past and present studies of one-to-one laptop programs have resulted in a wide range of findings and a variety of lessons. In a study of a one-to-one laptop initiative in Maine, Toy (2008) listed 10 lessons that are crucial for leaders to ensure successful implementation. The 10 lessons learned included modeling of technology by school leaders, consistency and support from leaders, articulating clear expectations, providing effective professional development and resources, selecting early adopters to lead the way, showcasing students' work, and moving the vision forward (Toy, 2008). Selecting a small team of teachers, referred to as early adopters, to motivate and encourage teacher buy-in from all teachers can facilitate technology integration. The early adopter concept is critical in the process of regular and successful use of technology (Schum & Levin, 2009).

Leadership in planning is a crucial part of a successful implementation. In a study of two schools, Lin, Lin, and Huang (2009) found leadership to be a key factor in the difference between the two schools. In the successful school, School A, the principal was supportive and shared in the leadership of the initiative and encouraged a warm and supportive school culture. In School B, which was less successful, the principal used more of a dictatorship style of leadership. The empowerment of a varied well developed planning team is a key factor in determining how effective the principal's role is in technology leadership (Chang et al., 2008).

This section cited literature that explored the importance of school leaders modeling effective technology use, maintaining consistency with support, providing clear communication, supporting teachers through effective professional development, and consistently articulating the educational benefits of a one-to-one laptop program and other technology integration plans. Although some laptop programs were successful, other laptop programs resulted in little to no significance in student achievement. However, in order for school leaders to provide the knowledge and vision of leading a one-to-one program or effectively integration technology in their schools, they must first revise the culture and climate of traditional educators and incorporate skills for a digital learning culture.

Digital Learning and Culture

The increase of technology in education has made teaching and learning different from teaching and learning several decades ago. Many educators are either teaching to or are themselves digital natives. Digital native is a term Prensky (2001) used to describe the generation that is born in the digital era. These digital natives are not aware of the world without cell phones, iPods, and computers. They bring this experience and background with them to school (Harvey-Woodall, 2009). They connect with the world and obtain information through technology. It is the responsibility of educators to meet the students where they are and prepare them for the future by teaching them to effectively use technology to gain information and compete globally.

Technology has changed the culture and the way information is received globally. This generation finds it difficult to imagine the world without technology. Youth are

exposed to technology in their personal and school life. As a matter of fact, there has been a drastic increase of technology in schools in recent years. Although technology tools may be plentiful, effective technology integration still remains lacking in the classrooms (Faulder, 2011). Therefore, it has become a priority for teachers, administrators, district leaders, and technology leaders to develop and share a common vision on integrating technology across the curricula.

With accessibility of technology in most schools, the culture of teaching and learning has changed. Teachers are currently considered facilitators in the classroom, meaning they are no longer the sole provider of learning and knowledge because of the easily accessible digital information. Allowing the learner to take ownership of what is learned is a move toward student centered classrooms and authentic schools (Beetham & Sharpe, 2013). With social media and web 2.0 tools, classroom teachers are somewhat forced into a role of facilitator and students are taking more control of their own learning.

In the age of social media, web 2.0 tools, cloud computing, smart phones, and rapidly development of technology devices that are easily accessible, it is the responsibility of educators to provide students with teaching and learning practices that motivate them to want to learn and gather information. Digital natives desire to become active and engaged learners. Educators are faced with the fact that digital natives desire to become active and engaged learners and it is necessary for teachers to explore how technology can be used for teaching and learning (Mishra & Koehler, 2009).

The global economy is highly competitive and students need new skills to survive in the 21stcentury. Failure to provide students in the United States with the necessary

skills to compete internationally increases the global achievement gap (Wagner, 2008). An effective curriculum for the digital learning transition will enable innovative learning methods that incorporate technology literacy, financial literacy, health literacy, problem solving and critical thinking, and innovation and communication skills (Davidson & Stone, 2009; Partnership for 21st Century Skills, 2009; Wagner, 2008). The curriculum is not textbook-driven or fragmented, but it is thematic, project-and problem-based that is integrated with the use of technologies (Bellanca & Brandt, 2010; Davidson & Stone, 2009). Use of interdisciplinary learning supported by technology integration allows students to construct, apply, and connect to new knowledge and personal experience.

An alliance of businesses, educators, and policymakers designated essential global skills that students need to survive. The Partnership for 21st Century Skills (2009) has grouped these skills into three categories: learning and innovations skills of 4Cs-creativity, critical thinking, communication and collaboration; information and media literacy; and social and career skills-flexibility, adaptability, self-direction, productivity, and responsibility (Partnership for 21st Century Skills, 2009). Technology integration is a catalyst in acquiring these essential skills.

Technology can be used to connect students to the rest of the world making learning more engaging and interesting. When students are motivated and gain meaningful experiences through technology integration, technology can have a positive effect on student achievement (Harvey-Woodall, 2009). The use of technology encourages students to gain academic knowledge and prepares them for the globalized society in which they live (Monke, 2009). Students should take ownership and

accountability for their learning by becoming part of the decision making process in their schools and districts (Hargreaves, 2009).When students and teachers develop the goal for change in schools, the social implication will affect the world in a positive way (Hargreaves, 2009).

In this section, literature has revealed students currently learn differently from students of previous generations. This generation has been tagged with terms such as digital natives, iGeneration, and GenZers. Although teachers traditionally served as the primary source of learning, currently it is necessary for students to play a greater role in the learning environment. As a result of student-centered classrooms, technology integration and change in instructional practices can change the way knowledge is constructed (Christensen, Horn, & Johnson, 2008; Schrum & Levin, 2009). Providing teachers with strategies and techniques that will help them incorporate constructivist principles into the classroom will increase their confidence when using technology for teaching and learning.

Instructional technology strategies. In 2009, 99% of public school teachers had computers or could bring computers into the classroom every day (National Center for Education Statistics [NCES], 2010). NCES statistics show that 95% of these computers had Internet access; however, classroom teaching practices have not changed or improved accordingly (Ertmer & Ottenbreit-Leftwich, 2010; Kelly, McCaine, & Jukes, 2009). When provided effective professional development, teachers can learn to use technology to enhance lesson plans that result in higher student learning (Martin et al., 2010). Technology integration is a pivotal part of transitioning teaching and learning and

teachers have to adjust instructional practices to achieve positive results from technology use (Sugar & Holloman, 2009).

When effective professional development is lacking in the transitional stage of technology integration the change in instructional practices is difficult and presents challenges. When teachers' perception of technology use is addressed and changed through professional development, technology integration is successful in many areas. In a qualitative case study of two middle schools with a one-to-one laptop environment, laptops presented added value as well as challenges to teachers in the areas of online research, communication, productivity tools, and practice drills (Dunleavy et al., 2007). Providing teachers with professional development that changes teacher knowledge and skills ultimately enhances student achievement (Martin et al., 2010).

A lack of high quality professional development that provides effective instruction teaching strategies, classroom management strategies, and content and resource strategies in a one-to-one laptop environment was a major factor for the challenges the teachers faced (Dunleavy et al., 2007). In order for teachers to successfully change instructional practices to include constructivist principles and technology integration, they need to adapt an effective framework. An effective framework would include the main areas of teaching and learning: knowledge of content, communication of the knowledge to the students, and use of technology as a tool for the knowledge and the gateway of the content.

Technology integration has a more positive effect on student achievement and student engagement when it integrates three components: content knowledge,

pedagogical knowledge, and technology knowledge (Koehler & Mishra, 2009).Content knowledge is knowledge of the lesson or subject taught at the given time. Pedagogical knowledge is knowledge of practices and methods for providing the desired outcome of the lesson or activity. Technological knowledge is the knowing how to use technology tools and resources to enhance or support the lesson or activity. Knowledge of the three components has to be seamlessly intertwined to effectively integrate technology into the classroom (Koehler & Mishra, 2009). Mishra & Koehler (2006) described the Technological Pedagogical Content Knowledge (TPACK) framework as an effective model to incorporate the necessary components of effective technology integration. TPACK. Attitudes and beliefs, as well as training and knowledge influence how teachers use technology in the classroom. The goal of professional development reform is to train teachers to successfully transition from the old norm of teaching to the new norm of facilitating (Desimone, 2011). This new norm is teaching with digital resources. Professional development that can provide training for new teaching practices requires a framework that has not only been recognized in literature but has been supported by research (Desimone, 2011).

The TPACK model defines how technology (T), pedagogy (P), and content (C) knowledge (K) work together to provide every area of knowledge needed to support technology integration. The TPACK framework has been used in preservice and in-service teacher training and has been described by many as an ideal professional development model for technology integration (Archambault & Crippen, 2009; Doering,

Scharber, & Miller, 2009; Graham Borup, & Smith, 2012; Harris, Mishra, & Koehler, 2009; Schmidt et al., 2009).

Although TPACK does not dictate a certain content to teach, it is critical for an educator to have teaching experience and a strong grasp of pedagogy and content knowledge (Mishne, 2012). Based on Kolb's (1983) learning theory, Lemke, Coughlin, & Reifsneider (2009) concluded that professional development based on experiences, concepts, and reflection is the most effective. This aligns with the conceptual framework of constructivism. By providing TPACK and targeted professional development, teachers are likely to feel more confident in meeting the needs of innovative learners.

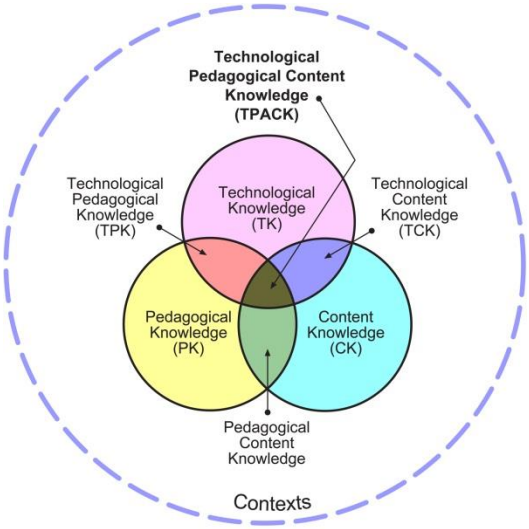
The ideal TPACK framework for professional growth is teacher-centered, embedded and ongoing (Angeli & Valandides, 2009). A four stage qualitative study revealed teachers progressively moved through the first three stages ranging from basic computer skills to lesson planning to technology integration and finally to effective pedagogical strategies (Schibeci et al., 2008). It took additional high quality professional development to reach the final stage. The study revealed that teachers need continuous training and support to integrate technology into instructional strategies. TPACK produces a technology integrated environment that focuses on teaching and learning with technology and not the technology itself (Donnelly, McGarr, & O'Reilly, 2011).

In a case study on the TPACK framework, Mouza and Wong (2009) found this suggestive process to be true. Data collected from case narratives from five in-service teachers, along with online discussions and interviews revealed that case developments

allowed the teachers to understand the relationship between technology, content, and pedagogy and turn their understanding into instructional practices.

The large disparity seen in technology integration happens when teachers have only some of the knowledge in the three domains (Koehler & Mishra, 2008). TPACK is comprised of six sub-domains: (a) content knowledge (b) pedagogical knowledge, (c) pedagogical content knowledge, (d) technological knowledge, (e) technological content knowledge, and (f) technological pedagogical knowledge. Figure 1 shows the TPACK model.

Figure 1: Technological Pedagogical Content Knowledge (TPACK) Model



Note. From "Technological pedagogical content knowledge: A framework for teacher knowledge," by P. Mishra and M. Koehler, *Teachers College Record, 108,* pp. 1017-1054. Reproduced by permission of the publisher, © 2012 by tpack.org

Content knowledge (CK) is knowledge about a specific curriculum area. Pedagogical knowledge (PK) is knowledge based on concepts and methods of effectively delivering and receiving lessons and information for educational purposes. Archambault and Crippen (2009) surveyed 596 K-12 online teachers to find out teachers knowledge

and understanding of the six components of the TPACK model individually and the TPACK model has a whole. The survey approach served as a good measuring instrument to determine teachers' self-assessment of TPACK (Schmidt et al., 2009; Archambault & Crippen, 2009).

Intense knowledge of the content and pedagogical knowledge are primary factors while knowledge of technology use is secondary to successful technology integration (Harris, Mishra, & Koehler, 2009). The different types of knowledge specified in the TPACK model are influenced by background, socioeconomic status, culture, and school climate factors (Harris & Hofer, 2011). An interpretivist study of a group of secondary social study teachers revealed TPACK changed instructional planning in ways that (a) improved the type of learning and technologies used for teaching, (b) transitioned learning from teacher-centered to more student-centered, and (c) increased the use and quality of technologies (Harris & Hofer, 2011).

Although studies have been conducted in attempt to explain, understand, and measure the framework of TPACK, future studies are necessary to give more insight on the overall effect it has on technology integration. Effective technology integration is a priority in education and the investment necessary to accomplish it is steadily increasing. Educators are accountable for students' preparation for global competitiveness; therefore technology education remains a pivotal part of teachers' development.

Web 2.0 tools. The term Web 2.0 was first used in 2004 and referred to the second generation of the Internet (Schrum & Levin, 2009). Web 2.0 is used as a technology tool that designs the World Wide Web into a facility of creativity, information

sharing, and collaboration among users. This new development is a revision in the ways end-users use the Web, it is not an update to technical specifications of the Web. Web 2.0 is web-based software such as blogs, wikis, media sharing sites, voice threads, as well as other social networking sites.

Integrating digital tools, such as Web 2.0 tools into classrooms can improve teaching and learning. There are six goals that educators need to focus on when transforming technology instructional practices. The goals are (a) increasing student achievement, (b) increasing student engagement, (c) increasing the quality of education, (d) recruiting and retaining high quality teachers, (e) increasing parental and community involvement, and (f) increasing accountability for student learning (Zucker, 2009). In determining how technology can achieve these goals, educators are responsible for changing instructional strategies to effectively transform schools. Web 2.0 tools are increasingly becoming a technology tool of choice and can assist students in reading, writing, and critical thinking (Dede, 2009; Owston, 2009; Zhang, 2009). These technologies are highly engaging and can have a positive impact on reading and other student outcomes (Leu et al., 2009).

The upgrade of Web 1.0 tools to Web 2.0 is described as an advancement that allows users, not just owners, to edit and collaborate online (Handsfield, Dean, & Cielocha, 2009). Web 2.0 includes social networks, such as Myspace, Facebook, and Ning; media sharing, such as YouTube, TeacherTube, Google Apps; social bookmarking, such as Delicious, Diigo, Blinklist, and others; wikis, such as Wikipedia; creative works, such as podcasts, video casts, blogs, and micro

blogs (e.g. Twitter, Blogger); content aggregation and organization, such as Really Simple Syndication (RSS) feeds and other unlimited combination of resources.

Teachers can expand on their personal knowledge through Web 2.0 practices by modeling these practices in the classroom (Greenhow, Robelia, & Huges, 2009).Web 2.0 technologies decentralize information and make it easily accessible among users. Although using Web 2.0 tools can prove beneficial, Ulrich et al. (2008) and Angeli (2008) cautioned teachers to consider other factors before reconstructing a classroom into a total Web 2.0 classroom. A Web 2.0 classroom without strong classroom management can result in chaos with little learning taking place.

When educators identify and adjust the strengths and challenges of Web 2.0 tools into their instructional strategies, the digital tools can effectively serve as a motivating, productive, and creative resource for students and teachers (Zhang, 2009).There is a need for further research identifying student collaborative creativity and teacher learning and innovation; designed-based research to produce sustained improvement in pedagogy and technology (Greenhow et al., 2009).

Web 2.0 represents a fast growing and fast changing complexity in education technology. The majority of Web 2.0 tools are free, web-based, and easily accessible to anyone with a computer and Internet access. These tools can be used to promote collaboration, interaction, and creativity. Teachers are recommended to incorporate Web 2.0 tools into their curriculum and educate colleagues and students on new creative ways

of learning. Teachers use Web 2.0 tools to blend current teaching methods with digital teaching methods (Owston, 2009; Zhang, 2009).

Some researchers view Web 2.0 tools as an old approach to a new innovative way of learning and others see Web 2.0 tools as an entirely new approach to a new innovative of learning. McGee and Diaz (2008) argued that Web 2.0 technology is an option to actively engage learners and allow the learner to build on prior knowledge. Some researchers believe Web 2.0 is a new approach to an old way of teaching and others believe it is a completely new innovative way of engaging and teaching students (McGee & Diaz, 2008).

Researchers believe Web 2.0 tools can be used to increase student engagement by making students producers of their own work (Martin, Diaz, Sancristobel, Gil, Castro, & Piere, 2011).In a mixed method study on the effect of Web 2.0 tools on student achievement, Malhiwsky (2010) found that Web 2.0 tools had a significant impact on how students in a Midwestern community college learned Spanish. Findings also revealed Web 2.0 technologies increased the cohesiveness of the learning community in courses that Web 2.0 technologies were integrated. Findings also revealed no significance in some relationships when students with integration of Web 2.0 were compared with students without integration of Web 2.0.

It is obvious that Web 2.0 technologies play some role in teaching and learning in the classroom. However the measures of effect Web 2.0 tools have on student learning outcomes remain questionable. The research continues to explore how Web 2.0 tools can

be effectively incorporated in the classroom and how the diverse new needs of teachers can be addressed to increase confidence and collective structure in pedagogical strategies.

Although educators have the responsibility of optimizing student learning, the responsibility for high quality professional development, continuous support, and unconditional guidance rest on stakeholders involved in visionary leadership. Research continues to find indicators that contribute to lack of effectiveness in technology integration including availability of resources, technical support, teacher readiness, teacher beliefs and attitudes, and professional development (Lowther et al., 2008; Guzman & Nussbaum, 2009; Probert, 2009).

Excellence in Professional Practice

Efforts to prepare students with skills to compete in a digital economy require technological literacy, but many teachers are not prepared. They are inhibited by historical models of education and epistemological beliefs that leave them reluctant to integrate educational technologies in their content instruction (Dunn & Rakes, 2010; Mouza & Wong, 2009). Change in instructional practices with use of technology is necessary before effective technology integration can yield positive outcomes (Reed-Swale, 2009; Hicks, 2013; Keengwe & Onchwari, 2009).

Researchers have found that most technology placed in classrooms is not being used to improve the quality of instruction (Inan & Lowther, 2010). Because teachers have not been trained to effectively transition from traditional teaching to digital integration, technology integration is not used effectively for student engagement and student achievement (Inan & Lowther, 2010).

Professional development. Research showed that professional development is a major supportive part of effective technology use (Ertmer, Ottenbreit-Leftwich, & York, 2007; Glover et al., 2007). Researchers reported many reasons why a great deal of technology professional development has been ineffective. Some of the reasons are: training on unfamiliar equipment, focus on the hardware and software, but not the integration into instructional curriculum, lack of connection to students' and teachers' needs, and no shared vision (Lawless & Pellegrino, 2007).

The teacher's role in technology integration is a significant factor in preparing students to compete in a global society. The teacher has to deliver lessons that are engaging and meet students at transformational learning. The teacher has to have knowledge of the content, how to deliver the content, and how to use technology to do so. In other words, the effectiveness of technology integration should include knowledge of technology use, knowledge of pedagogy, and knowledge in content area (Tamin et al., 2011). It is necessary that teachers know how to use technology to teach students and to reach students at their learning level (London & Draper, 2008).

The context or surrounding circumstances of teaching and learning plays an important role in how students learn (Holbrook, 2010), therefore professional development for technology use in the classroom is more effective when the training is structured to the teachers' content area (Edelson, 2001). Professional development is an agent for changing views, attitudes, beliefs, and other barriers that interfere with technology integration (Ertmer, Ottenbreit-Leftwich, Sadik, Sendurur, & Sendurur, 2012; Summak, Samancioglu, & Baglibel, 2010; Kim, Kim, Lee, Spector, & DeMeester, 2013).

The importance of professional development on teacher practices is so critical that it was emphasized in the National Educational Technology Plan by policy makers in the U. S. Department of Education's Office. A statement in the plan reads, "Episodic and ineffective professional development needs to be replaced by professional learning that is collaborative, coherent, and continuous" (U.S. Department of Education, 2010, p. xii). Policy makers recommended that all new educational technology implementation follow a repeating cycle of blended professional development, observation and assessment, and improvement.

The National Staff Development Council (NSDC, 2009) reported that in 2003-2004 only 14 percent of teachers believed professional development in educational technology is important. By 2009, 61 percent of teachers believed that professional development activities helped prepare them to use technology effective for instruction (National Center for Educational Statistics, 2009). Professional organizations, such as National Education Association (NEA) and the National Staff Development Council (NSDC), made progress by providing quality professional development opportunities for teachers.

The NSDC provided standards and recommendations for planning and implementing professional development plans for both schools and districts (Roy, 2010). Standards for Professional Learning (2011) replaced the term *professional development* with the term *professional learning* to emphasize assertive steps necessary in actively changing instructional practices. Mizell et al. (2011) described the standards as characteristics needed to become facilitators of learning. Teachers require training to

successfully transition from the center of the classroom to the facilitator of the classroom. In order for this change to take place, instructional practices have to be modified and restructured through ongoing professional development.

Schools in Texas that experienced less effective implementation of one-to-one programs indicated frequent changes in trainers and low level teacher participation in professional development during and after school. The focal point of the professional development was more on the technology tool itself rather than how to integrate the technology into the curriculum (Shapley et al., 2008). Similarly, teachers in Pennsylvania and North Carolina also felt that the lack of the ongoing professional development was an obstacle in successfully implementing the laptops, as well as lack of opportunities to collaborate with other teachers (Corn, 2009; Peck et al., 2008).

Although most research findings reported that lack of technology integration with one-to-one laptop implementations resulted from ineffective professional development (Hsu, 2010; Levin & Wadany, 2008; Mouza & Wong, 2009), some studies showed how effective professional development contributed to successful implementation of one-to-one implementations (Inan & Lowther, 2010; Kopcha, 2012; Rosen & Hill, 2012). In a study of a one-to-one professional laptop program, findings revealed that the 220 hour professional development changed teaching and technology practices. The change in teaching styles had a positive effect on student performance on standardized mathematics tests (Silvernail & Buffington, 2009).This finding supports the argument that professional development that is guided by a regularly scheduled plan of action and sustainability is more effective than irregularly planned professional development.

Findings from the evaluation studies in Texas reported that a successfully structured professional development framework was a significant factor to a higher level of implementation. These schools gave higher priority to professional development days, teachers' needs, and accountability of implementation (Shapley et al, 2008). Professional development had become a major part of educational reform.

It has been suggested that the term "educational reform" can be substituted for the term "professional development" (Desimone, 2009). Effective professional development is crucial in the success or failure of education reforms. *Effective* professional development is "that which results in improvements in teachers' knowledge and instructional practice as well as improved student learning outcomes" (Darling-Hammond, Jaquith, Mindich, & Wei, 2010, p. 2). The word *effective* has been defined as teachers' continuation of using what they have learned one year after learning it (Meltzer, 2012). Effective professional development is crucial in the success of education reforms.

As part of an educational reform, the United States Department of Education (2010) called for "new assessment systems [that] is to capture higher-order skills, provide more accurate measures of student growth, and better inform classroom instruction of response to academic needs" (p. 4). The federal government emphasized the importance in reaching goals of educating students and upholding accountability for student learning. Improving technology integration and mastering technical and digital skills are key focal points to raising the bar on student learning (Almond et al., 2010).

Systemic Improvement

With the emergence of the digital learning transition, an increase in globalization, and the technological era, the need for systemic improvement to provide students with skills is vital for success of students and the future (Bellanca & Brandt, 2010; Trilling & Fadel, 2012; Wan & Gut, 2011; Zhao, 2009). Although the definition of 21st century skills covers a broad set of knowledge skills, the Partnership of 21st Century Skills (P21) developed the most extensive framework of essential skills (see Appendix B) for success in the digital age (Bellanca & Brandt, 2010). The rapid advancement of the information age and globalization has made education reform an important part of the 21st century framework.

Systemic improvement is an ongoing process that changes frequently, however policy holders and education leaders are faced with the urgency of transforming traditional education to a suitable framework for modern day teaching and learning (Bellanca & Brandt, 2010; Fullan, 2009; Ziegenfuss, 2010).The advent of technology use in education is useful as an assessment method of accountability in education (Clarke-Midura & Dede, 2010). Technological changes that can increase the accessibility of information and communication can also provide possibilities to raise student achievement and provide students with required skills (Bonk, 2009; Collins & Halverson, 2009; Kolikant, 2010). Currently, schools are lacking in providing students with an education that can make this challenge possible (Wagner, 2010).

In an effort to make the U.S. more competitive in the areas of science, technology, engineering, and math, policy holders launched the STEM program (Sabochik, 2010).

The U.S. Department of Education also implemented a “Race to the Top” initiative in schools to promote academic progress and innovative skills, and knowledge for career and college readiness (Duncan, 2010). Principals, teachers, government leaders, National Governors Association, and the Council of Chief State School Officers developed standards referred to as “common core state standards” (National Governors Association Center for Best Practices, 2010).

The majority of the states have adopted the common core standards that are directed toward preparing students for college or a career. Although there are critics of the common core state standards, national supporters believe the common core standards are rigorous and relevant principles that are designed to prepare students for college or a career by reflecting the common skills that all students need for success and competitiveness (Duncan, 2010; National Governors Association Center for Best Practices, 2010).

Digital Citizenship

Since technology integration is a major component of systemic improvement, district and school leaders share in the responsibility of providing students with policies and procedures that address legal, ethical, and safety use of technology (Garland, 2009). When technology devices are available in schools, it is the role of school leaders to provide equitable access to each student regardless of disabilities, gender, or economic status (Garland, 2009). Promoting digital citizenship is important for successful technology integration.

Digital citizenship is one of the national technology standards that explains and emphasizes the importance of properly using technology in a technology driven world. Technology is frequently misused, but much of the misuse or abuse results from lack of knowledge of how to properly use and interact with technology. It is important to learn and know the appropriate use of technology etiquette. There are many behaviors that are addressed by digital citizenship ranging from misuse to abuse. When parents and teachers fail to educate students in digital citizenship awareness, illegal and unsafe incidents tend to increase (Hollandsworth, Dowdy, & Donovan, 2011).

The Internet can serve as a good source for learning and a good information resource, but the same Internet can also be a world of danger if cyber bullying and other digital citizenship topics are not addressed (Weigel, James, & Gardner, 2009). It is important that students are taught proper guidelines and protocol while becoming technological literate. Technology is an extensive part of students' lives and youth are more engaged in technology use than youth of previous years (Weigel et al., 2009).

Digital citizenship is a comprehensive approach to teaching and learning about student safety, technology as tool, and ethical and legal behaviors (Hollandsworth et al., 2011). Digital citizenship is as necessary as other forms of technological literacy. Furthermore, digital citizenship is the concept of understanding and knowing how to use the appropriate technology to communicate, collaborate, create, and consume information in a responsible way (Common Sense Media, 2009).

Literature Related to Qualitative Case Studies

Technology integration in schools has become ubiquitous; therefore, training teachers and students to effectively apply it in teaching and learning is unavoidable. These changes affect many different levels ranging from individual classroom, school as a whole, district, state, and national levels. A case study is an investigation of an occurrence where the boundaries of that occurrence are not clear or obvious (Yin, 1994). There are three types of case studies: single case study, multiple case study, and intrinsic case study (Creswell, 2007). A single case study focuses on one concern and selects a confined study to investigate and explain the outcome (Stake, 1995). A multiple case study uses several concerns from several sites or several concerns from one site to investigate or explain the outcome of one issue. This selection is often made to show different outcomes of the same issue. Multiple case studies that occur over a period of time result in rich context results. The third type of case study, intrinsic case study, focuses only on the case itself (Stake, 1995).

Qualitative case study is a study of a person, setting, or issue that is bounded and occurs over a period of time (Yin, 2003, Creswell, 2007, & Merriam, 2005). Patterns and themes emerge from data collection causing predetermined thoughts to be disposed or modified. Qualitative research draws from experience of the participants through observations conducted in the natural setting and interviews. Teachers' perceptions and beliefs occur over a period of time and are sometime caused by their environment. In a case study of twenty three elementary teachers, Young (2012) collected data from open-ended questionnaires and interviews. Four common themes emerged from the data

revealing barriers that prevented teachers from effectively integrating technology. The teachers perceived students' lack of technology accessibility, lack of ongoing professional development, lack of technical support, and lack of appropriate infrastructure as barriers for technology integration in information age learning goals.

Qualitative case study is often used for action research (Given, 2008). Given (2008) further explained this action by stating "everyday things in life are unpacked by engaging stakeholders in a deeper understanding of their experience" (p. 22, para 5). In such case studies, the researcher's goal is to use experiential knowledge to produce knowledge that can be used directly to the issue. The researcher may choose to look at the themes of the case as positive or negative to determine possible solutions to the problem. A case study can be used as an object of study or a product of inquiry. As an object of study, the method is usually a single or multiple case study, whereas, a product of inquiry case study is a descriptive case study (Given, 2008).

According to Thomas (2003), when an event, person, or group is studied in its natural setting, the case study can sometimes offer an understanding or explanation to why the event, person, or group behaves in a certain manner. Therefore, a qualitative single case study approach is appropriate to understand teachers' perceptions of professional development and technology integration by using interviews, observations, and field notes to collect data. As a result of the study, one can expect to gain a clearer understanding of why teachers' level of technology integration range from nonexistent to ineffective to effective by answering the research questions found in previous sections.

From the study, further research is commonly necessary to extensively and fully reflect on issues that develop from the study at hand.

In support of Thomas's (2003) epistemological theory, a case study examined experiences of secondary teachers in England that provided professional development sessions for groups of student-teachers. The data revealed that the teachers providing the professional development planned their sessions by using their personal experiences and knowledge to connect with the student-teachers (White, 2013). The constructivist approach used in the professional development sessions helped the professional development trainers empathize with the teachers. Transitioning from teacher to professional development trainer is compared to moving from a master in one field to a novice in another field. The study revealed that constructivist socialization and professional training are key factors to awareness and understanding needs of a learner (White, 2013). The epistemological philosophy of how prior knowledge affects new knowledge can be the concept used to train teachers how to effectively teach and learn with technology.

Literature Related to Mixed Methodology

The review of literature included qualitative, mixed-method, and quantitative research on technology integration and one-to-one digital conversions. Quantitative methods can be used to test specific interventions, but may not explain why things and behaviors occur (Givens, 2008). Quantitative methods are commonly used in social sciences such as education, psychology, and other health fields. Baxter & Jack (2008)

stated that when quantitative method is applied correctly, it provides social science research with interventions, programs, and theory.

In a quantitative study of five public and middle schools in Massachusetts, Bebell and Kay (2010) revealed that a one-to-one laptop program led to measurable teaching and learning practices, student achievement, and student engagement. The researchers used a pre and post comparative study design to triangulate data from a 3 year study of qualitative data collected from interviews, classroom observations, teacher and student surveys, student artifacts, and test scores. The study measured how teaching and learning practices changed after laptops were provided to students over a three year period. There was a variation in the deployment date and other factors among the participating schools.

In a mixed method study, Zook (2012) investigated how technology was used after the school was rewarded a grant that provided whiteboards, laptops, and other technology. Zook (2012) used the National Educational Technology Standards as the conceptual framework to guide evaluation of teachers' use of technology. Quantitative data were collected using the Concerns Based Adoption Model's Stages of Concern Questionnaire and qualitative data were collected using the Levels of Use basic interview protocol. Zook (2012) explained that the mixed method approach was selected to strengthen the results that may have developed from the methods if used individually. The participants were given surveys to collect numerical data on teaching experience, technology professional development, and technology use. The study revealed that teachers used the technology throughout the grant but technology professional development was discontinued.

In another mixed method study, Maninger and Holden (2009) collected quantitative data from nonparticipant classroom observations and teachers surveys. The quantitative data from classroom observations revealed the statistical data representing the number of minutes computers were used during a 55 minute session. Qualitative data were collected from teacher interviews. The participants included 15 teachers, 106 students, and 17 classrooms from a private K-8 school in southwestern United States. Data from the observations showed the students worked together as a whole class or students work individually the majority of the class time. Teachers served as facilitators of learning by directing and coaching the whole group. Teachers reported the students worked together and helped each other with software and hardware that was possible through the one-to-one laptop integration. Teachers also expressed that the collaboration allowed students with learning difficulties to blend seamlessly into the learning process. Teachers credited the Internet as an additional source of information that would not been easily accessible without the laptops. The teachers reported that the laptops made them more effective facilitators which in turn made the students more effective learners individually and collaboratively.

A case study may be used to investigate research questions that are general in the beginning to get a spectrum of evidence that is specific to research setting (Graham, 2010). This evidence is collected, analyzed, and interpreted to get the best possible results for the questions.

Summary

This section of the study was essential in providing academic research that provided access to vital components of effective technology integration: one-to-one laptop programs, visionary leadership, digital age culture learning, professional development, and digital citizenship. The section compared and contrasted findings from prior research on one-to-one laptop and instructional pros and cons of technology integration. Research literature commonly identified culture, beliefs, and ineffective training as barriers to technology integration. Constructivist learning has its roots in learners' prior knowledge, beliefs, and experiences, therefore it seemed logical to consider the constructivist approach as a model for effective technology professional development.

Section 3: Research Method

Introduction

The purpose of this case study was to explore the perceptions of teachers in HMS and HHS in integrating and enhancing instructional technology practices in a one-to-one classroom through professional development. In the study, I focused on beliefs, perceptions, and professional development. Through this study, I attempted to identify ways to increase effective technology integration in the classroom.

In this section, I describe the research design that is used in this study. The section also includes a summary of the rationale for the research design, research questions, conceptual framework, measures of ethical protection, procedures, role of the researcher, participants selection procedure, data collection, data analysis, and validity of data.

A qualitative case study was used to collect and analyze data from a group, person, issue, or program over a period of time to gain understanding from emerging patterns or themes (Creswell, 2003). Data were collected from two schools: HMS and HHS. The data from the two schools were combined, not compared for a single case study, to incorporate the vertical alignment among Grades 6 to 12. The decision to select a single case study rather than a multicase study was based on the understanding that the entire district is in the beginning stage of technology integration. The study included interviews from teachers, principals, and technology personnel from HMS and HHS. Classroom observations of teachers in the pilot laptop implementation from both schools were also conducted for data collection.

Rationale for Research Design

A qualitative approach is often used in studies to develop a greater understanding of a problem (Creswell, 2009). Qualitative design allows participants to interpret and use prior experiences (Merriam, 2009). The theory of constructivism as a framework for effective technology integration and effective professional development served as a prime factor in deciding on a qualitative design. Education is constantly changing; therefore, qualitative research seemed more appropriate in allowing for multiple interpretations of the changes in education and technology (Merriam, 2002).

In determining the appropriate research design, I wanted to understand the holistic context of the problem by exploring the climate, culture, and pedagogical styles of teachers in HMS and HHS. As I reflected on the problem, reviewed literature as it related to the problem, and desired to understand what effect professional development had on the problem, I decided on a qualitative research design. The qualitative research method allowed me to explore the participants' feelings and perceptions in order to understand how technology related professional development can affect technology integration for HMS and HHS.

A case study was an appropriate approach to use since I reviewed the current use of technology integration, professional development, and complex relationships surrounding them (Shen, 2009). Merriam (2002) stated that a case study can be determined by the unit of analysis. In this study, I analyzed a specific group in an early adopter program at two local schools and data were collected from interviews and observations. The case study method was appropriate for "how" and "why" questions

(Yin, 2009). The social behaviors examined in this study included reasons why teachers were willing or reluctant to implement technology into the classroom. Yin (2009) further stated that case studies have been used on research "about decisions, programs, the implementation process, and organizational change" (p. 29). In this study, I wished to disclose insights and interpretations rather than to control specific variables or test a hypothesis (Merriam, 2009; Yin, 2003b).

The qualitative approach was the design of choice because the results were descriptive whereby knowledge was translated "through words, documents, interviews, and observations" (Merriam, 2002, p.8). Qualitative design was selected over other research designs because (a) the researcher was the primary data collector, (b) a descriptive outcome provided others with a better understanding of the study, (c) it offered an opportunity for inductive research strategies, (d) it provided a deeper understanding of participants, and (e) it provided meaningful insights in modifying technology related professional development at HMS and HHS.

Quantitative instruments, such as surveys and experiments, were considered for data collection, but responses did not allow for necessary data to develop a deep understanding of participants' beliefs and perceptions in relevance to technology integration in the classroom. Qualitative research was the design of choice because it allowed for in-depth conversations that led to a descriptive narrative of findings.

Research Questions

The general questions of this study centered on the perceptions and beliefs of teachers at HMS and HHS related to technology integration in their classroom. The study was not limited to the perceptions and beliefs of the teachers but also sought to understand how professional development factored into technology integration into the teachers' classrooms. The first and second research questions focused on the perceptions of teachers at HMS and HHS and the one-to-one classrooms. The first examined the effectiveness of integration and the second was used to understand "what" and "how" professional development served as a component of effective technology integration in the classroom. The third research question helped explore and compare the perceptions of the, principal, instructional coach, and technology facilitators regarding effective technology integration in the classroom. The research questions were as follows:

1. What are the perceptions of teachers at HMS and HHS about effectively integrating technology in a one-to-one classroom?
2. What are the perceptions of teachers at HMS and HHS about effectively integrating technology in a one-to-one classroom?
3. How have teachers at HMS and HHS integrated technology in a one-to-one classroom?

Context for the Study

HMS and HHS are located in a rural section of the southeastern United States. To provide confidentiality, the school district and the two schools in the study were identified with pseudonyms. Because of the socioeconomics, culture, and size similarities of the two schools, a single case study rather than a multiple case study provided a broader representation of the district. Another indicator contributing to the choice of a single case study was that the students of HMS proceeded to HHS upon completion of eight grade. The two schools combined included a total of 900 students, 70 classroom teachers, two principals, and two assistant principals. HMS had 400 students in Grades 6 to 8. HMS had one principal, one assistant principal, two instructional coaches, one technology facilitator, and 30 classroom teachers. HHS served approximately 500 students in Grades 9 to 12. HHS had one principal, one assistant principal, four instructional coaches, one technology facilitator, and 40 teachers. Approximately 96% of the students are African American, 1% White, and 3% Hispanic. Both schools had 100% of the classrooms connected to the Internet. There was an interactive white board in every classroom at both schools. Each teacher and each student at both schools had access to an individual laptop.

Measures for Ethical Protection

As the researcher, I requested permission from the principals of both schools followed by Institutional Review Board (IRB) approval from Walden University before beginning actual study. I successfully completed a Human Research Protections training

module and Research Ethics Review Application and received a certificate of completion. After approval was granted, I requested an appointment with the Superintendent of Hometown District to notify her of approval to begin research. Following IRB approval and the superintendent's affirmation, the potential participants were contacted and emailed a consent form. The participants were notified of the right to discontinue participation at any time.

A coding process to protect confidentiality of the participants was used in all data collection. Computerized documents were stored on a secure external hard drive and password protected. Audio and visual devices and recordings were locked and secured when not in use. Member checking was used to validate transcripts, recordings, and preliminary findings. All data collected during the study was securely locked and protected until study was complete and published.

Role of the Researcher

I served as the primary collector of data at the two sites in the study. I was employed in the position of instructional technology facilitator at HHS. The role of the technology facilitator was to collaborate with the teachers on infusing and integrating technology into the curriculum. This role had no supervisory influence or responsibility over any of the teachers. Prior to that current position, I held the positions of the distance learning advisor and the school test coordinator, respectively. I was employed by HSD for 12 years. Prior to employment at HHS, I was a career and technical teacher at HMS.

During my tenure at HHS, teacher and administrator turnover rate was extremely high, thereby rendering me as one of the few veteran employees at HHS. In the years

employed by HSD, I did not serve in a supervisory role as it relates to potential participants. Although I worked with teachers to assist with technology integration and make classroom visits, I did not provide feedback to administrators for evaluation purposes. The purpose of my observations and classroom visits was strictly for support, assistance, and collaboration with technology integration.

Before conducting observations and interviews, I examined my own preconceptions and beliefs about technology integration and professional development. Although having certain objectives and goals for technology integration for HSD, I realized that personal feelings and biases can misrepresent participants' responses (Rubin & Rubin, 2005). I determined how my feelings could distort the research and then recorded several questions that could offset my biases. I continued to read questions and ponder over potential instances that could produce personal bias. I focused on remaining neutral and separating my personal feelings from my professional feelings while conducting interviews and collecting and analyzing data.

The professional role of the participants connected them culturally giving them certain commonalities that built trust and relationships. I had a rapport of professional nature with each of them and believed that all participants had a high level of trust in me and that trust was reciprocated. After thanking the participants for volunteering for the study, I acknowledged the signed consent forms and reviewed the purpose of the study with the participants. I explained the purpose of member checking to the participants.

Participants

Since professional development was a key indicator of effective technology integration and the two schools had plans of a school wide one-to-one conversion, the participants were purposely selected. The participants included the following staff from HMS and HHS: one principal, one technology instructional coach shared between the schools, one technology facilitator from each school, and eight teachers (HMS = 3; HHS = 5). The sample size included 12 participants that represented teaching and nonteaching instructional staff of the one-to-one laptop pilot. Pseudonyms were used to ensure confidentiality. The teachers were coded as HMTeacher1 (HMT1) through HMTeacher3 (HMT3) for HMS's teachers and HHTeacher1 (HHT1) through HHTeacher5 (HHT5) for HHS's teachers. The one principal and technology personnel were coded with school specific pseudonyms as well. The participants were purposely selected because of their relevant contribution to the one-to-one laptop program and they could inform and enrich an understanding of the research problem (Creswell, 2007). Among the 12 participants, HMS represented Grades 6 through 8 and HHS represented Grades 9 through 12. Teachers from both schools represented core content courses, career and technical education (CTE), and an elective (Advancement via Individual Determination).

Data Collection

Data collected from face-to-face interviews, classroom observations, and field notes from observations were used to answer the three research questions (Table 3). Face-to-face interviews, classroom observations, and field notes were qualitative methods that gave me firsthand experience with the participants. Perceptions and technological use

related to the one-to-one implementation in the classroom were investigated and understood in its natural setting (Creswell, 2003).

Face-to-face interviews and classroom observations included field notes conducted at the respective school of the teachers that provided an understanding of how technology integration was perceived and used in a one-to-one classroom (RQ1, RQ3). To provide deeper insight of how technology was integrated in the classrooms, interviews were conducted with the principal and technology personnel from HMS and HHS (RQ3). Face-to-face interviews with the teachers provided information about professional development and the impact it has on classroom instruction (RQ2). Each participant was sent a consent form with an explanation of the study.

Observations

The classroom observations allowed me to observe the teachers' interactions and behaviors in their natural setting. Field notes were taken during observations that provided additional data that enriched the findings. Observations of the teachers' interaction with technology and interaction with their students lasted 45 to 60 minutes of a class period. The classroom observations provided insight to Research Question 3: How have teachers at HMS and HHS integrated technology in a one-to-one classroom? Teachers were notified by email or face-to-face about scheduled classroom observations.

Technology professional development was scheduled to take place twice a month during teachers' prospective planning periods at both of the schools. Two classroom observations per teacher at each school were conducted. An observation was scheduled at

the beginning and the end of a 6-week grading period. A reminder was sent to teachers a week prior to each observation.

The observations allowed me a firsthand experience in identifying how teachers integrated technology in the classroom. Field notes comprised from open-ended items, a component of the LoFti instrument, were taken during classroom observations. The field notes were coded according to classroom observations to examine emerging themes. Teachers were informed of future face-to-face interviews.

Interviews

The purpose of case study interviews was to understand why and how the teachers perceived technology integration and technology professional development in a one-to-one classroom. Interviews were used to clarify and understand in more details the teachers' perceptions of technology integration in the classroom (RQ1). Interviews were scheduled during each teacher's planning period in the teacher's classroom.

The purpose for the interviews with the principal, instructional technology coach, and instructional technology facilitator was to obtain information from an administrator and professional development trainer's perspective on how teachers used technology in a one-to-one classroom and what support was needed for effective technology integration (RQ3). The nonteaching staff provided insight from regular observations and walk-throughs conducted throughout the school year. Interviews with the principal and technology personnel were scheduled to take place at a convenient time at the respective school.

The interview protocols (Appendices G and H) were guided by the purpose of this specific study; however, some of the interview questions were adapted from Bryant's (2008) questions and used by permission (Appendix I). The main questions were constructed to encourage the interviewee to discuss experiences and activities related to technology integration and professional development. Prior to beginning the interview, I requested the participant's permission to audio record the interview. I informed the participant that the interview would last about 45 to 60 minutes. By attentively listening to the answer of each question, I looked for opportunities to ask follow-up questions to provide rich descriptive narratives. To ensure proper interview techniques, I was cautious of nonverbal gestures and body language to limit any influence over the participants' responses.

Data Analysis

The goal of data analysis is to explore and generalize the findings within the context of the study (Yin, 1994). In the study, I focused on the implementation of a one-to-one laptop program, perception, beliefs, and attitudes of the teachers about the laptops, and addressing those perceptions, beliefs, and attitudes with excellence in professional development. Data collected from the nonteacher interviews were coded to gain insight into how the administrators and lead technology staff's (instructional technology coach and instructional technology facilitator) perceptions of technology integration in a one-to-one classroom compared with the teachers' perceptions. Qualitative researchers use codes or categories to sort data and develop patterns or themes in a more visual manner (Creswell, 2007). I read through participants' responses to the interview questions, made

notes, and sorted data into categories. While continually reflecting on data, I color-coded data according to the categories. I began with a broad list of codes that developed into more specific themes. I gathered the data into a categorized table. I reviewed the table and took notes to see if there were any themes emerging from the data. I used a similar coding process for classroom observations and notes taken during observations. The color-coding process was used to take further notes. I reviewed transcribed interviews. Themes from the observation data were placed in a separate table that was later compared to themes developed from the interviews. Notes were taken and recorded in a journal. The coding process were adjusted and recorded when necessary.

Validity and Reliability

According to Creswell (2003), validity outweighs reliability in qualitative studies. There are eight strategies used to implement a valid qualitative study (Creswell, 2003). Several of those strategies were used in this study. Those strategies included (a) triangulation of data, (b) member checking, (c) rich descriptive findings, (d) prolonged time in the field, and (e) role of researcher. Triangulation of the data strengthened the reliability of research findings. In addition, themes were combined, refined and reviewed in person with the participant's verification. The participants were sent their respective data along with preliminary analysis in electronic form for validation and they were requested to add, delete, or clarify statements and comment on the preliminary analysis. As the primary researcher, I developed a trustworthy relationship with the participants. Data were collected and analyzed in an ethical manner. My relationship with the participants over the time period of the study was cordial and professional in nature. This

rapport ensured the participants of my genuine interest in helping them effectively integrate technology with ongoing quality professional development. I frequently reflected and managed personal biases to further validate findings.

Additional methods that ensured validity and reliability included the process of conducting interviews with digital recording, transcribing by hand, and checking transcripts for accuracy. Documenting the step by step process in a journal and comparing coded data were used for reliability (Creswell, 2003). Reliability of the study was substantiated by composing and using data instruments from prior research related to the research questions. The research used instruments in the study that were trustworthy and had been used in prior studies. The Looking for Technology Integration (Lofti) observation tool was based on National Educational Technology Standards for Students and Teachers (ISTE NETS-S, ISTE NETS-T), IMPACT: Guidelines for North Carolina Media and Technology Programs, and Texas Star Chart. This tool provided a global perspective of school media and technology programs at both the building and system levels (Friday Institute, 2008). The LoFTi instrument was developed from lessons learned and resources developed in North Carolina high schools that were already engaged in one-to-one learning technology initiatives.

Summary

The case study of the one-to-one laptop implementation of HMS and HHS was a baseline study of technology integration in Hometown County School District. The study was necessary to understand the perceptions, attitudes, and beliefs about technology integration in this district. Throughout the study, I focused on teachers' beliefs, attitudes,

and perceptions about professional development of technology integration in the two schools. There were perceived biases toward SIG funded positions from external resources since the beginning of the SIG funding; therefore, every effort was taken to avoid researcher bias.

The purpose of the technology case study was to provide data that would help future researchers and stakeholders understand teachers' perception about technology integration and how professional development plays a role in effective technology use. This study can be used to further research in facilitating change in technology integration by focusing on effective professional development intervention.

Section 4: Results

The purpose of this single case study was to explore the perceptions of teachers in HMS and HHS in integrating and enhancing instructional technology practices in a one-to-one classroom through professional development. I explored the early adopter one-to-one program that was composed of six teachers from HMS and five teachers from HHS. The study focused on eight out of 11 teachers' beliefs, perceptions, and professional development on technology integration in a one-to-one classroom.

Through open-ended interviews with the teachers, I investigated teachers' understanding, awareness, and experience of technology integration and the role of technology related professional development in addressing teaching practices. Through data collected from interviews and observations by the principal, instructional technology coach, and instructional technology facilitators, I explored and compared information obtained from an administrator and professional development trainers' perspective on how teachers used technology in a one-to-one classroom and what support was needed for effective technology integration.

The nonteaching staff provided insight from regular observations and walk-throughs conducted throughout the school year. Data collected from the nonteacher interviews were used to gain insight into how the administrators and lead technology staff's (instructional technology coach and instructional technology facilitator) perceptions of technology integration in a one-to-one classroom compared with the teachers' perceptions. The study was based on the following research questions:

1. What are the perceptions of teachers at HMS and HHS about effectively integrating technology in a one-to-one classroom?
2. What are the perceptions of teachers at HMS and HHS about professional development and its effect on teaching practices in a one-to-one classroom?
3. How have teachers at HMS and HHS integrated technology in a one-to-one classroom?

This section includes the data analysis procedures, findings, and a summary. Data were collected over a 6-week period from face-to-face interviews and classroom observations. Data collected from interviews, classroom observations, and field notes were analyzed and coded by hand.

Procedures

Prior to beginning the study and data collection, I requested approval from the Superintendent of HSD to conduct research on a potential participant pool of 17 purposely selected educators of HMS and HHS. The variable for selection was participation in an early adopter program for the one-to-one digital conversion. This potential participant pool included a principal, instructional technology coach (ITC), instructional technology facilitator (ITF), six teachers from HMS, and a principal, instructional technology coach, instructional technology facilitator, and five teachers from HHS. After receiving approval from the superintendent and IRB approval #05-12-14-0120274, I emailed a consent form to teachers (Appendix G) and nonteaching staff (Appendix H) including the purpose of the study inviting them to participate. The teachers' consent form mentioned the two classroom observations and a face-to-face

interview. A consent form was sent to the principals and technology staff to notify them about a face-to-face interview. The potential participants were instructed to electronically reply with "I Consent" if consent was granted.

Twelve out of the 17 potential participants gave consent to participate in the study. Three out of six teachers from HMS, five teachers from HHS, and one of the principals answered favorably. After receiving returned email with "I Consent" in electronic form, I thanked the teachers who volunteered to participate and explained that I would email them the dates and time of classroom observations and interviews. I also thanked the principal, two instructional technology facilitators, and instructional technology coach who consented and explained how they would be notified about the face-to-face interview.

Within the first week of a grading period, classroom observations for teachers at HMS and HHS were scheduled. Within the period, face-to-face interviews were scheduled and conducted with the selected teachers, principal, and technology staff at HMS and HHS, and the second round of classroom observations for the teachers at HMS and HHS were scheduled and conducted. Interviews with the teachers were conducted using the Teacher Interview Questions protocol. Interviews with the nonteaching staff were conducted using the Principal, Instructional Technology Coach, Instructional Technology Facilitator Interview Questions. The interview protocols were guided by the purpose of this specific study.

The classroom observations were conducted using the LoFTi instrument that included a checklist and open ended items that allowed for field notes yielding more

qualitative data (Appendix F). Check list items and field notes comprised from the LoFTi instrument were coded to examine emerging themes from classroom observations. The data collection procedures are described below.

Classroom Observations

The classroom observations were conducted separately by the principal, instructional technology coach, and instructional technology facilitators using the LoFTI instrument. Interpretive inquiry was used to analyze the data collected from the classroom observations. Interpretive analysis was appropriate to explore how the teachers' perception of technology integration affected their level of use in the classroom. Interpretive inquiry is used by researchers to interpret what is observed and understood based on the participant's background, experience, and prior perception (Creswell, 2007).

Teachers were notified by email or in person about scheduled classroom observations. Observations of the teachers' interaction with technology and interaction with their students lasted approximately 60 minutes of a class period. The observations provided me with a firsthand experience in identifying how teachers integrated technology in the classroom. Checklists, ratings, and field notes comprised from open-ended items of the LoFTI instrument were categorized in a table and color coded according to classroom observations to examine patterns and themes. The subthemes *student engagement, technology as a tool, technology hardware use, and technology software use* were generalized into the theme *technology use in the classroom*.

To maintain confidentiality, the participants were identified by pseudonyms in the table and journal as HMT1 through HMT3 for teachers at HMS and HHT1 through

HHT5 for teachers at HHS. After the individual classroom observation with the teachers, face-to-face interviews were scheduled and verified. A reminder email was sent to each of them with the date and time of the face-to-face interview and the second observation a week prior to each.

Interviews

In most cases the interviews were conducted in the individual teacher's classroom during planning time. When the classroom was not a convenient place, the interview was conducted in a small office in the media center at HHS and a conference room at HMS. The principal's interview was conducted in the main conference room after school hours. The instructional technology coaches and instructional technology facilitators were interviewed in their respective offices at their school. The nonteaching staff were identified as HTP, HITC, HITC1, and HITC2 for confidentiality.

The interviews contained probing questions that focused on teachers' perception of technology integration in a one-to-one classroom with a follow-up question focusing on how professional development affected their perceptions and the use of technology. The interviews were transcribed word for word using NVivo10 and transferred to Microsoft Word within 72 hours of the interviews. The same coding processed was used for interviews and observation. To obtain more details and clarify responses to some of the interview questions, email and phone calls were used to communicate. After developing a rich description and themes from the interviews, I emailed transcripts and preliminary analyses from the interviews to the participants for reliability and validity

purposes (Creswell, 2007). Some participants added comments to clarify or expand on previous responses.

Table 2. Participant Profiles

Participant code	Course(s)	Education level	Gender	Age	Experience in years
HMT1	Soc Studies	Masters	M	20-35	8
HMT2	Science	Masters	F	20-35	4
HMT3	English	Masters	F	36-45	7
HHT1	Health & PE	Masters	F	20-35	5
HHT2	AVID	Masters	F	20-35	4
HHT3	CTE	Masters	F	36-45	4
HHT4	English	Masters	F	36-45	4
HHT5	Math	Bachelors	M	46+	3
HTP	Principal	Masters	F	46+	25+
HITC	IT Coach	Masters	F	36-45	10+
HITF1	IT Facilitator	Masters	F	36-45	10+
HITF2	IT Facilitator	Masters	M	36-45	20+

Note. Profiles gathered from Interview Question #1.

Tracking Data

The study focused on the implementation of a one-to-one laptop program, perceptions, beliefs, and attitudes of the teachers about the laptops, and addressing those perceptions, beliefs, and attitudes with excellence in professional development. Qualitative researchers use codes or categories to sort data and develop patterns or themes in a more visual manner (Creswell, 2007). Participants' responses to the interview questions were read several times, highlighted and color-coded, and sorted into

categories. A broad list of codes was initially developed into more specific themes and categorized into a table. The table was reviewed and notes were taken to see if there were any themes emerging from the data. The subthemes that emerged from the interviews were narrowed to main themes that provided rich descriptive findings for the research questions. Similar coding was conducted for classroom observations and field notes. The color-coded process was used to take further notes. Themes from the observation data were placed in a separate table that was later compared to themes developed from the interviews. The coding process was adjusted and recorded when necessary.

Notes were taken and recorded in a journal. All analyzed data were saved on a password-protected external hard drive and stored in my home office.

Findings

This case study provided data collected from interviews and classroom observations that gained understanding on the beliefs and perceptions of teachers at HMS and HHS about integrating and enhancing instructional technology practices in a one-to-one classroom. Data collected from interviews with a principal and lead technology staff provided a comparison of their perceptions of technology integration in a one-to-one classroom with the teachers' perceptions.

The findings triangulated from the interviews, observations, and field notes are presented by research questions. The following themes emerged: *technology integration - positive perceptions; benefits – communication and collaboration; challenges – lack of support, classroom management, and poor infrastructure; professional development and*

changes on perceptions; professional development and continued support, and increased technology use in the classroom (see Table 3).

Table 3. Alignment of Data Analysis

Research question	Data tool	Data points	Data source
RQ_1: What are the perceptions of teachers on effectively integrating technology in a one-to-one classroom?	Teacher Interview Nonteacher Interview	Appendix G: 2-10 Appendix H: 3,8,10,11	Teachers Principal IT Coach IT Facilitators
RQ_2: What are the perceptions of teachers at HMS and HHS about professional development and its effect on teaching practices in a one-to-one classroom?	Teacher Interview Nonteacher Interview	Appendix G: 2b, 3, 4, 6, 7 Appendix H: 7, 10, 11	Teachers Principal IT Coach IT Facilitators
RQ_3: How have teachers at HMS and HHS integrated technology in a one-to-one classroom?	Teacher Interview Nonteacher Interview Observation (LoFTI) Field Notes (LoFTI)	Appendix G: 2-10 Appendix H: 3-11 Appendix F: Checklist and Open-ended items	Teachers Principal IT Coach IT Facilitators Principal IT Coach IT Facilitators

Research Question 1

RQ1: What are the perceptions of teachers at HMS and HHS about effectively integrating technology in a one-to-one classroom?

Interview Question 2 provided pertinent data that addressed beliefs and perceptions of teachers at HMS and HHS about technology integration. The remaining interview questions contributed data that reinforced findings about perceptions of technology integration with laptops (Appendix G). Interview Questions 3, 8, 10, and 11 from the nonteaching staff interview protocol (Appendix H) were used to obtain information from an administrator and professional development trainer's perspective on how teachers used technology in a one-to-one classroom and what support was needed for effective technology integration. The nonteaching staff provided insight from regular observations and walk-throughs conducted throughout the school year.

Theme 1: Technology integration – positive perceptions. Because the questions from the interview protocols addressed the teachers' beliefs, attitudes, and perception of technology integration, many of the responses to the interview questions began with *I believe, I feel, or I think.* Although several subthemes emerged from the data, the emerging theme was generalized as *positive perceptions and beliefs*. Initial coding generated themes such as technology integration promotes 21st century survival skills, student engagement, differentiated learning opportunities, and rigor in the classroom. Further coding and subcoding produced more subthemes such as teacher practices, culture relevancy, and student growth. Overall, the eight teachers interviewed provided positive feedback of technology integration. The teachers believed that technology

integration was important to real world survival. The teachers expressed their desire and willingness to effectively integrate technology in a one-to-one classroom. Three out of eight teachers suggested daily use of technology in the classroom. For example, HMT2 not only believed that technology integration is essential in modern day classrooms but stated, "I use technology in my class everyday...a learning management system (Edmodo) for all assignments." Teacher HHT3 reinforced HMT2 by stating, "I think technology should be embedded into daily classroom instruction. Using technology has become something that is used daily for most people." Teacher HHT5 stated, "It is important that we effectively integrate technology in our classrooms as often as we teach a lesson. Technology should not override the lesson but it should enhance it by offering a more extensive resource of information." Findings revealed that 100% of teachers interviewed from HMS and HHS had a positive perception of technology integration in a one-to-one classroom when certain factors are established. But when referring to other teachers, the early adopters gave a somewhat different perspective.

The early adopters suggested that some of the teachers were not comfortable with integrating technology in their classrooms. The teachers indicated that barriers such as confidence, planning and preparation time, too many demands, lack of training, and inadequate network were common issues when technology integration was inconsistent in many classrooms. HMT3, HHT3, and HHT5 expressed that teachers have a challenging time learning and keeping abreast of best practice strategies and new initiatives that there is very little time to plan and prepare effective technology infused lessons. Teacher HMT1 stated, "Teachers become frustrated with all the instructional and noninstructional

duties as it is…you never get a planning for holding someone else's class or going to a meeting"…when is there time to create technology enriched lessons? HHT2 indicated that she would love to work with other teachers, collaborating and integrating technology. She explained, "…we have very little time to research, practice, and collaborate with other teachers about strategies learned in Tech Tuesdays." HHT5 believed that smaller group training was necessary to build confidence in effectively integrating technology and to prepare engaging and productive lessons for students. He suggested,

> Again, provide me more training time or offer a professional development session for teachers (not on weekends or planning period)… The one-to-one laptop issuing to students was a step in the right direction...the school's technology personnel are always willing to assist when time permits... I would like to see a technology coach assigned to each curriculum department to assist with integrating new technology skills and opportunity into the classroom.

Teachers HHT1 and HHT4 mentioned several teachers by name who had requested one on one training from them on web 2.0 tools to use in their classroom. Teacher HHT3 was also requested by teachers to assist them in creating and publishing their web-based class pages. There was a perception that other teachers had an interest and desire to infuse technology efficiently in their classrooms as well. Teachers HH3 reported that several teachers complained about students not keeping laptops charged and leaving laptops home. Teacher HMT1 stated many of the teachers did not use the laptops because of classroom management issues.

Some teachers blamed Internet problems for their unwillingness to use the laptops in the classroom. Teacher HMT2 stated that crucial instructional time had been wasted because of network issues. One hundred percent of the participants provided credibility to the accusation of poor Internet accessibility as a barrier for effective technology by stating inadequate Internet as the biggest challenge. The principal, instructional technology coach, and instructional technology facilitators also stated the network was the biggest frustration reported when it came to daily integrating technology in the classroom.

Data collected from classroom observations and interviews with the principal and technology staff slightly contrasted data provided by the teachers (early adopters) concerning teachers' perceptions and use of technology in the classroom. The difference may have resulted from the use of the word *teachers.* Although the teachers referred to in the interview questions and observations were the *early adopters*, it is believed the nonteaching staff considered all teachers when providing data. There were times during the interviews that the term *early adopter* was used to narrow the answer to include only the participants in the study.

The nonteaching staff each mentioned the variation of the level of technology integration ranging from beginning to advanced. HTP stated,

> Well, I think the teachers have embraced the one-to-one concept…but overall I would like to see more engaging technology infused lessons. Some teachers [early adopters] have their classrooms designed in a collaborative layout with students

using their laptops to do research, create projects, make video presentations, and use web 2.0 tools.

Each classroom in HMS and HHS is equipped with a SMART interactive board, document camera, teacher laptop, access to laptop carts, and wireless network. The two schools have more technology resources including assigned technology staff than any of the other schools in the district. The vision of one-to-one implementation at HMS and HHS was to produce a constructivist technology enriched environment in the classroom.

During regular classroom walk-throughs from the principal and technology staff, it was evident that the vision of the traditional classroom continued to override the constructivist collaborative classroom the early adopters spoke about. Statements expressed by the principal, technology coach, and technology facilitators unknowingly paralleled each other when explaining the use of the SMART Board as a projector with no student-teacher interaction in many of the teachers' classrooms. Participant ITC stated, "Teachers that are not comfortable with technology normally use technology as a demonstration device with their students and there is very little independent student use." The lack of student engagement was reinforced when HTP stated "… that many classrooms had the desk-in-a-row layout and constructivist teaching practices were minimum."

According to HTP, the teachers who were interviewed and observed had a more positive perception of technology integration than many of the teachers in the school. For example, the teachers (early adopters) interviewed and observed demonstrated confidence when using technology, high student engagement in their classrooms, constructivist

teaching practices, and a willingness to assist others with technology integration. HTP stated,

> Overall, I think the teachers are excited about the technology resources that are available to them. Many of the teachers are excited about the opportunity of each student having a laptop, but there are those that are fearful and have many concerns. I think classroom management and responsibility are some concerns among the teachers...those that have class management issues now are more reluctant to use the laptops.

There were emerging themes in data collected from HTP, HITC, HITF1, and HITF2. HTP observed the contrast in classrooms of the early adopters and some of the other teachers such as, lack of student engagement, student-centered classrooms, and creativity. The technology staff (HITC, HITF1, and HITF2) had very similar indications.

Participant HITF1 stated, "There are mixed feelings on the one-to-one. You can see this by the variation of how laptops are used in the classroom and how often they are used." Participant HITF2 stated,

> Well … I have heard mixed views … teachers were excited about the one to one implementation until the students got the laptops... I notice that it's usually the same teachers that are interested in exploring something new and are using the laptops every day in the classrooms. On the other hand, some teachers have not moved their assigned laptop carts out of the media center.

HTIC expected, "Teachers that have vast experience with technology, tend to use it more often with their students than teachers who know just the basics." HITF1 supported this observation by stating,

> However, there are some teachers that feel that it is just another thing they have to learn to do and will be evaluated on it. The laptops are rarely used in the classroom for collaboration and student-centered learning. The early adopters are some of the few teachers that consistently use laptops every day and the students are creating, publishing, and showing pride in their creations.

The nonteaching participants acknowledged that the early adopters were the few teachers who consistently used the laptops for everyday instruction in their classrooms. These were the teachers who had set up classroom wikis, class pages, Edmodo, and other learning management systems that served as a main component in student-teacher interaction.

Theme 2: Benefits – communication and collaboration. Although there were some benefits, frustrations, and problems that affected perceptions of teachers at HMS and HHS about technology integration, the benefits outweighed the challenges.

Teacher HMT2 gave an example of his use of Edmodo in keeping students abreast of assignments when they are absent or he was absent. Teacher HMT2 stated, "When I am out, their class work is already posted and the substitute does not have to worry about whether the students know what to do." Several of the teachers felt that the laptops improved communication methods between student and teachers. Communication and collaboration were repeated by three of the eight teachers.

Teacher HHT1 said, “Email, Google applications, and publicizing information increased communication with colleagues and students.” Communication with parents also improved as a result of the laptops. Parents were able to access their child’s grade at any time. They did not have to wait for progress reports or report cards to be mailed home. Teachers emailed parents with concerns and updates on the student’s academic and behavior progress whether good or bad. Teacher HH3 believed that communication between parent and school would benefit all stakeholders. She stated,

> I do think training parents could have a positive effect on parental involvement and student outcome. Parents would be more aware of what is going on in the classroom, and could monitor their child’s academic progress if they could see activities/assignments due. Also I have noticed that most parents have Smart phones so that can be away for them to access online notifications, and other parent portals concerning their child.

Teacher HH2 felt broadening the communication pathways would be a benefit to parents, students, and teachers. She stated, “Technology is used to communicate through emails, blogs, instant messaging and web page announcements… training parents will set the tone for communication and technology use in and out of the classroom.”

Other benefits of technology integration in a one-to-one classroom included differentiated learning, real world relevancy, student engagement, motivation, rigor, exposure to various forms of information, independent research, and student growth. When specifically asked about benefits of the laptops, Teacher HHT1 said “I have found that my students are more engaged since the one-to-one implementation. The technology

integration has helped increase student choices which allow the students more flexibility."

Other benefits coded from the interviews and supported during the classroom observations included increase of student ownership in learning, increase opportunity in displaying creativity, global learning opportunities, authentic experiences while learning, students learn to effectively use technology for learning, exposure to various forms of technology, and diversity among learners. In student-centered classrooms, students are given the opportunity to learn through their own creativity while using experiences and knowledge that will prepare them for the future. Teacher HHT3 stated,

> Most businesses now require you to apply online or submit cover letters/resume`s electronically. It is the same when students have to apply to college it is all done online. Students have to know how to communicate, connect, and collaborate by using technology. These technology skills will prepare them for the "real world".

HHT4 expressed agreement with the diversity, exposure, and authentic learning by stating,

> I believe technology helps engage students in more diverse material. It allows teachers to provide exposure to various forms of technology they will encounter in the work force. In addition, they can learn about events, peoples, and things they may not have otherwise been familiar.

Constructivist principal motivates technology integration. Technology integration provides an array of different learning styles. Teacher HHT2 stated,

> Technology integration in the one-to-one classroom allows differentiated learning among the students. She also emphasized that project based learning, a concept of constructivist learning, can provide effective technology integration because it reinforces student-centered learning.

Despite the noted benefits of constructivist instructional practices including communication and collaboration as a result of effective technology integration, the teachers at HMS and HHS continued to lack skills for teaching and learning with technology. With exception to the early adopters, many of the remaining teachers' laptop carts stayed locked and unused more than they were used. The principal and technology staff stated they were not satisfied with the overall student engagement and creation [with the laptops] that were observed during routine walk-throughs. Furthermore, several challenges came along with the benefits of the one-to-one laptop implementation.

Theme 3: Challenges – lack of support, classroom management, and appropriate infrastructure. While the teachers asserted a positive perception of the laptop implementation, they also mentioned challenges, such as, conformity, classroom management, website filtering, and inadequate infrastructure. Some of the teachers also indicated a lack of support from district and school administrators and a lack of willingness to change from colleagues as challenges that impeded the laptop implementation.

Teacher HHT1 stated,

> Everyone in the district is not on board with the one-to-one implementation. Several people do not put technology as a priority and it makes it very difficult for

classroom teachers. For instance, when people do not check their email on a regular basis it is difficult to expect the students to do the same thing.

Teacher HMT3 stated, "They [teachers] need to be willing to change some strategies they've been using and allow technology to help them deliver their lessons…" Another teacher implied that the students' willingness and motivation to use technology devices and tools for learning are sometimes determined by the teacher's attitude. According to the early adopters and the technology staff, many of the teachers blamed their negative attitudes on the unreliable wireless Internet. One hundred percent of the participants supported this accusation by stating poor Internet service as the biggest challenge to technology integration with the laptops.

Unsurprisingly, in addition to inadequate network infrastructure, classroom management was indicated by the early adopters, the principal, and technology staff as a common challenge when attempting technology integration among the teachers at both schools. Teacher HHT2 echoed this challenge in the comment "one of the frustrations that I have encountered with one-to-one use resulted from network issues…and another frustration was keeping students on task during instruction."

When talking about classroom management, Teacher HHT4 specified that the students were not unruly or distracting, but "my concerns were not being able to control what websites they were on…(laughing) they were at their quietest when they were off task…watching a video, chatting, or on Facebook."

Students getting around filtered websites, watching videos, and listening to music were some of the concerns mentioned as challenges. HITF2 mentioned that several

teachers had requested monitoring software from the onset of the one-to-one implementation. Although the technology team had talked about it at several weekly meetings, the software was never purchased.

According to the technology plan, HSD had sufficient Internet filtering software (met the state's guidelines) but classroom monitoring software was not provided by the district. Individual schools could purchase supervision and monitoring computer software for the classrooms, but this investment may not have been the total solution to one-to-one classroom management concerns. The fact that classroom management can be a deterrent in effectively integrating technology in a one-to-one classroom, proper training that will offer the teachers strategies in transitioning instructional practices is necessary in minimizing this barrier. These topics were addressed with Research Question 2.

Research Question 2

RQ2: What are teachers at HMs and HHS perceptions about professional development and its effect on teaching practices in a one-to-one classroom?

Initial coding of the interview transcripts produced several subthemes of technology professional development: quality of professional development, ongoing professional development, support relating to professional development, and differentiation in professional development. These subthemes were generalized into the theme professional development changes on perception and professional development and continued support.

Theme 4: Professional development and changes on perceptions.

Professional development played a key role in how the teachers perceived technology integration in the one-to-one classroom. The teachers who were selected for this study participated in online professional development and face-to-face professional development before the students were issued the laptops. These teachers were referred to as "early adopters". They were the first teachers to have laptop carts in the classrooms. They participated in two 6 weeks online professional development sessions entitled "Innovate to Transform the 1:1 Classroom with Web 2.0 Tools" sponsored by The William & Ida Friday Institute for Educational Innovation.

In these courses, early adopters were exposed to many of the freely available tools on the Web and got the chance to experiment with new tools each week. Teachers developed lessons that aligned with the six International Society for Technology Education's (ISTE) National Educational Technology Standards for Students (2007) and to learner outcomes found within Common Core or NC Essential Standards. Participants focused on how the tools, along with their new and developing professional knowledge, could teach them to seamlessly integrate technology that would enhance student learning.

The early adopters emphasized the impact professional development had on their willingness to use technology and become leaders for the other teachers. Along with the technology coach and facilitators, the early adopters learned about classroom layouts, web 2.0 tools, and TPACK. The online training took place a year after the technology coach and technology facilitators at HMS and HHS had offered mandatory

face-to-face professional development called “Tech Tuesday” twice a month for 45 to 60 minutes of the teachers’ planning block. The early adopters indicated that the online professional development introduced some new and reinforced other web 2.0 tools and strategies for integrating technology in the classroom. The teachers indicated that professional development played an important role in how they perceived the one-to-one laptop integration. Teacher HMT1 said,

> Professional development offered different ways to use technology in the classroom. It introduced new tools and how they could be used in lessons. There were things that I learned in PD that were new and I immediately knew when and how I could incorporate it into my lessons.

The participants provided several ways professional development affected their willingness and ability to change their perception of technology use for teaching and learning. The examples included how to be a facilitator in the classroom (HHT3), how to use specific web 2.0 tools in a lesson (HMT3), using technology and real time videos to keep students engaged (HHT2, HHT4, & HHT5), effectiveness in organization and productivity (HHT5), and use of social media and Internet resources to improve digital information literacy (HMT1). Effective professional development is necessary for teachers to infuse technology into their lesson plans without allowing the technology device to overpower the desired outcome of the lesson. This statement was reinforced in all of the professional development training. Teacher HMT1’s perception of effective technology professional development paralleled this when she stated, “technology integration is effective when teachers learn to seamlessly integrate the technology

without the focus being so much on the tool used." Teachers have to motivate students by allowing students to guide their learning through digital literacy. "They just need to be willing to change some strategies they've been using and allow technology to help them deliver their lessons in a more creative, fun and engaging ways"(Teacher HMT3).

Several of the early adopters confirmed that professional development had transformed their attitudes and beliefs from what technology could do to how it could be used for authentic learning. Teacher HHT3 stated "the role that professional development plays in my beliefs, attitudes, and perception is *relevance*." She explained how professional development showed her how she could actually apply technology to her classroom practices and how the students could apply it to their own learning by relating it to real life. Other teachers also credited professional development with their positive perceptions and beliefs about their willingness to continue to grow and change instructional strategies to improve student success. Teacher HHT2 stated,

> Professional development has allowed me to be more receptive to the use of technology in the classroom because I have been exposed to effective methods of incorporating technology and keeping students engaged. The strategies that were introduced in professional development allowed me to explore the effectiveness of technology use and review the statistics which support it.

Responses from the technology staff revealed that the teachers displayed a willingness and increase in technology use in the classroom. HITC stated that she would like to see more teachers transitioning into the role of facilitators in majority of

the classrooms. She implied that many teachers still had the need to have total control in the learning process in their classrooms. HTP's comments about the low-level of technology integration supported the teaching and nonteaching participants' responses. HTP stated, "While teachers and students often used technology, the level of usage is low and not engaging in many of the classrooms."

Theme 5: Professional development and continued support. The participants recognized the importance of professional development in integrating technology in their individual classrooms. The regularity of professional development was also noted in the teachers' perception of technology professional development. In explaining her belief about professional development, Teacher HMT1 said "…ongoing professional development is crucial to effective technology integration."

Several of the teachers spoke about the twice a month technology professional development they referred to as "Tech Tuesday". They explained that a year before the one-to-one initiative was implemented each teacher had to complete at least 40 hours of technology professional development. Beginning in the month of September, HMS and HHS scheduled every other Tuesday "Tech Tuesday" for mandatory technology professional development. As an incentive to the teachers, continuing educational units (CEUs) were given to each teacher who completed the training. The School Improvement Grant provided funds for an incentive bonus plan for staff and teachers to receive a monetary bonus ranging from $500 to $2000 depending on their job category. In order for the employees to be eligible for the bonus, they had to meet certain criteria. One of the criteria for teachers was to attend 80% of professional development.

Although “Tech Tuesday” was mandatory for HMS and HHS teachers, the annual monetary bonus served as an additional incentive.

The teachers talked about the consistency of Tech Tuesdays in the first year of the one-to-one implementation. They explained how demands from other school initiatives and everyday duties began to affect technology integration. Teacher HMT2 lamented

> Professional development started out every other Tuesday, but eventually other things became a priority. In the beginning, I enjoyed the Tech Tuesdays, but with everything else (like PLCs, departmental meetings, holding classes for other teachers, and other professional development), we rarely got a planning and did not have time to practice what we had learned in Tech Tuesday.

Teacher HHT1 echoed the gradual decrease in the bimonthly “Tech Tuesdays”, however she indicated an understanding and justification for the less frequent technology training. She stated that

> Technology integration is a must for 21st century classrooms … the first year of the implementation we had Tech Tuesday every other Tuesday unless we were [state] testing. If teachers missed the Tech Tuesday session because they were absent or meeting with the principal or parent, the training were available online through Schoology. The following year we had a new principal. That is when technology training [Tech Tuesday] was barely once a month.

Although the teachers did not consider decreasing the number of mandatory technology professional development sessions a big mistake, they firmly expressed that

technology professional development is necessary and should be ongoing at least on a voluntarily basis (HMT1, HMT2, & HHT4). Teacher HMT3 suggested ongoing training is necessary because of "fast paced development in technology". HHT3 stated, "Being provided with the technology to use in the classroom is the first step. Next, continuing to provide professional development that will inform me of technology options and ways to incorporate it in the classroom." Whereas, HHT5 stated, "…provide me more training time or offer a professional development session for teachers…not on weekends or planning period."

Subthemes, such as modeling technology, classroom support, and training for individual needs, also emerged from the data. The teachers suggested that professional development for technology integration is more effective when it is supported and modeled by school leaders and treated as a priority professional development topic. Teacher HHT1 stated, "The principal, instructional technology coach, and instructional technology facilitator can continue to support me by understanding the unique limitations of technology integration." Teacher HHT2 indicated it would be beneficial to have more modeling of specific strategies. She stated, "…strategies to keep students engaged and on task…professional development trainers can model these strategies and help create mock one-to-one environments."

The technology staff also believed that part of technology training is to model effective use of technology. The technology staff felt it was important to be trained in the latest educational technology practices before they could demonstrate effective instructional practices to the teachers. The technology staff attended technology boot

camps, several state conferences, online professional development, and work sessions that introduced best practices and trained them to support teachers with integrating technology in the classrooms. HITF2 expressed his enjoyment for supporting the teachers and how he models using technology in instruction practices daily. He stated,

> Technology is constantly changing and improving the way of life…it is challenging to try to keep up with the pace of change. However, I must say I enjoy the challenge. I use technology everyday on my job and in my personal life, therefore I am willing to keep up to date and I find it exciting.

HITC also expressed excitement in working with the teachers. She stated, "I enjoy…..sharing with others the techniques I have learned."

Teacher HHT4 was grateful for strategies introduced by the technology staff and she demonstrated lessons using Web 2.0 tools incorporated in her classroom wiki (tools she credited to Tech Tuesdays) during classroom observations. She stated,

> Without the training I wouldn't know where to begin. The training pointed me in the right direction for technology options I could use in the classroom. After being pointed in the right direction, I was able to adapt the information to fit the needs of my students. Also, I was able to find examples of how other teachers have used the technology in their classrooms and what they found to be successful and challenges.

Although the teachers expressed how the additional professional development and Tech Tuesdays could continue to change perceptions and improve technology integration in their classrooms, they stressed a desire for more individualized training. For example,

in a classroom there are students with different learning styles and on different levels in their learning; therefore, the same observation can be true for teachers in their professional learning process. The teachers from HMS and HHT commonly stated that the "one size fits all" professional development was not as effective as meeting the teachers at their level of technology skills. HHT1 stated,

> …all school personnel does not understand how technology is integrated and it can make the integration more difficult…professional development needs to be differentiated to fit the needs of each teacher…all teachers are not on the same level and do not need basic professional development.

During professional development sessions, classroom visits, and face-to-face interviews, it was obvious that the variation of technology use ranged from beginning to advanced. Teachers from both schools spoke about different levels of technology integration and the need for differentiation in professional development (HMT2, HHT2, HHT3, & HHT4). Several teachers also made recommendations that the principal and technology staff should visit the classrooms more often and offer technology support and feedback to the students (HHT3, HHT4, & HHT5).

The responses about differentiation and quality of professional development were similar among the technology staff and somewhat repetitive when answering the questions. The principal's observation of professional development differed slightly from the other participants. HITC gave examples of how she researched and sought out tools that could be "easily and quickly integrated into a lesson" and she stated that she looked for opportunities "to provide relevant examples that relate to the teachers' curriculum

area." One of the instructional technology facilitator (HITF1) used the same practice for his school in addition to accepting requests from teachers to train and demonstrate use of specific tools and resources. HTF2 stated,

> We try to work with the teachers one-on-one and meet them where they are. We also do blended PD where online is convenient for many of them. Differentiation is something we are trying to do more of as a request for many of the teachers that frequently use technology.

The instructional technology staff used technology need assessments, evaluation forms from professional development sessions, classroom visits, recommendations, student technology-integrated projects, and principal feedback to determine the quality of professional development and ongoing support. The instructional staff expressed that they were readily available at an individual teachers' request for assistance, co-teaching, modeling and sharing new tools, after-school training, and work with individual teachers at the request of the principal.

Data collected from the principal about professional development seemed to contradict the responses of the teachers about Tech Tuesdays. The principal proudly talked about the Tech Tuesdays that were offered to all teachers. She also mentioned the SMART boards in every classroom as well as laptops and computer labs. She stated that technology integration was a priority in the school. She stated that professional development for technology integration would continue to be a priority, for example new teachers would be trained on the SMART board and they would receive training to catch them up with current teachers. The principal gave examples of technology tools and

projects she would like to observe in the classrooms. She expressed that having a technology coach and technology facilitator was an additional resource to the teachers and staff. Interviews and classroom observations revealed at least half of the teachers at HMS and HHS demonstrated the beginning levels of technology integration in the classroom. The principal and technology personnel witnessed a variation of technology integration that enhanced the learning outcome but did not transform the learning outcome. Observations gave nonteaching participants an opportunity to compare the teachers' interview responses to their actual use of technology in the classrooms.

Research Question 3

How have teachers at HMS and HHS integrated technology in a one-to-one classroom? The theme that emerged from the data was "increased technology use in the classroom".

Theme 6: Increased technology use in the classroom. The first set of classroom observations showed teachers and students collaborating face to face in an introductory manner. For example, the teachers were going over expectations, objectives, and introduction to the lesson. All of the classrooms observed were arranged in small group collaborative settings. Students were engaged in group assignments. In HHT1's English class, the students were working independently on research projects using Google Docs. The teacher was sitting behind the desk working on the desktop computer. The teacher was given the students real-time feedback in Google Docs. The teacher and students were collaborating without a lot of physical movement taking

place in the classroom. The teacher would periodically walk to a student's workstation and provide audible feedback or comments.

In Teacher HMT1's classroom, students were engaged in an interactive lesson activity on the SMART board. The teacher had entered the students' names in an interactive tool called *Random Selector* to select a student to go to the SMART board to sort and drag the name of a Greek god to the correct description of the god. The student would then use the random selector to select the next student. The lesson was very engaging and the students took notes on their laptops during the class assignment while analyzing the selection choice.

The classroom observations revealed various web 2.0 tools, SMART Board activities, Google Docs, wikis, and learning management systems (Edmodo and Schoology). However, activities in HHT2's classroom displayed a lack of cohesiveness during the observation. Several students asked questions about the assignment and seemed to lack knowledge of what they were supposed to do. HHT2 seemed to put too much emphasis on the laptops which took the focus away from the assignment. Students were observed going to websites that had nothing to do with the assignment.

Seven out of eight teachers observed showed an improvement in technology integration from the first observation to the second. There was evidence of use of Web 2.0 tools that were discussed in the interviews. Learning management systems, such as Edmodo, Inc. and Schoology, Inc. were used in 2 of the classrooms. The CTE teacher had a classroom wiki and her students used flip cameras to make videos to upload to

Teacher Tube. The students were very comfortable with the technology. They were highly engaged and needed little guidance from the teacher.

The second set of classroom observations showed an increase in effective technology integration. In Teacher HHT3's class all students were actively engaged in reviewing for their upcoming exam using their laptops. Integrating technology with one-to-one laptops made various methods of learning and retaining information available to the students. Students could choose the learning style that was suitable for their needs. Some students worked in pairs using the class wiki, others worked individually using handwritten notes, and some used digital response tools, such as clickers and Socrative, Inc. Students were able to work in pairs collaborating with their partner for assistance before turning to the teacher. Teacher HHT3 circulated the classroom supporting peer teams as necessary. Conversations among the students indicated that peer learning was beneficial. Students also seemed to like using the clickers for responding to whole class assessment.

HMT3 demonstrated higher learning skills by asking students to create scenarios that would allow for specific solutions to math problems. This allowed students to assess their own learning. HMT3 then facilitated learning by modeling a scenario and using a math problem to solve it. He called on students to present their scenarios and solutions on the SMART Board using SMART interactive software, in several cases having the students use the graphic calculator under the document camera. Most students were on task and participated as directed.

Discrepant Case

The data for this case study were carefully reviewed and analyzed for discrepant cases or nonconforming data. HHT5's initial response was inconsistent with his remaining responses and observed actions. When asked about the benefits of the one-to-one technology integration, he stated, "It's hard to say. I guess I knew that integrating technology into the classroom could be beneficial when done right, but I just saw it (technology) more as a distraction." He continued the remaining of his response in a more positive attitude described in the findings above.

It was difficult to decipher the principal's input as discrepant or nonconforming because of her preconceived thoughts of effective technology integration. The principal indicated her lack of knowledge in technology integration but her willingness to improve because it was an expectation. For example, a school leader or principal has several roles including the role of technology leader. Schrum and Levin (2009) explained that education technology leaders require skills in organizational leadership and technology use. The school leader and technology leaders are prevalent to the success of a change in the school's culture. It is clear that the technology leaders served an important role in the school. It is a primary role of technology leaders to keep abreast of modern technology and how technology can be used to improve teaching and learning.

Evidence of Quality

Member Checking

The transcripts were emailed to the participants for clarification, comments, and editing. As the interview transcripts were returned via mail, the data from the interviews, classroom observations, and field notes were triangulated again using NVivo and transferred to Microsoft Word. Preliminary findings were sent to participants for further clarification and feedback. On several occasions, a phone call was necessary for clarification on preliminary analysis.

Credibility and Reliability

To ensure credibility and reliability of the data, the interviews were recorded while notes were taken, transcribed verbatim by hand, and transcribed and triangulated using Nvivo10 as a backup. Triangulation of the data strengthened the credibility of research findings. In addition, themes were combined, refined and reviewed in person with the participant's verification.

Confidentiality

A coding process to protect confidentiality of the participants was used in all data collection. Computerized documents were stored on a secure external hard drive and password protected. Audio and visual devices and recordings were locked and secured when not in use.

Reliability

Documenting the step by step process in a journal and comparing coded data were used for reliability (Creswell, 2003). Reliability of the study was substantiated by

composing and using data instruments from prior research related to the research questions. The research used instruments in the study that were trustworthy and had been used in prior studies. The Looking for Technology Integration (LoFTi) observation tool is based on National Educational Technology Standards for Students.

Summary

At HMS and HHS the early adopters were leading the way in technology integration in the classrooms. They were teaching and learning with technology while promoting competitive skills, such as problem solving, analytical, higher order thinking, critical thinking, and other innovative skills. The early adopters were serving as leaders in technology integration as students are prepared to compete in a global society.

Section 5 includes an interpretation of the results, recommendations for action, recommendations for future study, and contributions to positive social change.

Section 5: Discussion, Conclusions, and Recommendations

The purpose of this single case study was to explore the early adopters' beliefs, perceptions, and attitudes about technology integration and technology related professional development in a middle and high school in eastern North Carolina. One objective of this study was to examine how professional development addressed and changed perceptions, attitudes, and beliefs of teachers at HMS and HHS. Another objective of the study was to determine how findings could assist with implementing an effective professional plan that will enable teachers to adjust pedagogical methods using technology along with knowledge of content.

Data were collected from face-to-face interviews and classroom observations that gained an understanding of the beliefs and perceptions of three teachers at HMS and five at HHS about integrating and enhancing instructional technology practices in a one-to-one classroom. Data collected from interviews with a principal and an instructional technology coach and two instructional technology facilitators provided a comparison of their perceptions of technology integration in a one-to-one classroom with the teachers' perceptions. Three teachers at HMS were unable to participate in the study. The research questions explored by the study were as follows:

1. What are the teachers at HMS and HHS perceptions about effectively integrating technology in a one-to-one classroom?
2. What are teachers at HMS and HHS perceptions about professional development and its effect on teaching practices in a one-to-one classroom?

3. How have teachers at HMS and HHS integrated technology in a one-to-one classroom?

Summary of Findings

The findings indicated that the early adopters had a positive perception of technology integration in the one-to-one classroom and that professional development played a key role in teachers' perception and use to technology in teaching practices. Professional development was necessary in changing traditional classroom practices to constructivist practices of teaching and learning. In order to have a constructivist learning environment that produces communication, collaboration, critical thinking, and creativity, teachers have to change their attitudes about technology use (Bai & Ertmer, 2008).

Findings from teacher interviews indicated the early adopters believed that (a) technology integration can be beneficial when teachers and students are trained to appropriately use it, (b) technology can be used as a learning management tool, (c) teachers can learn to integrate technology into lessons, (d) technology integration can increase learning by increasing communication and collaboration, (e) technology integration will not only promote global learning but promote rigor as well, (f) technology will help teachers effectively group students for differentiated and project based learning, (g) technology provides students with authentic learning, and (h) technology integration promotes student engagement and diverse literacy. The teachers believed that ongoing, effective, and differentiated professional development was the

key to improving student achievement and digital literacy through technology integration

Findings collected from the principal, instructional technology coach, and two instructional technology facilitators gave insight to how their perceptions of technology integration in a one-to-one classroom compared with the teachers' perceptions. The nonteaching staff agreed that while some of the teachers lacked skills in high level technology integration, their perceptions were positive. The principal and technology staff constantly referred to all of the teachers when answering interview questions, not just the early adopters. However, when they were asked to specify the responses to the early adopters, the perception of technology integration was positive. The principal and technology staff believed that the majority of the teachers at HMS and HHS should increase the level of technology integration to transform student learning in their classrooms. The principal and technology staff indicated that technology professional development was crucial to changing teachers' roles in the classroom. Observations revealed that teachers as a whole at HMS and HHS continued to lack in effective technology integration in the classroom. Although teachers' willingness and technology use gradually increased during the one-to-one implementation, the majority of the teachers integrated technology at a low level. Classroom observations and field notes supported the finding that the early adopters integrated technology to transform the learning process and instructional practices by using activities that would be difficult or impossible to do without technology.

Interpretation of Findings

Research Question 1

What are the perceptions of teachers at HMS and HHS about effectively integrating technology in a one-to-one classroom?

Several subthemes emerged on integrating technology in a one-to-one classroom and were generalized into three main themes:

1. Integration of technology–positive perceptions,
2. Benefits–communication and collaboration, and
3. Challenges–lack of support, classroom management, and appropriate infrastructure.

Technology has changed how information is communicated. It provides diverse information that is easily and quickly available. Integrating technology into the learning environment changes the way students gain and interpret knowledge. This fast-paced way of receiving information and possibly improving student outcome has added to list of education reforms. Integrating technology has become one of the most challenging reforms for constructing student learning because of teachers' reluctance to change instructional practices (Collins & Halverson, 2009; U.S. Department of Education, 2010).

Changing the look of the classroom is a pivotal part of the digital transitional learning environment. Technology gives students the opportunity and accessibility to take ownership of their learning. Traditional classrooms were designed for the teacher to have all the knowledge and expertise in a specific content area and provide that knowledge to

the students. Technology has provided massive avenues to information and knowledge. This information is available to anyone with access to a smart phone, laptop, or any other device that has an Internet connection. No longer do teachers and textbooks monopolize learning. In other words, technology provides students with the centralization of their own learning. When students increase knowledge based on prior experiences and actions, constructivist learning takes place (Lambert et al., 2002). Technology literacy and constructivist teaching and learning practices are prime factors in developing and applying necessary skills to compete in the 21st century.

Theme 1: Technology integration-perceptions and beliefs. Although all of the teachers indicated a positive perception of technology integration, seven out of the eight teachers showed evidence of a constructivist student-centered classroom. The three teachers at HMS and four of the teachers at HHS used learning management systems such as Edmodo, Blackboard, wikis, and the teacher class page. In addition to face-to-face interviews, observations and field notes supported constructivist teaching and learning practices in these classrooms. Independent learning and collaboration through web 2.0 tools, such as wikis and other web-based collaboration tools, support constructivist learning. One of the principles of constructivism is allowing learning and understanding through personal behavior and experiences (Chai & Lim, 2011; Liu & Chen, 2010; Teo et al., 2008; Wetzel et al., 2008).

Technology enriched classrooms produced increased student-teacher interaction, differentiated teaching and learning and learning through collaboration (Rosen & Beck-Hill, 2012). In the current study, I found that teachers at HMS and HHS believed that

technology integration in a one-to-one classroom gives students ownership of their learning and increases constructivist learning strategies (Denton, 2012; Smart et al., 2012).

One teacher emphasized that teachers need to be trained in classroom management and how to integrate technology without the focus being on the technology. Students taking ownership in their learning is a goal for future growth and information literacy; however, classroom management can be a concern when students have total control of when and what they pursue in a digital classroom. In a one-to-one laptop classroom, distractions and off-task behavior require strong classroom management in maximizing learning and minimizing disruptive occurrences (Dunleavy et al., 2007).

All of the teachers interviewed and observed indicated that technology integration has benefits and is pivotal to teaching and learning. The teachers believed that technology's benefits are recognized with proper training. Collins and Halverson (2009) indicated that a transition in teachers' traditional practices must be guided through a process of change. Exploring teachers' beliefs about technology integration is the first step in transforming teacher practices (Ertmer & Ottenbreit-Leftwich, 2010). Teachers who have a positive perception and attitude about technology are usually willing to integrate technology into their classrooms (Ertmer & Ottenbreit-Leftwich, 2010). Technology has changed the personal and private lives of many; therefore, the culture of teaching and learning must change. During face-to-face interviews with the teachers in the current study, those who expressed daily use of technology use in their personal lives demonstrated a higher level of technology integration in their classrooms. Technology

integration is more effective with buy-in from teachers and students. In order to have an effective one-to-one implementation, it is important to address and change the attitudes and perception of teachers as well as the culture. In the same way that constructivist teaching practices are used to build on students' prior knowledge, the constructivist approach should be used to explore teachers' perceptions and beliefs about technology integration. To change teachers' attitudes, beliefs, and perceptions, it is necessary to understand the background, prior experiences, and prior knowledge teachers bring to the classroom. The constructivist approach is not only helpful in exploring the teachers' perceptions and beliefs but can also be useful in constructing student knowledge in technology integration. Perceptions, beliefs, and attitudes have previously been identified as barriers in technology integration (Abbitt, 2011; Hansen et al., 2009; Heo, 2009; Wang et al., 2004; Watson, 2006).

The instructional technology coach and instructional technology facilitators expressed that technology had a major influence in their personal lives that led to their current profession. Additionally, the principal indicated that her recent years of service in education had an impact on the increase of technology use in her personal life. It appears that many digital immigrants are forced to become digital natives (Prensky, 2001).

While younger people cannot visualize life without cell phones and other technology devices, it remains difficult to understand why ineffective use of technology integration still a major obstacle in improving students' outcome today. Effective technology integration is the path for developing instructional technology skills. When teachers are provided with technology professional development that effectively change

or enhance traditional teaching practices, student outcomes tend to improve (Desimone, 2011; Koehler & Mishra, 2009; Martin et al., 2010). Studies revealed that when technology integration and constructivist teaching practices are incorporated into the learning environment, independent learning, student-centered learning, authentic learning, collaboration, and communication increase (Chai & Lim, 2011; Teo et al., 2008; Wetzel et al., 2008).

Theme 2: Benefits–communication and collaboration. The numerous studies of one-to-one implementations have yielded positive and negative results. With the variation of success to failure, it is still difficult to determine if successful laptop implementations had a significant impact on student outcomes. Research showed that some one-to-one laptop implementations reported added value in online research, productivity tools, communications, homework and learning games, and technology skills of teachers and students (Dawson et al., 2008; Dunleavy et al., 2007; Lei & Zhao, 2008; Murphy et al., 2007; Shapley et al., 2010).

Findings from previous studies indicated that students were more engaged after the one-to-one implementation (Bebell & Kay, 2010; Rosen & Beck-Hill, 2010). It was also found that using technology socially as professional learning networks supported collaboration and communication among teachers as well as students (Hargreaves, 2009; Zhao, 2009). The technology integration increased student choice, which allowed the students more ownership. Communication and collaboration between students and teachers also increased (Maninger & Holden, 2009). Students were able to do better research and complete assignments on time, and student testing could be administered

online or electronically. Teachers also stated that the one-to-one program gave students an opportunity to learn from a global perspective and offered various learning opportunities (Monke, 2009). Some researchers have found that an effective planned one-to-one laptop implementation can have positive results and benefits (Donovan et al., 2010; Spires et al., 2012; Suhr et al., 2010; Weston & Bain, 2010). However, rarely are there benefits without challenges.

Theme 3: Challenges–lack of support, classroom management, and appropriate infrastructure. Technology integration in a one-to-one classroom is no different. First of all, the culture of the school needs to transition from teaching and learning without technology to teaching and learning effectively with technology. This transition comes from changing perceptions, attitudes, and beliefs. With this change, teachers learn not only how to use the available technology, but how to seamlessly integrate it into instructional practices. In this study, I found that different levels of technology integration resulted from professional development opportunities, time to practice and collaborate with peers, support from administrators and technology staff, and adequate infrastructure.

All of the teachers interviewed identified an unreliable network infrastructure as the biggest challenge. Teachers described planning and preparing technology infused lessons only to have difficulty executing the lesson with the students in the classroom as a result of the Wi-Fi dropping and freezing up. Several teachers told about times the frustration from the students called for a total restructure of the lesson.

The findings were consistent with common challenges revealed in studies on one-to-one implementations. A lack of high quality professional development that provides effective instruction teaching strategies, classroom management strategies, and content and resource strategies in a one-to-one laptop environment was a major factor for the challenges the teachers faced (Dunleavy et al., 2007).

Findings from other studies revealed three key factors of a successful one-to-one laptop program include (a) teacher collaboration, (b) daily use of technology, and (c) uniform integration school and district wide (Greaves et al., 2010). Schools that did not include the three key factors had a less successful implementation of the laptop program. It is important that teachers' instructional practices are adaptive to technology enhanced classrooms prior to beginning a one-to-one laptop program (Clausen et al., 2008). Appropriate planning, support, and training from the district as well as the school are vital for successful implementation.

Research Question 2

What are HMS and HHS's teachers' perceptions about professional development and its effect on teaching practices in a one-to-one classroom?

Theme 4: Professional development and positive perceptions. Desimone (2011) acknowledged that a reform in professional development focused on transitioning teachers from traditional practices to teaching with digital resources. In the current study, the participants stated Tech Tuesday, the name given to the technology professional development offered twice a month, provided confidence, strategies, and a willingness to incorporate technology into their classroom.

The teachers in the current study expressed the importance of professional development in perception, attitude, and belief changes. They also believed professional development was the essence to change in instructional strategies. An understanding of teachers' perceptions, beliefs, and attitudes about technology is an indicator of how they will use technology in instructional practices (Abbitt, 2011; Hansen et al., 2009; Heo, 2009; Wang et al., 2004; Watson, 2006). The study revealed that teachers need time to collaborate, practice, and prepare lessons that are infused with technology literacy. Allowing time for teachers to collaborate and observe how technology is being used in different classrooms is necessary for effective technology integration school wide. When collaboration is rich among teachers, professional development is more effective. Teachers become a part of professional development planning and the shared vision for instructional change. This was evident among the early adopters. The early adopters attended additional professional development, collaborated often, and attended periodically scheduled meetings at their respective school as well as both schools combined. According to Drayton et al. (2010), allotted time and professional training are key factors for effective technology integration. Professional development that is "collaborative, coherent, and continuous" is the goal for effectiveness in technology integration (U.S. Department of Education, 2010, p. xii).

Theme 5: Professional development and continued to support. In the study, I found that professional development, adequate technology resources, and administrator support were important in transitioning classroom practices to

constructivist and innovative teaching and learning. Researchers found that one-to-one implementations in North Carolina and Pennsylvania failed as a result of the lack of collaboration among teachers and a lack of ongoing professional development (Corn, 2009; Pect et al., 2008). Until teachers have ongoing effective training and consistent support, technology integration will remain ineffective and teachers' perception about technology integration will not improve. The teachers in the study continued to emphasize the need for ongoing, content specific, and differentiated professional development. The responsibility for high quality professional development, continuous support, and guidance rests on all stakeholders.

In the study, it was revealed that differentiation is an important factor in technology professional development. The more advanced teachers believed different levels of training should be offered and teachers should be given an option of the one they wanted to attend. Teachers also lamented that they would like to have more content specific training. Knowledge of the content, pedagogy, and technology has to be seamlessly intertwined to result in effective technology integration (Koehler & Mishra, 2009). This framework called TPACK (technological, pedagogical, and content knowledge) has become an effective model for training in technology professional development. As the teachers talked about the different types of Web 2.0 tools they encountered in Tech Tuesdays and used in their classrooms,

From the interviews and observations, it was revealed Web 2.0 tools was one of the most used technology integration topics. All of the teachers used Web 2.0 tools for collaboration. Web 2.0 tools are becoming a technology of choice and have been shown

to assist students in reading, writing, and critical thinking (Dede, 2009; Owston, 2009; Zhang, 2009). These are highly engaging, collaborative tools and can have a positive effect on student outcome (Leu et al., 2009).

The teacher's role in technology integration is important in preparing students to compete globally. Engaging and transforming learning need to be prevalent in the classroom. Knowledge of the content, technology, and instructional practices is necessary to teach and reach students. Teachers require practice and instructional practices have to be restructured through ongoing professional development.

Lack of technology professional development, available resources, technical support, teacher readiness, and teacher beliefs and attitudes contribute to ineffectiveness in technology integration (Guzman & Nussbaum, 2009; Lowther et al., 2008; Probert, 2009).

Research Question 3

How have HMS and HHS's teachers integrated technology in a one-to-one classroom?

Classroom observations of the teachers, interview questions with teachers, and interview questions with a principal, an instructional technology coach, and the instructional technology facilitator of HMS and HHS allowed a firsthand experience in identifying how teachers integrated technology in the classroom. Field notes comprised from open-ended items, a component of the LoFti instrument, were taken during classroom observations. The field notes were coded according to classroom

observations to examine the emerging theme *increased technology use in the classroom.*

Theme 6: Increased technology use in the classroom. Although the teachers (early adopters) in the study had a positive perception of the one-to-one technology integration at HMS and HMS, findings from classroom observations and face-to-face interviews with the principal and technology personnel revealed that technology integration had improved over the first year of the laptop implementation but still lacked a consistent change in instructional practices for some. The technology staff stated that they observed majority of the teachers at the transformation level according to the LoFTI instrument. They stated that transformation was good for the beginning of a one-to-one laptop implementation. The principal noted that too many teachers were using the SMART board for display purposes. The early adopters of both schools demonstrated acceptable technology integration practices during the second classroom observation. The first classroom observations by the principal and instructional technology staff reflected several early adopters using a lower level of technology integration such as, note taking, research, and posting to learning management systems. The principal indicated that she expected more audible and engaging lessons during classroom walk-throughs and observations. The HITC, HITF1, and HITF2 reported consistency in technology use for collaboration among students in several classrooms via wikis, Google Drive, Edmodo, and other web based tools. Web 2.0 tools, such as wikis, podcasts, blogs, and other web-based collaboration tools support constructivist

learning because these tools encourage and allow learners to construct their own learning through their own creation (Liu & Chen, 2010).

All teachers stated the collaboration, communication, creativity, and accessibility to unlimited information produced by the one-to-one program were crucial to transforming teaching and learning, however, there continued to be unused laptop carts in several classrooms. Throughout the study, I found that the level of technology integration used in the classrooms ranged from note taking to research, from creating to publishing videos and other projects. Classroom observations and interviews showed that the teachers were using many of the tools and strategies that were presented in Tech Tuesdays. According to the principal, most of the teachers credited the instructional coach and instructional facilitators for support, examples, and assistance creating technology integrated lessons that were observed in the classrooms.

Limitations of the Study

Three teachers of HMS did not participate in the study. One of the teachers was out on maternity leave and the other teachers stated time was a factor. Two teachers who did not participate were novice teachers that taught 3 years or less and both were under the age of 30. It was noted by the instructional technology facilitator that the teachers were advocates of technology integration. One of the teachers was selected to facilitate a district professional development session on the learning management system Edmodo that he used in his classroom daily. The instructional technology facilitator indicated that the teacher on leave used technology in her classroom daily.

At the time of the study HMS was between principals. The principal who served during the initial pilot study of the one-to-one laptops was moved to an elementary school in the district. The principal who began the following school year left after the first semester of the school year. A district level administrator served as interim principal until the end of the school year. The interim principal declined to participate in the study. She indicated that she was not as comfortable using technology as she would like to be but she encouraged, supported, and expected the teachers to engage students with technology infused lessons consistently. She also indicated that in addition to her observations and walk-throughs, she frequently collaborated with the instructional technology coach and instructional technology facilitator for recommendations and feedback about technology integration in the classroom. The principal stated that she relied on the technology leaders to assist her with school-wide effective technology integration because their skills and expertise were higher than hers.

Implications for Social Change

In 2013, the spending for mobile devices used in K-12 classrooms in the United States was approximately two billion dollars (Nagel, 2014). As the investment in educational technology continues to increase, studies that reveal improvement in student learning as a result of technology integration become more important to all stakeholders. This case study explored the perceptions, beliefs, and attitudes of teachers about technology integration in a one-to-one classroom. The teachers who were classified as early adopters worked at two schools which were recipients of a School

Improvement Grant. One of the interventions of transforming the two schools was "to create instructional change and provide engaging instruction for students that will continue through high school graduation" (Hometown District School Improvement Grant Proposal, 2010).Technology integration propelled by a one-to-one digital conversion was part of the instructional change. In the study, I explored the understanding of how early adopter teachers at HMS and HHS readily use technology in their classrooms after receiving professional development, different learning style strategies based on constructivism, student-led classrooms, and how the environment can shape the learning process. Findings from the case study can increase teachers' knowledge of (a) district and school leaders' expectations of digital learning transition, (b) students' expectations of digital learning transition, (c) society's expectation of digital learning transition, and (d) digital natives not only require but demand a quality digital learning transition.

I also examined how professional development can positively change teachers' beliefs, perceptions, and attitudes toward technology integration. Professional development played a key factor in technology integration becoming a norm at HMS and HHS. The study was significant because there were no historical data that addressed perceptions, beliefs, and professional development in relationship to technology integration. The study served as a base line for future studies on technology integration in HSD. The data collected from the study served as a foundation for eliminating barriers and providing professional development that prepared teachers to

integrate technology with confidence and purpose across HSD. Preparing students to compete in a globalized society is the district's primary goal.

The current study intended to provide teachers with an understanding of perceptions, attitudes, and beliefs that would enable them to seek out constructivist strategies and technology professional development opportunities that met their needs. As a result of effective technology professional development, teachers and students will become more confident and comfortable with using technology in their classrooms and society will reap the benefits. A school with effective technology integration can serve as a model for other schools in the district and the district can become a district of effective technology integration and serve as a model district for the state. This chain reaction can have an impact on social change by providing society with future workers and citizens who can compete globally. A nation that can produce students with highly competitive global skills is no longer A Nation at Risk (1983).

Recommendations for Actions

Although school leaders and technology specialists' support is fundamental for effective technology integration throughout the school. It is the responsibility of the building administrators and district personnel, and all educational leaders to move education reform into the digital age (ISTE, 2009-10). In order to experience effective technology use in schools, it is necessary for leaders to be both knowledgeable and supportive of essentials that are crucial for teachers to integrate technology into their instructional practice. The leaders of this transitioning process should include a small

group of teachers who have a positive attitude and can influence the perceptions of technology integration among the rest of the teachers.

The current study revealed that all of the early adopters had positive perceptions of the one-to-one implementation. The purpose of the early adopter concept is to change the perception, beliefs, and attitudes of a group of teachers through professional development and have those teachers (early adopters) change the entire culture of the school to an innovative culture of teaching and learning. Studies have found that the one-to-one program is more effective when a group of individuals take on the role of early adopters to provide support, leadership, and guidance during the laptop implementation (Silvernail & Lane, 2007). This small group of teachers is trained and designated to motivate and encourage teacher buy-in from all teachers to facilitate technology integration throughout the school. The early adopter concept is critical in the process of regular and successful use of technology (Schum & Levin, 2009).

This study aligned with other studies by revealing that professional development played a significant role in changing teachers' perceptions and instructional practices. The early adopters in the study received additional professional development, along with the technology specialists, from an educational research service provider, Friday Institute. This initial training from a reputable and knowledgeable organization stimulated the change in perceptions and instructional practices for the early adopters. Funding from the School Improvement Grant awarded to HMS and HHS provided both schools with an instructional technology coach and an instructional technology facilitator. The SIG funded technology personnel were

available to both schools all day every day. The funding also provided external professional development opportunities, such as Friday Institute and NCTIES for the early adopters.

The demand of quality and ongoing professional development comes with an increase in personnel and budget. As mentioned as a limitation to this study, strategies for sustainability need to be a part of goal setting. Districts need to have alternatives to professional excellence and growth. The early adopter concept is a highly recommended concept. Early adopters who have received high quality professional development, resources, and best practices can past this knowledge on to others in the district. For example, as other schools in the District replicate the one-to-one implementation or just transition to modern day instructional practices, each school should select early adopters that will be trained by the original early adopters and technology specialists of HMS and HHS. In other words, districts should take advantage of the expertise within their own district resulting in lower professional development cost. Another recommendation would be to develop an online technology community forum for the district-wide early adopters, instructional technology personnel, and computer technicians to collaborate. The online technology forum would offer technical support, professional development opportunities, best practices, and feedback.

It is also recommended that this type of forum be created at individual schools to provide comments and feedback on technology integration among the administrators and teachers. This would allow administrators and school leaders to know about

strengths and challenges as soon as they occur. This would increase collaboration and communication within the individual school, thereby increasing collaboration within the district.

Other recommendations would include blended professional development, differentiated professional development, and Bring Your Own Device (BYOD). As the district increases technology resources and demand for effective technology integration, professional development needs to be readily available to meet teachers' needs. With the growing responsibilities and directives on teachers, time restraints are inevitable. Professional development should be available to enable teachers to participate at any time, which would require online access. The district should provide online professional development along with face-to-face development. While online professional development is available at a cost, it should be the responsibility of the district's instructional technology staff to create and provide a blended model of technology professional development.

The teachers in the current study lamented about the importance of differentiating professional development. It is recommended that online professional development and face-to-face professional be offered at a beginning, intermediate, and advanced level. Differentiating technology professional development effectively will require time and personnel. It is recommended that technology need assessments be administered district-wide and for personnel to be hired and trained based on results of the need assessments. Technology professional development should not be one-size-fits all; it should meet the needs of the individuals.

When planning for future sustainability, the district should consider options for maintaining and staying abreast with technology devices. The expense of purchasing, repairing, and updating technology devices can be one of the largest expenses a district incurs. Supply and demand of technology devices have lowered the cost of laptops and the majority of students own smart phones and tablets. To meet students where they are and prepare them with the necessary skills to compete in a global society, it is recommended that BYOD is considered as an option for sustainability.

After each school is equipped with wireless access points in each classroom and multiple access points in common areas such as media centers and cafeterias, I recommend that each school implement a one-to-one digital conversion. Prior to implementation, instructional technology coaches and facilitators should be employed to offer summer and school year ongoing professional development to all teachers. It is also recommended that each school has at least one full time instructional technology person assigned to its staff. Once these prerequisites are in place, it is recommended that further study be conducted on how technology professional development impacts teachers' perceptions, attitudes, beliefs, and classroom practices.

Recommendation for Further Study

The study was limited to only two schools in a small rural demographic area that only represents schools with short term financial advantage over nine other schools in the district and results may not be representative of schools in other districts in North Carolina or other states. The participants were purposely selected as part of the early adopter program for initial startup of the one-to-one. The early adopters received

additional professional development from an external technology innovative educational center, which could have given the early adopters an advantage over the other teachers at the two schools.

The case study gathered data concerning early adopters' beliefs, perceptions, and attitudes about technology integration and technology related professional development as part of a one-to-one laptop implementation. The objective of the study was to understand how effective professional development can enable teachers to adjust pedagogical methods using technology along with knowledge of content.

The study included eight teachers, one principal, an instructional technology coach, and two instructional technology facilitators. The limited number of participants makes it difficult to generalize the findings of this study to teachers throughout the school, district, state, or country. Further research will need to be conducted with a larger number of participants to compare the findings of this study. The current study included only early adopters who received additional professional development prior to the one-to-one implementation. It is recommended that further research include all teachers' perceptions, beliefs, attitudes, and instructional practices related to technology integration, not just in a one-to-one environment.

One of the schools in the current study showed substantial student growth, 4 consecutive years after the initial implementation of the one-to-one program. The current study could be extended to include data collected from teachers and students in state tested content areas and add a research question to explore whether the one-to-one program had any impact on student growth. Implementing a proven technology

professional development model and sustaining technology resources and support should remain a priority in future plans and research.

Reflection on Researcher's Experience

Teaching has become more demanding than ever. It has been 12 years since I have been a teacher in a traditional classroom. After the traditional classroom setting, I became a classroom facilitator for virtual online classes. Although my career as an educator took place in one small district, the changes that I have seen and experienced have been monumental. In the years employed by HSD, I did not serve in a supervisory role as it relates to potential participants. Although I worked with teachers to assist with technology integration and make classroom visits, I did not provide feedback to administrators for evaluation purposes. The purpose of my observations and classroom visits was strictly for support, assistance, and collaboration with technology integration.

I have always believed that teachers are the foundation of all other professions, but I have gained a higher respect for teachers in the last 5 years. During my tenure at HHS, teacher and administrator turnover rate was extremely high, thereby rendering me as one of the few veteran employees at HHS. I have seen teachers not recommended for rehire after coming to work 2 hours earlier than most and staying 2 hours later than counterparts, preparing outstanding lessons that the students ignored, meeting or holding classes during planning periods within a week's time, and expected to juggle several new initiatives at the same time. Preparing engaging, seamlessly technology infused lessons being one of the expectations. I believe empathizing with the teachers

helped me listened to them and understand their individual needs with technology integration.

I served as the primary collector of data at the two sites in the study. I was employed in the position of instructional technology facilitator at HHS. The role of the technology facilitator was to collaborate with the teachers on infusing and integrating technology into the curriculum. This role had no supervisory influence or responsibility over any of the teachers.

Before conducting observations and interviews, I examined my own preconceptions and beliefs about technology integration and professional development. Although having certain objectives and goals for technology integration for HSD, I realized that personal feelings and biases can misrepresent participants' responses (Rubin & Rubin, 2005). I determined how my feelings could distort the research and then recorded several questions that could offset my biases. One of the questions that I continued to ask myself was, "What instructional changes are necessary in preparing students today for succeeding tomorrow?" I continued to focus on this question in effort to prevent personal bias. The review of literature and prior studies also reduced bias. I focused on remaining neutral and separating my personal feelings from my professional feelings while conducting interviews and collecting and analyzing data.

I listened to the teachers, not as an administrator or supervisor, but as a peer. I believed that their perceptions and beliefs could be changed if the support and resources were available to them. Realizing that ongoing high quality professional development was a leading factor in successful technology integration, I concentrated

on what the teachers requested and required verbally and nonverbally. My personal bias towards effective technology integration did not influence my dispassion of the teachers during face-to-face interviews and classroom observations.

The findings have motivated me to continue to research and evaluate technology professional development strategies that will meet individual teacher's needs. As a result of the study, I have planned to seek professional opportunities that will expand the professional learning community in technology integration for the district. Since beginning the study, I have included best practices, suggestions, and objectives found in other studies and review of literature.

Conclusion

Students are living in a global society and teachers must take steps in providing students with technology literacy that is needed to survive and compete. The purpose of this case study was to explore the perceptions of teachers in HMS and HHS in integrating and enhancing instructional technology practices in a one-to-one classroom through professional development. The study was an examination of the actions that school leaders and technology staff took to implement technology use into HMS and HHS and how technology professional development serves as a catalyst for changing teachers' perceptions and practices.

Professional development in technology instruction was the main topic of the study. Although professional development was a major part of funding provided to HSD, technology professional development need to be a priority in changing teachers' instructional practices. A change in instructional practices is pivotal to preparing students

to use 21st century skills. Teachers need proper training and constant support to be highly qualified in technology use. Providing ongoing, differentiated, blended, quality professional development plan is a major part of the transition process.

The study suggested several implications for practice that could help schools and districts successfully implement a one-to-one initiative. One hundred percent of the teachers interviewed suggested professional development as a major factor for changing teachers' perceptions and practices about technology integration in a one-to-one laptop initiative. One teacher implied that the training started a year before the laptops were actually distributed which gave them a concept of what to expect and allowed them time to digest a new type of teaching practices.

Data collected revealed that the teachers were allowed to experiment and use tools that they felt comfortable using and the administrator did not force or dictate how technology integration occurred. Teachers implied that they were not told they had to use the laptops every day or that they had to use them at all. There were SMART boards in all of the classrooms and as long as technology integration was present during classroom observations, the administrators acknowledged it. Technology integration was more effective in classrooms when the teacher was the facilitator. The students worked in groups and among themselves as the teacher guided them when needed. Classroom management was an issue with the laptops only with teachers who had classroom management concerns before the laptops. The more the teachers used the laptops in the classroom, the more confident they became with technology integration, and referrals and frustrations in the classroom decreased. Data collected through

observations showed that based on age, the younger teachers used the laptops more the older teachers. It was difficult to determine if the lack of laptop use was a result of the wireless infrastructure, but all of the participants in the study complained about the wireless network in both of the schools.

An inadequate infrastructure can be a key factor for an unsuccessful one-to-one laptop implementation. Data collected in this study as well as other studies attributed slow sluggish and unreliable Internet connection as a reason for not using laptops more and lack of technology integration. It is suggested that more than adequate bandwidth and wireless connection be made available before a school launches a one-to-one implementation. It was observed during the classroom walk-throughs that in classrooms that have an access point in the room, the Internet was more reliable than in classrooms where the access point was in the hall. High quality, reliable wireless infrastructure is just as important as professional development. If the infrastructure is not adequate, it is impossible for teachers to demonstrate technology infused best practices and strategies needed for career and workplace readiness.

References

Abbitt, J. (2011). Measuring technological pedagogical content knowledge in preservice teacher education: A review of current methods and instruments. *Journal of Research on Technology in Education, (43)* 4, 281-300. Retrieved from www.iste.org.

Almond, P., Winter, P., Cameto, R., Russell, M., Sato, E., Clarke-Midura, J.…Lazarus, S. (2010). Technology-enabled and universally designed assessment: Considering access in measuring the achievement of students with disabilities—A foundation for research. *Journal of Technology, Learning, and Assessment, 10*(5). Retrieved from http://ejournals.bc.edu/ojs/index.php/jtla

An, Y., & Reigeluth, C. (2011). Creating technology-enhanced, learner-centered classrooms: K-12 teachers' beliefs, perceptions, barriers, and support needs. *Journal of Digital Learning in Teacher Education, 28*(2), 54-62. Retrieved from http://www.iste.org

Anderson, R.E., & Dexter, S. (2005). School technology leadership: An empirical investigation of prevalence and effect. *Educational Administration Quarterly, 41*(1), 49-82. doi:10.1177/0013161X04269517

Angeli, C., & Valandides, N. (2009). Epistemological and methodological issues for the conceptualization, development, and assessment of ICT-TPCK: Advances in technological pedagogical content knowledge (TCPK). *Computers and Education, 52,* 154-168. doi:10.1016/j.compedu.2008.07.006

Archambault, L., & Crippen, K. (2009). Examining TPACK among K–12 online distance educators in the United States. *Contemporary Issues in Technology and Teacher Education, 9*(1), 71–88. Retrieved from http://www.citejournal.org/vol15/iss1/

Ash, K. (2010). U.S. ed-tech plan urges rethinking in K-12 schools. *Education Week, 29*(24), 1-1, 16, 17. Retrieved from http://search.proquest.com/docview/202781524?accountid=14872

Bai, H., & Ertmer, P. A. (2008). Teacher educators' beliefs and technology uses as predictors of preservice teachers' beliefs and technology attitudes. *Journal of Technology and Teacher Education, 16*(1), 93-112. Retrieved from http://www.citejournal.org/vol15/iss1/

Bangolu, K. (2011). School principals' technology leadership competency and technology coordinatorship. *Educational Sciences: Theory and Practice, 11*(1), 208-213. Retrieved from http://www.academia.edu/1393310/School_Principals_Technology_Leadership_Competency_and_Technology_Coordinatorship

Barrett-Greenly, T. (2013). *Investigating the impact of professional development on teacher practices and beliefs regarding the use of mobile educational applications in the classroom* (Doctoral dissertation) Available from ProQuest Dissertations & Theses Global. (Order No. 3555257)

Bas, G. (2012). Investigating the correlation between students' perceptions on the constructivist learning environment and their academic success in science course

with path analysis. *Journal of Baltic Science Education, (11)*4, 367-378. Retrieved from http://www.jbse.webinfo.lt/journal.htm

Baxter, P., & Jack, S. (2008). Qualitative case study methodology: Study design and implementation for novice researchers. *Qualitative Report, 14*(4), 544-559. Retrieved from http://www.nova.edu/ssss/QR/

Bebell, D., & Kay, R. (2010). One-to-one computing: A summary of the quantitative results from the Berkshire Wireless Learning Initiative. *Journal of Technology, Learning, and Assessment, 9*(2), 7-59. Retrieved from http://ejournals.bc.edu/ojs/index.php/jtla

Beetham, H., & Sharpe, R. (Eds.). (2013). *Rethinking pedagogy for a digital age: Designing for 21st century learning.* Abingdon, London: Routledge.

Bellanca, J., & Brandt, R. (2010). *21st century skills: Rethinking how students learn*. Bloomington, IN: Solution Tree Press.

Ben-Ari, R., & Kedem-Friedrich, P. (2000). Restructuring heterogeneous classes for cognitive development: Social interactive perspective. *Instructional Science, 28*(2), 153-167. Retrieved from http://link.springer.com/journal/11251

Bonk, C. J. (2009). *The world is open: How web technology is revolutionizing education*. San Francisco, CA: Jossey-Bass.

Borthwick, A., & Pierson, M. (Eds.). (2008). *Transforming classroom practice: Professional development strategies in educational technology.* Eugene, OR: International Society for Technology in Education.

Bryant, F. L. (2008). Elementary teachers' experiences with technology professional development and classroom technology integration: Influences of elements of diffusion and support (Doctoral dissertation, George State University). Retrieved from http://library.gsu.edu/

Chai, C.S., & Lim, C.P. (2011). The Internet and teacher education: Traversing between the digitized world and schools. *Internet and Higher Education, 14*(1), 3-9. doi: 10.1016/j.iheduc.2010.04.003

Chang, I., Chin, J., & Hsu, C. (2008). Teachers' perceptions of the dimensions and implementation of technology leadership of principals in Taiwanese Elementary Schools. *Journal of Educational Technology & Society, 11*(4), 229-245. Retrieved from http://search.proquest.com/docview/1287038627?accountid=14872

Chapman, L., Masters, J., & Pedulla, J. (2010). Do digital divisions still persist in schools? Access to technology and technical skills of teachers in high needs schools in the United States of America. *Journal of Education and Teaching, 36*(2), 239-249. doi: 10.1080/02607471003651870.

Christensen, C. M., Horn, M. B., & Johnson, C. W. (2008). *Disrupting class: How disruptive innovation will change the way the world learns.* New York, NY: McGraw-Hill.

Chitanana, L. (2012). A constructivist approach to the design and delivery of an online professional development course: a case of the iEARN online course. *International Journal of Instruction, (5)*1, 23-48. Retrieved from http://www.e-iji.net/dosyalar/iji_2012_1_2.pdf

Clausen, J. M., Britten, J., & Ring, G. (2008). Envisioning effective laptop initiatives. *Learning & Leading with Technology, 36*(2), 18-22. Retrieved from http://auth.waldenulibrary.org

Collins, A., & Halverson, R. (2009). *Rethinking education in the age of technology: The digital revolution and schooling in America.* New York, NY: Teachers College Press.

Common Sense Media. (2009, June) Digital Literacy and Citizenship in the 21st Century: Educating, Empowering, and Protecting America's Kids. Retrieved from http://www.commonsensemedia.org/digital-literacy-and-citizenship-21stcentury

Cormode, G., Krishnamurthy, B. (2008). Key differences between Web 1.0 and Web 2.0.*First Monday, 13*(6). Retrieved from http://www.uic.edu/htbin/cgiwrap/bin/ojs/index.php/fm/article/view/2125/1972

Corn, J. (2009). *Evaluation report on the progress of the North Carolina one-to-one learning and technology initiative (Year 2) (NC State Board of Education Report).* Raleigh, NC: Friday Institute for Educational Innovation, North Carolina State University.

Creswell, J.W. (2003). *Research design: Qualitative, quantitative, and mixed methods approaches* (2nd ed.). Thousand Oaks, CA: Sage.

Creswell, J.W. (2007). *Qualitative inquiry and research design: Choosing among five approaches* (2nd ed.). Thousand Oaks, CA: Sage.

Darling-Hammond, L., Jaquith, A., Mindich, D., & Wei, R. (2010). *Teacher professional learning in the United States: Case studies of state policies and strategies.* Oxford, OH: Learning Forward.

Davidson, N., & Stone, J. (2009). 21st century transformation. *Principal Leadership, 10*(1), 52-55. Retrieved from http://search.proquest.com/docview/216295341?accountid=14872

Dawson, K., Cavanaugh, C. & Ritzhaupt, A. D. (2008). Florida's EETT leveraging laptops initiative and its impact on teaching practices. *Journal of Research on technology in Education, 41*(2), 143-159. Retrieved from http://sfxhosted.exlibrisgroup.com

Dede, C. (2009). Technologies that facilitate generating knowledge and possibly wisdom. *Educational Researcher, 38*(4), 260-263. Retrieved from http://search.proquest.com/docview/216902806?accountid=14872

Denton, D. W. (2012). Enhancing instruction through constructivism, cooperative learning, and cloud computing. *TechTrends, 56*(4), 34-41. doi: http://dx.doi.org/10.1007/s11528-012-0585-1

Desimone, L. M. (2009). Improving impact studies of teachers' professional development: Toward better conceptualizations and measures. *Educational Researcher, 38*(3), 181-199. Retrieved from http://search.proquest.com/docview/216902889?accountid=14872

Desimone, L. M. (2011). A primer on effective professional development. *Phi Delta Kappan, (92),* 68-71. Retrieved from http://web.a.ebscohost.com.ezp.waldenulibrary.org

Doering, A., Scharber, C., & Miller, C. (2009). GeoThentic: Designing and assessing with technology, pedagogy, and content knowledge. *Contemporary Issues in Technology and Teacher Education, 9*(3), 316–336. Retrieved from http://web.a.ebscohost.com.ezp.waldenulibrary.org

Donnelly, D., McGarr, O., & O'Reilly, J. (2011). A framework for teachers' integration of ICT into their classroom practice. *Computers & Education, 57*(2), 1469-1483. doi:http://dx.doi.org/10.1016/j.compedu.2011.02.014

Donovan, L., Hartley, K., Strudler, N. (2007). Teacher concerns during initial implementation of a one-to-one laptop initiative at the middle school level. *Journal of Research on Technology in Education. 39* (3), 263-286. Retrieved from: www.eric.ed.gov/ERICWebPortal/recordDetail?accno=EJ768880

Donovan, L., Green, T., & Hartley, K. (2010). An examination of one-to-one computing in the middle school: Does increased access bring about increased student engagement? *Journal of Educational Computing Research, 42*(4), 423-441. Retrieved from http://web.b.ebscohost.com.ezp.waldenulibrary.org

Doukakis, S., Chionidou-Moskofoglou, M., Mangina-Phelan, E., & Roussos, P. (2010). Measuring technological and content knowledge of undergraduate primary teachers in mathematics. *Technology Enhanced Learning. Quality of Teaching and Educational Reform, 73,* 405-410. doi: 10.1007/978-3-642-13166-0_57

Drayton, B., Falk, J., Stroud, R., Hobbs, K., & Hammerman, J. (2010). After installation: Ubiquitous computing and high school science in three experienced, high-technology schools. *Journal of Technology, Learning, and Assessment, 9*(3). Retrieved from http://ejournals.bc.edu/ojs/index.php/jtla

Duncan, A. (October 22, 2009). *Teacher preparation: Reforming the uncertain profession.* (Speech presented at Teachers College, Columbia University). Retrieved from http://www2.ed.gov/news/speeches/2009/10/10222009.html

Duncan, A. (May 9, 2009). Excerpts from Secretary Arne Duncan's remarks at the National Press Club. Retrieved from http://www.ed.gov/blog/2009/06/excepts-from-secretary-arne-duncan%E2%80%99s-remarks-at-the-national-press-club/

Dunleavy, M., Dexter, S., & Heinecke, W. F. (2007). What added value does a one-to-one student to laptop ratio bring to technology-supported teaching and learning? *Journal of Computer Assisted Learning, 23,* 440-452. doi:10.1111/j.1365-2729.2007.00227.x

Dunn, K., & Rakes, G., (2010). Learner-centeredness and teacher efficacy: Predicting teachers' consequence concerns regarding the use of technology in the classroom. *Journal of Technology and Teacher Education, 18*(1), 57-83. Retrieved from http://www.aace.org/pubs/jtate/

Eckert, M. T. (2010). *Eight years of ubiquitous technology access and digital curricula: Business and marketing high school teachers' perspective* (Doctoral dissertation, Virginia Commonwealth University). Retrieved from http://scholarscompass.vcu.edu/cgi/viewcontent.cgi?article=3332&context=etd

Edelson, D. (2001). Learning-for-use: A framework for the design of technology-supported inquiry activities. *Journal of Research in Science Teaching, 38*(3), 355-385. doi: 10.1002/1098-2736(200103)38:3<355: AID-TEA1010>3.0.CO;2-M

Edmodo, Inc. (2015). Retrieved from http://www.edmodo.com.

Ertmer, P.A., Ottenbreit-Leftwich, A., Sadik, O., Sendurur, E., Sendurur, P. (2012). Teacher beliefs and technology integration practices: A critical relationship, *Computers & Education, (59)*2, 423-435. doi:10.1016/j.compedu.2012.02.001

Ertmer, P. A., Ottenbreit-Leftwich, A., & York, C. S. (2007). Exemplary technology-using teachers: Perceptions of factors influencing success. *Journal of Computing in Teacher Education, 23*(2), 55-61. Retrieve from http://www.tandfonline.com/toc/ujdl19/23/4#.VR35hPnF87t

Ertmer, P.A., & Ottenbreit-Leftwich, A. (2010). Teacher technology change: How knowledge, confidence, beliefs, and culture intersect. *Journal of Research on Technology in Education, 42*(3), 255-284. Retrieved from http://www.tandfonline.com/loi/ujrt20#.VR37tfnF87s

Ertmer, P. & Ottenbreit-Leftwich, A. (2013). Removing obstacles to the pedagogical changes required by Jonassen's vision of authentic technology-enabled learning, *Computers & Education, 64.* doi:10.1016/j.compedu.2012.10.008

Faulder, T. R. (2011). *Technology integration: A research-based professional development program* (Master's thesis). Retrieved from http://digitalcommons.cedarville.edu/education_theses/30

Forcier, R. C., & Descy, D. E. (2008). *The computer as an educational tool: Productivity and problem-solving* (5th ed.). Upper Saddle River, New Jersey: Pearson Education, Inc.

Friday Institute, (2008). *North Carolina Learning Technology Initiative Framework for Planning Prepared by the Friday Institute for Educational Innovation.* Unpublished manuscript.

Fullan, M. (2009). Large-scale reform comes of age. *Journal of Educational Change, 10(*2/3), 101-113. doi:10.1007/s10833-009-9108-z

Gardner, D. P., National Commission on Excellence in Education (ED), W. D., & And, O. (1983). A Nation At Risk: The Imperative For Educational Reform. An Open Letter to the American People. A Report to the Nation and the Secretary of Education. Retrieved from http://web.b.ebscohost.com.ezp.waldenulibrary.org/

Garet, M. S., Porter, A. C., Desimone, L., Birman, B. F., & Yoon, K. S. (2001). What makes professional development effective? Results from a national sample or teachers. *American Educational Research Journal, 38*(4), 915. Retrieved from http://search.proquest.com/docview/200450497?accountid=14872

Gillham, B. (2010). *Case study research method*. London, GBR: Continuum International Publishing.

Given, L. M. (Ed.). (2008). *The sage encyclopedia of qualitative research methods (Vol.1 & 2).* Thousand Oaks, CA: Sage.

Glover, D., Miller, D., Averis, D., & Door, V. (2007). The evolution of an effective pedagogy for teachers using the interactive whiteboard in mathematics and

modern languages: An empirical analysis from the secondary sector. *Learning, Media and Technology, 32*(1), 5-20. Retrieved from http://search.proquest.com/docview/214091256?accountid=14872

Golden Leaf, (2009). An update from the Golden Leaf Foundation. *Leaf Lines*. Retrieved from http://goldenleaf.org/newsletter/LEAF_Lines_Fall2009.html.

Gorder, L.M. (2008). A study of teacher perceptions of instructional technology integration in the classroom. *Delta Pi Epsilon Journal, 50*(2), 63-76. Retrieved from http://www.worldcat.org/title/delta-pi-epsilon-journal/oclc/1566126

Gordon, M. (2009). Toward a pragmatic discourse of constructivism: Reflections on lessons from practice. *Educational Studies: Journal of the American Educational Studies Association, 45*(1), 39-58. doi: 10.1080/00131940802546894

Gordon, M. S., & Cui, M. (2012). The effect of school-specific parenting processes on academic achievement in adolescence and young adulthood. *Family Relations, 61*(5), 728-741. doi: 10.1111/j.1741-3729.2012.00733.x

Graham, C. R., Borup, J. J., & Smith, N. B. (2012). Using TPACK as a framework to understand teacher candidates' technology integration decisions. *Journal of Computer Assisted Learning, 28*(6), 530-546. doi: 10.1111/j.1365-2729.2011.00472.x

Graham, C., Burgoyne, N., & Borup, J. (2010). The decision-making processes of preservice teachers as they integrate technology. In C. Crawford, D. A. Willis, R. Carlsen, I. Gibson, K. McFerrin, J. Price & R. Weber (Eds.), *Proceedings of the*

Society for Information Technology & Teacher Education International Conference 2010 (3826–3832). Chesapeake, VA: AACE.

Gray, L., Thomas, N., and Lewis, L. (2010). Teachers' Use of Educational Technology in U.S. Public Schools: 2009 (NCES 2010-040). National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education. Washington, DC. Retrieved from http://nces.ed.gov/pubs2010/2010040.pdf

Greaves, T., & Hayes, J. (2006). America's digital schools 2006: A five-year forecast. *The Greaves Group, the Hayes Connection.* Retrieved from www.k12hsn.org/files/research/Online_Learning/ADS2006KF.pdf.

Greaves, T., & Hayes, J. (2008). America's digital schools: 2008: Six trends to watch. Shelton, CT: MDR. Retrieved from http://www.lcps.org/cms/lib4/VA01000195/Centricity/Domain/52/Americas_Digital_Schools_2008.pdf

Greenhow, C., Robelia, B., & Hughes, J. E. (2009). Learning, teaching, and scholarship in a digital age. *Educational Researcher, 38*(4), 246-259. Retrieved from http://search.proquest.com/docview/216906081?accountid=14872

Greenhow, C., Robelia, B., & Hughes, J. E. (2009). Research on learning and teaching with web 2.0: Bridging conversations. *Educational Researcher, 38*(4), 280-283. Retrieved from http://search.proquest.com/docview/216906231?accountid=14872

Griffin, P., McGaw, B. and Care, E. (eds) (2012). *Assessment and Teaching of 21st Century Skills*. Educational Assessment in an Information Age, doi: 10.1007/978-94-017-9395-7_1

Grimes, D. & Warchauer, M. (2008). Learning with laptops: a multimethod case study. *Journal of Educational Computing Research, 38*(3), 306. doi: 10.2190/EC.38.3.d

Guzman, A., & Nussbaum, M. (2009). Teaching competencies for technology integration in the classroom. *Journal of Computer Assisted Learning, 25*, 453-469. doi: 10.1111/j.1365-2729.2009.00322.

Hall, G. E. (2010). Technology's achilles heel: Achieving high-quality implementation. *Journal of Research on Technology in Education, 42*(3), 231-253. Retrieved from http://search.proquest.com/docview/817559575?accountid=14872

Hall, G. E., & Hord, S. M. (2011). *Implementing change: patterns, principles, and potholes* (3rd ed.). Boston, MA: Pearson.

Handsfield, L. J., Dean, T. R., & Cielocha, K. M. (2009). Becoming critical consumers and producers of text: Teaching literacy with web 1.0 and web 2.0. *The Reading Teacher, 63*(1), 40-50. Retrieved from http://search.proquest.com/docview/203280235?accountid=14872

Hansen, L., Donovan, L. & Fitts, S. (2009). Bilingual and ELL Preservice Teachers and Technology Self-Efficacy. In I. Gibson et al. (Eds.), *Proceedings of Society for Information Technology & Teacher Education International Conference 2009* (pp. 688-695). Chesapeake, VA: Association for the Advancement of Computing in Education (AACE). Retrieved from http://www.aace.org/conf/site

Hargreaves, A. (2009). Change Wars. In A. Hargreaves & M. Fullan (Eds.), *The fourth way of change towards an age of inspiration and sustainability* (pp. 11-43). Bloomington, IN: Solution Tree Press.

Harris, J., Grandgenett, N., & Hofer, M. (2010). Testing a TPACK-based technology integration assessment rubric. In C. Crawford, D. A. Willis, R. Carlsen, I. Gibson, K. McFerrin, J. Price & R. Weber (Eds.), *Proceedings of the Society for Information Technology & Teacher Education International Conference 2010* (pp. 3833–3840). Chesapeake, VA: AACE. Retrieved from http://www.aace.org/conf/site

Harris, M. J. (2010). *Impactful student learning outcomes of one-to-one student laptop programs in low socioeconomic schools* (Doctoral dissertation). Retrieved from ProQuest Dissertations & Theses Global (Order No. 3438093).

Harris, J. & Hofer, M. (2011). Technological Pedagogical Content Knowledge (TPACK) in Action: A descriptive study of secondary teachers 'curriculum-based, technology-related instructional planning, *Journal of Research on Technology in Education (43)*3, 211-229. Retrieved from http://www.iste.org/learn/publications/journals/jrte

Harris, J., Mishra, P., & Koehler, M. (2009). Teachers' technological pedagogical content knowledge and leaning activity types: Curriculum-based technology integration reframed. *Journal of Research on Technology in Education, 41*(4), 393-416. http://www.iste.org/learn/publications/journals/jrte

Harvey-Woodall, A. (2009). Integrating technology into the classroom: How does it impact student achievement? Abstract retrieved from http://eric.ed.gov/?id=ED505984

Hashemzadeh, N. & Wilson, L. (2007). Teaching with the lights out: What do we really know about the impact of technology intensive instruction? *College Student Journal, 41*(3), 601-612. Retrieved from http://www.projectinnovation.com/college-student-journal.html

Heo, M. (2009). Digital storytelling: An empirical study of the impact of digital storytelling on pre-service teachers' self-efficacy and dispositions towards educational technology. *Journal of Educational Multimedia and Hypermedia, 18*(4), 405-428.

Hixon, E., & Buckenmeyer, J. (2009). Revisiting technology integration in schools: Implications for professional development. *Computers in the Schools*, *26*(2), 130-146. doi: 10.1080/07380560902906070

Holbrook, J. (June, 2010). Education through science as a motivational innovation for science education for all. *Science Education International, 21*(2), 80-91.

Holcomb, L. B. (2009). Results & lessons learned from one-to-one laptop initiatives: A collective review. *TechTrends: Linking Research & Practice to Improve Learning*, *53*(6), 49-55. doi: 10.1007/s11528-009-0343-1

Hollandsworth, R., Dowdy, L., & Donovan, J. (2011). Digital Citizenship in K-12: It Takes a Village. *TechTrends: Linking Research & Practice To Improve Learning, 55*(4), 37-47. doi: 10.1007/s11528-011-0510-z

Holmes, P. (2008). On our bikes! *Australian Council in Educational Research*, *1988*(53). Retrieved from http://research.acer.edu.au/teacher/

Hometown Development Commission, (2010). Hometown North Carolina: We mean business. Retrieved from http://hometowndevelopment.com/index.php.

Howley, A., Wood, L., & Hough, B. (2011). Rural elementary school teachers' technology integration. *Journal of Research in Rural Education, 26*(9), 1-13. Retrieved from http://search.proquest.com/docview/877890715?accountid=14872

Hsu, S. (2010). Developing a scale for teacher integration of information and communication technology in grades 1-9. *Journal of Computer Assisted Learning, 26*(3), 175-189. doi: 10.1111/j.1365-2729.2010.00348.x.

Hu, W. (2007, May 4). Seeing no progress, some schools drop laptops. *New York Times*, Retrieved from http://www.nytimes.com

ISTE, (2012). NETS-A, *International Society for Technology in Education*. Retrieved from http://www.iste.org/docs/pdfs/nets-a-standards.pdf?sfvrsn=2

Inan, F., & Lowther, D. (2010). Factors affecting technology integration in K-12 classrooms: a path model. *Educational Technology Research and Development, 58*(2), 137-154. doi: 10.1007/s11423-009-9132-y

Inan, F. A. & Lowther, D. L. (2010). Laptops in the K-12 classrooms: Exploring factors impacting instructional use, *Computers & Education, 55*(3), 937-944. doi:10.1016/j.compedu.2010.04.004

International Reading Association (2009). *New literacies and 21st century technologies. A position statement of the International Reading Association*, Newark, DE: International Reading Association.

Johnson, C. D. (2009). *The joy of children's literature. The new literacies: The world of online children's literature* (pp. 357-364). Boston, MA: Houghton Mifflin.

Johnstone, B. (2003). *Never mind the laptops: Kids, computers, and the transformation of learning.* New York: iUniverse Inc.

Jonassen, D., Howland, J., Mari, R., & Crismond, D. (2008). *Meaningful learning with technology* (3rd ed.). Upper Saddle River, New Jersey: Pearson Education, Inc.

Keengwe, J., & Onchwari, G. (2009). Technology and early childhood education: A technology integration professional development model for practicing teachers. *Early Childhood Education Journal 37*(3), 209–218. doi: 10.1007/s10643-009-0341-0

Kelly, F. S., McCain, T., & Jukes, I. (2009). *Teaching the digital generation: No more cookie cutter high school* .Thousand Oaks, CA: Corwin Press.

Kim, C., Kim M., Lee, C., Spector, M., & DeMeester, K. (2013).Teacher beliefs and technology integration, *Teaching and Teacher Education, (29),* 76-85. doi:10.1016/j.tate.2012.08.005

Klieger, A., Ben-Hur, Y., & Bar-Yossef, N. (2010). Integrating laptop computers into classroom: Attitudes, needs, and professional development of science teachers—A case study. *Journal of Science Education & Technology*, *19*(2), 187-198.doi:10.1007/s10956-009-9191-1

Koehler, M. & Mishra, P. (2008). Introducing technological pedagogical content knowledge. In AACTE Committee on Innovation and Technology (Eds.),

Handbook of technological pedagogical content knowledge (TPCK) for educators (pp. 3-29). New York, NY: Routledge.

Koehler, M. J., & Mishra, P. (2009). What is technological pedagogical content knowledge? *Contemporary Issues in Technology and Teacher Education*, *9*(1). Retrieved from http://www.citejournal.org/vol9/iss1/general/article1.cfm

Koh, J. & Frick, T. (2009). Instructor and student classroom interactions during technology skills instruction for facilitating preservice teachers' computer self-efficacy. *Journal of Educational Computing Research*, *4*0(2), 211-228. doi: 10.2190/EC.40.2.d

Kolikant, Y. B. D. (2010). Digital natives, better learners? Students' beliefs about how the Internet influenced their ability to learn. *Computers in Human Behavior, 26*(6), 1384-1391. doi: 10.1016/j.chb.2010.04.012

Kopcha, T. J. (2012). Teachers' perceptions of the barriers to technology integration and practices with technology under situated professional development. *Computers & Education, 59*(4), 1109-1121. doi: 10.1016/j.compedu.2013.10.011

Kriek, J. & Grayson, D. (2009). A holistic professional development model for South African physical science teachers. *South African Journal of Education, 29*(2), Retrieved from http://www.sajournalofeducation.co.za/index.php/saje

Lalonde, C. (2011). Courses that deliver: Reflecting on constructivist pedagogical approaches to teaching online and on-site foundations courses. *International Journal of Teaching and Learning in Higher Education, (23)*3, 408-423, ISSN 1812-9129. Retrieved from http://www.isetl.org/ijtlhe/

Lamanauskas, V., (2012). A constructivist approach to integrated science education: Teaching prospective teachers to do science. *Problems of Education in the 21st Century, 45,* 5-9. Retrieved from http://www.scientiasocialis.lt/pec/

Lambert, L., Walker, D., Zimmerman, D., Cooper, J., Lambert, M., Gardner, M., & Szabo, M., (2002.). *The constructivist leader.* (2nded.) NY: Teachers College Press.

Larkin, K. (2011). You use! I use! We use! Questioning the orthodoxy of 1: 1 computing in primary schools. *Journal of Research on Technology in Education, 44*(2), 101-120. Retrieved from http://www.iste.org/learn/publications/journals/jrte

Larson, L., Miller, T., & Ribble, M., (2009-10, December/January). 5 considerations for digital age leaders: What principals and district administrators need to know about tech integration today? *Learning and Leading with Technology, 37*(4). Retrieved from http://tinyurl.com/l3n7fyg

Lawless, K. A., & Pellegrino, J. W. (2007). Professional development in integrating technology into teaching and learning: Knowns, unknowns, and ways to pursue better questions and answers. *Review of educational research, 77*(4), 575-614. doi: 10.3102/0034654307309921

Learning Cultures Consulting, Inc., (2006). One-to-one Mobile Computing – Literature Review retrieved from http://education.alberta.ca/media/528965/litreview.pdf

Lei, J., & Zhao, Y. (2008). One-to-one computing: what does it bring to schools? *Journal of Educational Computing Research, 39*(2), 97-122. doi: 10.2190/EC.39.2.a

Lei, J. (2009). Digital natives as preservice teachers: What technology preparation is needed? *Journal of Computing in Teacher Education, 25*(3), 87-97. Retrieved from http://www.tandfonline.com/toc/ujdl19/23/4#.VR67SfnF87s

Lemagie, S. (2010, November 21). 1 student, 1 laptop proves costly. *Minneapolis Star-Tribune.* Retrieved from http://www.startribune.com/local/109779099.html

Lemke, C., Coughlin, E. & Reifsneider, D. (2009). *Technology in schools: What the research says: An update.* Culver City, CA: Commissioned by Cisco. Retrieved from http://www.cisco.com/web/strategy/docs/education/tech_in_schools_what_research_says.pdf

Leu, D., O'Byrne, W., Zawilinski, L., McVerry, G., & Everett-Cacopardo, H. (2009). Comments on Greenhow, Robelia, and Hughes: Expanding the new literacies conversation. *Educational Researcher, 38,* 264-269. Retrieved from http://edr.sagepub.com/content/current

Levin, T., & Wadmany, R. (2008).Teachers' views on factors affecting effective integration of information technology in the classroom: Developmental scenery. *Journal of Technology and Teacher Education, 16*(2), 233-263. Retrieved from http://editlib.org.

Lee Yuen, L. (2010). The Use of Constructivist Teaching Practices by Four New Secondary School Science Teachers: A Comparison of New Teachers and Experienced Constructivist Teachers. *Science Educator*, *19*(2), 10-21. Retrieved from http://onlinelibrary.wiley.com/

Lin, C., Lin, Lin, M., & Huang, Y. (2009). *The influence of leadership styles to the in-service teachers' integrating IT into teaching and learning.* Paper presented At the Society for Information Technology and Teacher Education International Conference 2009, Charleston, SC, USA. Retrieved from http://www.editlib.org/noaccess/30992/

Liu, C. & Chen, I. (2010). Evolution of constructivism. *Contemporary Issues in Education Research, 3*(4), 63-66. Retrieved from http://search.proquest.com/docview/196354565?accountid=14872

Livingston, P. (2009). *1-to-1 Learning: Laptop Programs That Work. (*2nd ed.). DC: Library of Congress

London, H., & Draper, M. (2008). The silent revolution in higher education. *Academic Questions, 21*, 221-225. doi: 10.1007/s12129-008-9052-z

Loucks-Horsley, S., Love, N., Stiles, K. E., Mundry, S. E., & Hewson, P. (2003). *Designing professional development for teachers of science and mathematics* (2nd ed.). Thousand Oaks, CA: Corwin Press.

Lowther, D. L., Inan, F. A., Shrahl, J. D., & Ross, S. M., (2008). Does technology integration "work" when key barriers are removed? *Educational Media International, 45*(3), 195-213. doi: 10.1080/09523980802284317

Lowther, D. L., Inan, F. A., Ross, S., & Strahl, J. D. (2012). Do one-to-one initiatives bridge the way to 21st century knowledge and skills? *Journal of Educational Computing Research, 46*(1), 1-30. Retrieved from http://jrnledcompresearch.com/index.php/jecr/index

Madden, M., Lenhart, A., Duggan, M., Cortes, S., & Gasser, U. (2013). Teens and technology 2013. *Pew Internet & American Life Project.* Retrieved from http://pewinternet.org/Reports/2013/Teens-and-Tech.aspx

Malhiwsky, D. R. (2010). *Student achievement using web 2.0 technologies: A mixed methods study* (Doctoral dissertation). Available from ProQuest Dissertations & Theses Global. (UMI No. 3397630).

Maninger, R.M., & Holden, M.E. (2009). Put the textbooks away: Preparation and support for a middle school one-to-one laptop initiative. *American Secondary Education, 38* (1), 5-33. Retrieved from: https://www.ashland.edu/coe/about-college/american-secondary-education-journal

Martin, S., Diaz, G., Sancristobal, E., Gil, R., Castro, M., &Peire, J. (2011). New technology trends in education. Seven years of forecasts and convergence. *Computers & Education, 57*(3), 1893-1906.doi:dx.doi.org/10.1016/j.compedu.2011.04.003

Martin, W., Strother, S., Beglau, M., Bates, L., Reitzes, T., Culp, K. (2010). Connecting instructional technology professional development to teacher and student outcome. *Journal of Research on Technology in Education, 43*(1), 53-74. Retrieved from http://www.iste.org/learn/publications/journals/jrte

Maxwell, L. A. (2013). Educational equity. *Education Week, 32*(29), 5. Retrieved from www.edweek.org

McDonald, L. (2009). Teacher change: A dynamic interactive approach. *The International Journal of Learning, 16*(10), 623-636. Retrieved from http://www.world-education-center.org/index.php/ijlt

McGee, P., & Diaz, V. (2007). Wikis and podcasts and blogs? Oh, my! What is a faculty member supposed to do? *EDUCAUSE Review, 42*(5). Retrieve from http://www.educause.edu/ero

Meltzer, S. T. (2012). *Step-by-step professional development in technology.* Larchmont, N.Y.: Eye on Education, Inc.

Menard, L. B. (2010). *Elementary teachers' perceptions of technology as a catalyst for constructivist practices in the classroom: A case study* (Doctoral dissertation). Available from ProQuest Dissertations & Theses database. (UMI No. 3432817)

Merriam, S. (2002). *Qualitative research in practice: Examples for discussion and analysis.* San Francisco: Jossey-Bass.

Merriam, S. B. (2009).*Qualitative research: A guide to design and implementation.* San Francisco: Jossey-Bass.

Meyer, D. L. (2009).The poverty of constructivism. *Educational Philosophy and Theory, (41)*3, 332-341. doi: 10.1111/j.1469-5812.2008.00457.x

Milner, A. R., Templin, M. A., & Czerniak, C. M. (2010). Elementary science student's motivation and learning strategy use: Constructivist classroom contextual factors in a life science laboratory and a traditional classroom. *Journal of Science Teacher Education, (22),* 151-170, doi: 10.1007/s10972-010-9200-5

Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers College Record, 108,* 1017-1054. doi: 10.1111/j.1467-9620.2006.00684.x

Mishne, J. (2012). *An investigation of the relationships between technology use and teachers' self-efficacy, knowledge and experience*. (Doctoral dissertation, Pepperdine University). Available from ProQuest Dissertations and Theses database. (UMI No. 3503821)

Mizell, H., Hord, S., Killion, J., & Hirsh, S. (2011). New standards put the spotlight on professional learning. *Journal of Staff Development, 32*(4), 10-12, 14. Retrieved from http://learningforward.org/publications/jsd

Mizuko, I., Horst, H., Bittanti, M., Boyd, D., Herr-Stephenson, B., Lange, P., Pascoe, C.J., Robinson, L., (with Baumer, S., Cody, R., Mahendran, D., Mart´ınez, K., Perkel, D., Sims, C., and Tripp, L.) (2008). *Living and learning with new media: Summary of findings from the digital youth project*. The John D. and Catherine T. MacArthur Foundation Reports on Digital Media and Learning. Chicago: MacArthur Foundation.

Monke, L. Compensating for computers: Why a high-tech society requires a high-touch childhood. [Editorial]. (2009). *Independent School, 68(2),* 32-36, 38.

Mouza, C. (2008). Learning with laptops: Implementation and outcomes in an urban, under-privileged school. *Journal of Research on Technology in Education, 40*(4), 447-473. Retrieved from http://www.iste.org/learn/publications/journals/jrte

Mouza, C. (2011). Promoting urban teachers' understanding of technology, content, pedagogy in the context of case development. *Journal of Research on Technology in Education, 44*(1), 1-29. Retrieved from http://www.iste.org/learn/publications/journals/jrte

Mouza, C., & Wong, W. (2009). Studying classroom practice: Case development for professional learning in technology integration. *Journal of Technology and Teacher Education, 17*(2), 175-202. Chesapeake, VA: AACE. Retrieved from http://www.editlib.org/p/26963.

Mueller, J., Wood, E., Willoughby, T., Ross, C., & Specht, J. (2008). Identifying discriminating variables between teachers who fully integrate computers and teachers with limited integration. *Computers & Education 51*, 1523–1537. doi: 10.1016/j.compedu.2008.02.003

Murphy, D., King, F., & Brown, S. (2007). Laptop initiatives impact: accessed using student, parent, and teacher data. *Computers in Schools, 24*(1/2), 57-73. doi: 10.1300/J025v24n01_05

Nagel, D. (2014, June 11). Spending on instructional tech to reach $19 billion within 5 years. *The Journal.* Retrieved from http://thejournal.com/research/list/the-journal-digital-edition.aspx

National Center for Education Statistics (NCES), (2003-2013). *Technology in schools: Suggestions, tools, and guidelines for assessing technology in elementary and secondary education-home page.* Retrieved from nces.ed.gov/pubs2003/tech_schools/index.asp

National Center for Education Statistics (NCES), (2009). *Digest of Educational Statistics, 2009.* Retrieved from http://nces.ed.gov/programs/digest/d09/

National Center for Educational Statistics (NCES), (2010). *Teachers' use of educational technology in U.S. public schools: 2009.* Retrieved from http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2010040.

National Governors Association Center for Best Practices, (2010). Council of Chief State School Officers, Washington D.C.

National Staff Development Council. (2009). *Status of professional learning.* Retrieved from http://www.learningforward.org/stateproflearning.cfm.

Nevin, A. I., Thousand, J. S., & Villa, R. A. (2009). Collaborative teaching for teacher educators: What does the research say? *Teaching and Teacher Education, 25*, 569-574. doi: 10.1016/j.tate.2009.02.009

North Carolina Department of Public Instruction, (n.d). *Education first: NC school report cards.* Retrieved from http://www.ncreportcard.org/src/.

Orlando, A. D. (2005). *The integration of learning technologies in the elementary classroom: Identifying teacher pedagogy and classroom culture.* (Doctoral dissertation, Drexel University). Available from ProQuest Dissertations and Thesis database. (UMI No. 30499291)

Ottenbreit-Leftwich, A., Glazewski, K., Newby, T., & Ertmer, P. (2010). Teacher value beliefs associated with using technology: Addressing professional and student needs. *Computers & Education, 55*(3), 1321-1335. doi: 10.1016/j.compedu.2010.06.002

Overbay, A., Patterson, A. S., Vasu, E. S., & Grable, L. L. (2010). Constructivism and technology use: Findings from the impacting leadership project. *Educational Media International, 47(*2), 103-120. doi:10.1080/09523987.2010.492675

Owston, R. D. (2009). Digital immersion, teacher learning, and games. *Educational Researcher, 38*(4), 270-273. Retrieved from http://edr.sagepub.com/

Partnership for 21st Century Skills (2009). P21 framework definitions. Retrieved from http://www.p21.org/

Peck, K., Clausen, R., Vilberg, J., Meidi, C., & Murray, O. (2008). *Classrooms for the future: Year 2 evaluation.* Report given to Pennsylvania Department of Education. Retrieved from http://news.psu.edu/

Phirangee, K. (2013). Beyond the elementary classroom walls: Exploring the ways participation within Web 2.0 spaces are reshaping pedagogy. *Journal of Educational Multimedia and Hypermedia, 22*(3), 299-316. Retrieved from http://www.aace.org/pubs/jemh/

Piaget, J. (1926). *The language and thought of the child*. London: Routledge & Kegan Paul.

Pitsoe, V. J., & Maila, W. M. (2012).Towards constructivist teacher professional development. *Journal of Social Sciences, (8)*3, 318-324. Retrieved from http://thescipub.com/journals/jss

Polly, D., & Hannafin, M. J. (2011). Examining how learner-centered professional development influences teachers' espoused and enacted practices. *Journal of Educational Research, 14*(2), 120–130. doi:10.1080/00220671003636737

Powell, K. C., & Kalina, C. J. (2009). Cognitive and social constructivism: Developing tools for an effective classroom. *Education, 130*(2), 241-250. Retrieved from http://search.proquest.com/

Prensky, M. (2001). Digital natives, digital immigrants. *On the Horizon, 9*(5). Retrieved from http://www.emeraldinsight.com/loi/oth#

Probert, E. (2009). Information literacy skills: Teacher understandings and practice. *Computers & Education, 53,* 24-33. Retrieved from http://www.journals.elsevier.com/computers-and-education/

ProPublica, Inc. (2010). *Journalism in the public interest. Recovery tracker: How much stimulus funding is going to our county?* Retrieved from http://projects.propublica.org/recovery/locale/north-carolina/halifax

Rakes, G., Fields, V., & Cox, K. (2006).The influence of teachers' technology use on instructional practices. *Journal of Research on Technology in Education, 38*(4), 409-424.

Recovery Act, (2010). *Track the money*. Retrieved from http://www.recovery.gov/Transparency/RecoveryData/Pages/RecipientReportedDataMap.aspx

Reed-Swale, T. W. (2009). Engaging digital natives in a digital world. *Connect Magazine, 22* (3), 22–25. Retrieved from http://www.connectyourmeetings.com/magazine/

Richey, R. C. (2008). Reflections on the 2008 AECT Definitions of the Field. *TechTrends, 52*(1), 24-25. doi: 10.1007/s11528-008-0108-2

Rosen, Y. (2009). The effects of an animation-based on-line learning environment on transfer of knowledge transfer and on motivation for science and technology learning. *Journal of Educational Computing Research, 40*(4), 439–455. Retrieved from http://www.sagepub.com/journals/Journal202399

Rosen, Y., & Beck-Hill, D. (2012). Intertwining digital content and a one-to-one laptop environment in teaching and learning: Lessons from the time to know program, *Journal of Research on Technology in Education, 44*(3), 225-241. Retrieved from http://www.iste.org/learn/publications/journals/jrte

Rosen, Y., & Salomon, G. (2007). The differential learning achievements of constructivist technology-intensive learning environments as compared with traditional ones: A meta-analysis. *Journal of Educational Computing Research, 36*(1), 1–14.

Roy, P. (2010). *Using the SAI to build a district professional development plan*. National Staff Development Council in collaboration with Arizona Department of Education. Retrieved from Retrieved from http://www.nsdc.org

Rubin, H., & Rubin, I. (2005). *Qualitative Interviewing: The art of hearing data (*2nd ed.). Thousand Oaks, CA: Sage Publications, Inc.

Sabochik, K. (2010). Changing the equation in STEM education. The White House Blog.. Retrieved from http://www.whitehouse.gov/blog/2010/09/16/changing-equation-stem-education

Saxe, G. B., Gearhart, M., & Nasir, N. (2001). Enhancing students' understanding of mathematics: A study of three contrasting approaches to professional support.

Journal of Mathematics Teacher Education, 4(1), 55-79. Retrieved from http://link.springer.com/journal/10857

Schrum, L., & Levin, B. (2009). *Leading 21st century schools: Harnessing technology for engagement and achievement*. Thousand Oaks, CA: Corwin.

Schmidt, D., Baran, E., Thompson, A., Mishra, P., Koehler, M., & Shin, T. (2009a). Examining preservice teachers' development of technological pedagogical content knowledge in an introductory instructional technology course. In G. Ian W. Roberta, M. Karen, C. Roger& W. Dee Anna (Eds.), *Proceedings of the Society for Information Technology &Teacher Education International Conference 2009* (pp. 4145–4151). Chesapeake, VA: AACE.

Schoology, Inc. (2015). Retrieved from http://www.schoology.com

Selwyn, N., Potter, J., & Cranmer, S. (2010). *Primary schools and ICT: Learning from pupil perspectives.* London, England: Continuum.

Shapley, K. S., Sheehan, D. Maloney, C., & Caranikas-Walker, F. (2008). Evaluation of the Texas technology immersion pilot: Outcomes for the third year (2006-07). Retrieved from www.tcer.org/research/etxtip/documents/y3_etxtip_quan.pdf

Shapley, K. S., Sheehan, D., Sturges, K., Caranikas-Walker, F., Huntsberger, B., & Maloney, C. (2009). Evaluation of the Texas technology immersion pilot: Final outcomes for a four-year study (2004-05 to 2007-08). Austin: Texas Center of Education Research. Retrieved from www.tcer.org/research/etxtip/documents/y4_etxtip_final.pdf

Shapley, K.S., Sheehan, D., Maloney, C., & Caranikas-Walker, F. (2010). Evaluating the implementation fidelity of technology immersion and its relationship with student achievement. *Journal of Technology, Learning, and Assessment, 9*(4). Retrieved from http://www.jtla.org

Shen, Q. (2009). Case study in contemporary educational research: conceptualization and critique. *Cross-Cultural Communication, 5*(4), 21-31. Retrieved from Academic Search Complete database.

Sherman, T. & Kurshan, B. (2005, February). Constructing learning: Using technology to support teaching for understanding. *Learning & Leading with Technology, 32* (3), 10-13. Retrieved from http://www.learningandleading-digital.com/learningandleading

Silva, E. (2009). *Measuring skills for the 21st century. Washington, DC:* Education Sector.

Silvernail, D. L. & Gritter, A. K. (2007). *Maine's middle school laptop program: Creating better writers*. (Research Brief). Maine Education Policy Research Institute in collaboration with University of Southern Maine. Retrieved from http://maine.gov/mlti/resources/Impact_on_Student_Writing_Brief.pdf

Silvernail, D. L., & Buffington, P. J. (2009). *Improving mathematics performance using laptop technology: The importance of professional development for success.* (Research Brief). Maine Education Policy Research Institute in Collaboration with the Maine International Center for Digital Learning University of Southern

Maine. Retrieved from http://usm.maine.edu/cepare/pdf/Mathematics_Final_cover.pdf.

Smart, K. L., Witt, C., & Scott, J. P. (2012). Toward learner-centered teaching: An inductive approach. *Business Communication Quarterly, 75*(4), 392-403. doi:10.1177/1080569912459752

Spais, G. S., & Vasileiou, K. Z. (2008). An investigation of technology avoidance effect into higher education environments: Some empirical evidence of marketing students' background and their use of personal computers outside the academic culture. *IEJLL: International Electronic Journal for Leadership in Learning, 12*(2). Retrieved from http://iejll.journalhosting.ucalgary.ca/iejll/index.php/ijll

Speer, N. M., & Wagner, J. F. (2009). Knowledge needed by teacher to provide analytic scaffolding during undergraduate mathematics classroom discussions. *Journal for Research in Mathematics Education 40*(5), 530-563. Retrieved from http://math.coe.uga.edu/olive/EMAT6990Sp10/JRME2009-11-530a.pdf.

Spilkova, V. (2011). Development of student teachers' professional identity through constructivist approaches and self-reflective techniques. *Orbis Scholae, (5)*2, 117-138. Retrieved from www.orbisscholae.cz

Spires, H. A., Oliver, K., & Corn, J. (2011). The new learning ecology of one-to-one computing environments: Preparing teachers for shifting dynamics and relationships. *Journal of Digital Learning in Teacher Education*, *28*(2), 63-72.

Socrative, Inc. (2014). Retrieved from http://www.socrative.com.

Strudler, N. (2010). Perspectives on technology and educational change. *Journal of Research on Technology in Education, 42*(3), 221-229. Retrieved from http://search.proquest.com/docview/817562632?accountid=14872

Sugar, W., & Holloman, H. (2009). Technology leaders wanted: Acknowledging the leadership role of a technology coordinator. *TechTrends, 53*(6), 66-75. doi: 10.1007/s11528-009-0346-y

Suhr, K. A., Hernandez, D. A., Grimes, D., & Warschauer, M. (2010). Laptops and fourth-grade literacy: Assisting the jump over the fourth-grade slump. *The Journal of Technology, Learning, and Assessment, 9*(5), 42. Retrieved from http://www.jtla.org

Summak, M., Samancioğlu, M., Bağlibel, M. (2010). Technology integration and assessment in educational settings, *Procedia - Social and Behavioral Sciences, (2*)2, 1725-1729. doi:10.1016/j.sbspro.2010.03.973

Taffel, R. (2009). *Childhood unbound: Saving our kids' best selves—confident parenting in a world of change*. New York, NY: Free Press.

Tamin, R., Bernard, R., Borokhovski, E., Abrami, P., & Schmid, R. (2011). What forty years of research says about the impact of technology on learning: A second-order meta-analysis and validation study. *Review of Educational Research, 81*, 4-28. Retrieved from http://rer.sagepub.com.ezp.waldenulibrary.org/

Tedre, M., Hansson, H., Mozelius, P., & Lind, S. (2011). Crucial considerations in one-to-one computing in developing countries. In *IST-Africa Conference Proceedings, 2011* (pp. 1-11). IEEE.

Teo, T. (2008). Pre-service teachers' attitudes towards computer use: A Singapore survey. *Australasian Journal of Educational Technology, 24*(4), 413-424. Retrieved from http://ascilite.org.au/ajet/submission/index.php/AJET/index

Teo. T., Chai, S. C., Hung, D., & Lee, C. B. (2008). Beliefs about teaching and uses of technology among preservice teachers. *Asia-Pacific Journal of Teacher Education, 36*(2), 163-174. Retrieved from http://atea.edu.au/

Thomas, M. (2003). *Blending qualitative & quantitative research methods in theses and dissertations.* Thousand Oaks, CA: Corwin Press.

Thomas, L. G., & Knezek, D. G. (2008). Information, communications, and educational technology standards for students, teachers, and school leaders. In J. Vooght & G. Knezek (Eds.), *International Handbook of Informational Technology in Primary and Secondary Education* (pp. 333-348). New York: Springer.

Topor, D. R., Keane, S. P., Shelton, T. L., & Calkins, S. D. (2010). Parent involvement and student academic performance: A multiple mediational analysis. *Journal of Prevention & Intervention in the Community, 38*(3), 183-197.

Toy, C., (2008). Ten lessons learned: Consideration for school leaders when implementing one-to-one learning. *Meridian Middle School Computer Technologies Journal, 11*(1). Retrieved from http://www.ced.ncsu.edu/meridian/index.php/meridian/article/view/43

Trilling, B., Fadel, C. (2009). *21st century skills: Learning for life in our times*. San Francisco, CA: Jossey-Bass.

U.S. Department of Education (2010). *Transforming American education—Learning powered by technology: National Education Technology Plan 2010.* Washington, DC: Office of Educational Technology, U.S. Department of Education

U.S. Department of Education. (2010). *Teaching: Prepare and Connect, National Education Technology Plan.* Retrieved from http://www.ed.gov/technology/netp-2010/teaching-prepare-and-connect

Ullrich, C., Borau, K., Luo, H., Tan, X., Shen, L., & Shen, R. (2008). "Why web 2.0 is good for learning and for research: Principles and prototypes", In *Proceedings of the 17th International Conference on World Wide Web (WWW '08). ACM, New York, NY, USA,* 705-714. doi:10.1145/1367497.1367593

Ultanir, E., (2012). An epistemological glance at the constructivist approach: Constructivist learning in Dewey, Piaget, and Montessori. *International Journal of Instruction, (5*)2. Retrieved from www.e-iji.net.

Umphrey, J. (2010). Toward 21st Century Supports. *Education Digest, 75*(6), 48-53. Retrieved from http://www.eddigest.com/

Unger, K. L. (2012). Examining the factors of a technology professional development intervention. (Wayne State University). *ProQuest Dissertations and Theses, 258*. Retrieved from http://search.proquest.com/docview/1010417547?accountid=14872. (1010417547).

United States Census Bureau, (2010). State & county quickfacts. Retrieved from http://quickfacts.census.gov/index.html.

United States Census Bureau, (2009). Small area income and poverty estimates. Retrieved from http://www.census.gov/did/www/saipe/

Vannatta, R., & Beyerbach, B. (2000). Facilitating a constructivist vision of technology integration among education faculty and preservice teachers. *Journal of Research on Computing in Education, 33*(2), 132-148.

Vygotsky, L. (1962). *Thought and language*. Cambridge, MA: Harvard University Press.

Vygotsky, L. (1978). *Mind in society: The development of higher psychological processes.* Cambridge, MA: Harvard University Press.

Wagner, T. (2008). *The global achievement gap.* New York, NY: Basic Books.

Wagner, T. (2010). *The global achievement gap: Why even our best schools don't teach the new survival skills our children need-and what we can do about it.* New York, NY: Basic Books.

Wan, G., & Gut, D. M. (Eds.). (2011). *Bringing schools into the 21st century.* New York, NY: Springer Publishing Company.

Wang, L., Ertmer, P.A., & Newby, T.J. (2004). Increasing preservice teachers' self-efficacy beliefs for technology integration, *Journal of Research on Technology in Education, 36*(3), 231-252. Retrieved from www.eeraonline.org/journal

Warschauer, M., Cotton, S., & Ames, M (2012). One laptop per child Birmingham: Case study of a radical experiment. *International Journal of Learning and Media, 3*(2), 61-76. Retrieved from www.mitpressjournals.org/loi/ijlm

Warschauer, M. Arada, K, &Zheng, B. (2010). Laptops and inspired writing. *Journal of Adolescent and Adult Literacy, 54*(3), 221-223. doi: 10.1598/JAAL.54.3.8

Warschauer, M., Grant, D., Real, G., Rousseau, M. (2004). Promoting academic literacy with technology: Successful laptop programs in K-12 schools. *Incorporating Multimedia Capability in the Reporting of Applied Linguistics Research, (32),*4, 525-537, doi:10.1016/j.system.2004.09.010

Warschauer, M., & Ware, P. (2008). Learning, change, and power. In J. Coiro, M. Knobel, C. Lankshear, D. J. Leu (Eds), *Handbook of research on new literacies* (pp. 215-240). New York, NY: Lawrence Erlbaum Associates.

Watson, G. (2006). Technology professional development: Long-term effects on teacher self-efficacy. *Journal of Technology and Teacher Education, 14*(1), 151-165.

Waycott, J., Bennett, S., Kennedy, G., Dalgarno, B., & Gray, K. (2010). Digital divides? Student and staff perceptions of information and communication technologies, *Computers & Education, 54*(4), 1202-1211.

Weigel, M., James, C., & Gardner, H. (2009). Learning: Peering backward and looking forward in the digital era. *International Journal of Learning and Media, (1)*1, p. 8.

Wei, R. C., Darling-Hammond, L., Andree, A., Richardson, N., & Orphanos, S. (2009). Professional learning in the learning profession: A status report on teacher development in the United States and abroad. Dallas, TX: National Staff Development Council.

Wei, L., & Hindman, D. B. (2011). Does the digital divide matter more? Comparing the effects of new media and old media use on the education-based knowledge gap. *Mass Communication and Society, 14*(2), 216-235.

West, M. R. (2012). Education and global competitiveness: lessons for the United States

from international evidence. *Issues in Science & Technology (28)*3, 37-44.

Weston, M. E. & Bain, A. (2010). The end of techno-critique: The naked truth about one-to-one laptop initiatives and educational change. *Journal of Technology, Learning, and Assessment, 9*(6). Retrieved from http://www.jtla.org.

Wetzel, K., Foulger, T. S., & Williams, M. (2008). The evolution of the required educational technology course. *Journal of Computing In Teacher Education, 25*(2), 67-71.

White, E. (2013). Exploring the professional development needs of new teacher educators situated solely in school: Pedagogical knowledge and professional identity. *Professional Development in Education, 39*(1), 82-98.

Willingham, D. T. (2009).*Why Don't Students like School?* San Francisco, CA: Jossey-Bass.

Yin, R. K. (2009).*Case study research: Design and methods* (Vol. 5).Thousand Oaks, CA: Sage.

Yin, R. (2003b).*Case study research: design and methods* (3rded). Thousand Oaks, CA: Sage.

Yin, R. (1994).*Case study research: design and methods.* Beverly Hills, CA: Sage

Young, D. K. (2012). Teachers' perceived barriers to technology integration as prescribed by 21st century learning skills. (Order No. 3548993, Walden University). *ProQuest Dissertations and Theses, 244*. Retrieved from http://search.proquest.com/docview/1283064879?accountid=14872. (1283064879).

Zawilinski, L. (2009). HOT blogging: A framework for blogging to promote higher order thinking. *Reading Teacher, 62*(8), 650-661.

Zhang, J. (2009). Comments on Greenhow, Robelia, and Hughes: Toward a creative social web for learners and teachers. *Educational Researcher 38*(4), pp. 274-279. doi: 10.3102/0013189X09336674.

Zhao, Y. (2009). *Catching up or leading the way: American education in the age of globalization*. ASCD.

Ziegenfuss, R. M. (2010). *Education in the 21st century: Toward an expanded epistemic frame of leadership.* (Order No. 3410471, University of Pennsylvania). *ProQuest Dissertations and Theses,* 186-n/a. Retrieved from http://search.proquest.com/docview/499974761?accountid=14872. (499974761).

Zucker, A., & Hug, S. T. (2007). A study of the one-to-one laptop program at the Denver School of Science & Technology online submission. *Science, 323*(5910), 82-85.doi:10.1126/science.1167705.

Zucker, A. (2009). Transforming schools with technology. *Independent School*, 22-30. Retrieved from www.nais.org

Appendix A: Request for Permission

From: iste@iste.org
To: permissions@iste.org
Cc: xxxxxxxxxxxxx
Date: 11/10/2012 11:36:35 EST
Subject: Permissions and Reprints Request from Alfreda Smith
A request to reprint ISTE material has been submitted from Alfreda Smith
1. What material are you interested in? Check one or more:
National Educational Technology Standards for Students (NETS•S)
National Educational Technology Standards for Teachers (NETS•T)
National Educational Technology Standards for Administrators (NETS•A)
2. Are you requesting (check all that apply):
Print Rights (How Many Copies?) 1 copy each
3. How do you intend to use the material? (The more detail you provide, the faster we is able to
process your request.) I intend to use the reprint as an APPENDIX in my doctorate study on professional development in technology integration.
Please email permission to smithalfreda99@gmail.com
4. Is there a commercial aspect to this use? (ie. product charges, subscription fees, admission
charges, etc.) No
If yes, please explain:

Tina Wells

Fri, Nov 16, 2012 at 1:50 PM

To:

Dear Alfreda Smith,

Thank you for your request for permission to use ISTE's National Educational Technology Standards for Students, Teachers, and Administrators.

For our records, would you be so kind as to provide us with the country, state, or province in which you reside?

As long as your usage is noncommercial, not for profit, and for educational purposes only, you have our permission to use the NETS.S, NETS.T, and NETS.A in the appendix of your doctorate study. The rights granted herein are nonexclusive, non-transferable, print rights only.

If the NETS are altered, then 1) you must not call your adaptation NETS and 2) you must indicate where the complete (unaltered) NETS can be found.

Please use the following credit lines in all uses of the material:

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NETS.S:

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NETS.T:

http://www.iste.org/Content/NavigationMenu/NETS/ForTeachers/2008Standards/NETS_for_Teachers_2008.htm

NETS.A:

http://www.iste.org/Content/NavigationMenu/NETS/ForAdministrators/2009Standards/NETS_for_Administrators_2009.htm

Please let us know if we can be of additional assistance. We wish you every success with your project.

Best regards,

Tina Wells
Book Production Editor
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Appendix B: P21 Framework for 21st Century Learning

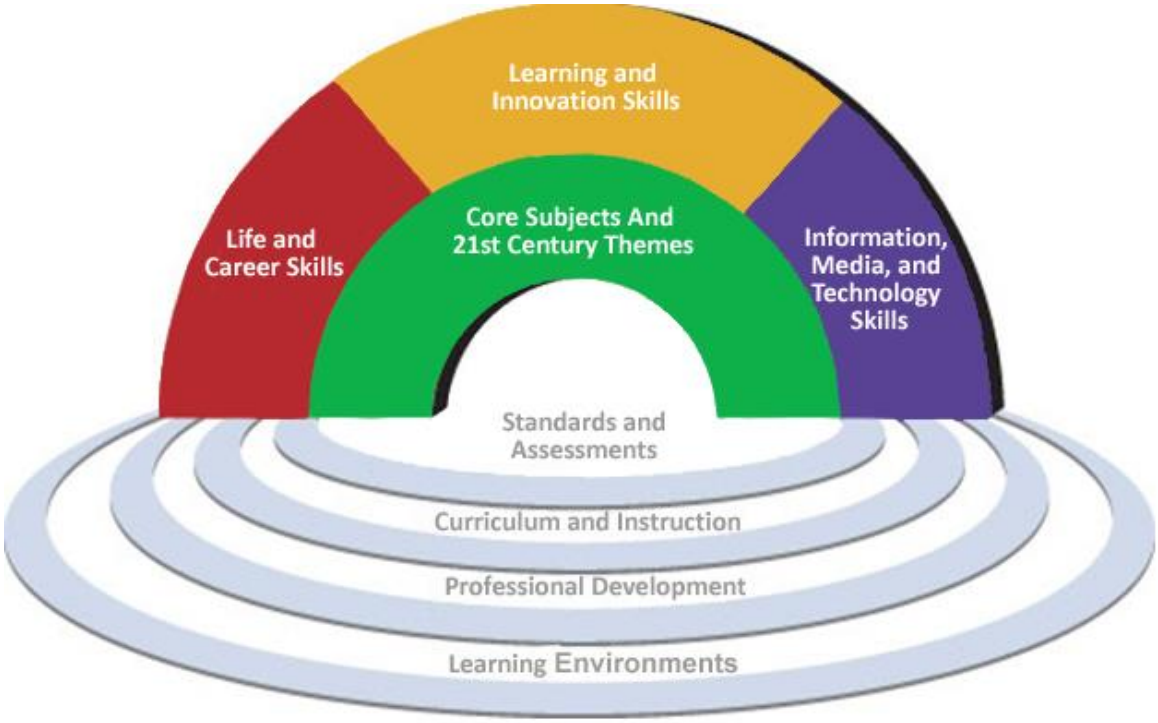

Figure 1 - P21 Framework for 21st Century Learning

Partnership for 21st Century Skills (2009). P21 framework definitions. Retrieved from http://www.p21.org/. Reprinted with permission (Appendix C).

Appendix C: Permission to Use P21 Framework Model

Lizzette Arias < @p21.org> Mon, Apr 6, 2015 at 9:42 AM
To: Alfreda Smith alfreda.smith@waldenu.edu

Thank you for your inquiry Alfreda,
Our materials and educator resources are free for educational purposes. We are happy to grant you permission to use P21 materials, as long as no P21 materials and references are used to imply P21 endorsement. Please see our full terms of use here: http://www.p21.org/our-work/use-of-p21-content

Thank you for citing P21 (Partnership for 21st Century Learning) and linking to our website - www.P21.org.

Please let me know if you have any questions,

Lizzette

Lizzette Arias
Administrative Coordinator
Partnership for 21st Century Learning (P21)
1 Massachusetts Avenue NW, Suite 700
Washington, DC 20001
(202) 312-6427
www.P21.org

Appendix D: Emailed Consent Form for Teacher

Hello,

I am doing a research study on the early adopter program in the one-to-one classroom. Please read the consent form below and let me know if you are willing to participate by returning this email to me with ***"I Consent"*** in the body of the email.

Title of Research: Technology Professional Development – A Case Study of Teachers' Perceptions of Technology Integration with a One-to-One Digital Conversion

You are invited to take part in a research study of examining the use of technology integration in two School Improvement Grant (SIG) schools. You are invited to take part in the study because you are an early adopter teacher for the one-to-one initiative at one of the two schools. This form is part of a process called "informed consent" to allow you to understand this study before deciding whether to take part.

This research study is being conducted by Alfreda Smith, who is a doctoral student in the Administrator Leadership for Teaching and Learning at Walden University. You may already know the researcher as an Instructional Technology Facilitator for Hometown High School, but this study is separate from that role. The experience, thoughts, and input are important to the study and could assist the District in improving professional development and technology integration.

Background Information:
The purpose of this case study is to explore the perceptions of teachers in HHS and HMS in integrating and enhancing instructional technology practices through professional development. There is little to no research that has examined how technology is integrated and teachers' perceptions and beliefs about technology professional development.

Procedures:
If you agree to be in this study, you will be asked to:

- Participate in a face-to-face interview with the researcher lasting about 30-45 minutes at your school at a convenient time for you. Interviews may be recorded, if permitted.
- Participate in two announced classroom observations where field notes are used in data collection. The first observation will take place at the beginning of a 6 week grading period and the second observation will take place at the end of the grading period.
- Review your respective data and the preliminary analysis for validation, prior to submission of study and, if necessary, provide clarifying input. A copy of your data and the preliminary analysis and a letter of concurrence will be mailed to

your residence, along with a confidential return envelope for you to return the letter or provide additional confidential input.

Here is a sample of the interview protocol:

- Describe your beliefs, attitudes, and perception about technology integration in the classrooms.
- How has the training you have received prepared you to integrate technology effectively?
- Describe in details what strategies you would like to learn or improve in order to effectively integrate technology into your classroom.

Voluntary Nature of the Study:

Your participation in this study is strictly of a voluntary basis. Your decision to participate will be respected. You will not be treated any differently if you decide not to be in the study. If you decide to join the study now, you can still change your mind during or after the study. You may stop at any time. Your opinions and input are voluntary and confidentiality is a top priority. Your identity and information will be protected at all times.

Risks and Benefits of Being in the Study:

The risks of this study are small. Time is the biggest factor. The purpose of this study is to examine the perceptions, attitudes, and beliefs of teachers in the Early Adopter pilot program. Professional development is the means to addressing and conquering these perceptions, attitudes, and beliefs. The results of this study will assist with implementing an effective professional plan that will enable teachers to adjust pedagogical methods using technology along with knowledge of content. Confidentiality is a priority and all data collected will be disguised by use of pseudonyms and kept in a secured location. Participants as well as other educators can benefit from study by gaining knowledge from research and best practices. Your participation is beneficial to our students, schools, and districts. This study will address needs and challenges of 21st century learning.

Payment

There will be no payment or reimbursement for participating in this study.

Privacy

Any information you provide will be kept confidential. Pseudonyms will be used to disguise identity of individual schools, the school district, and the participants. The researcher will not use personal information for any purposes outside of this research project. Your name will not be used on anything that could identify you in the study. Electronic data will be secured on a password-protected external hard drive that is only accessible to me. All written data and audio recordings will be stored and locked in a file cabinet. Data will be kept for a period of at least 5 years, as required by the university.

Contacts and Questions

You may ask any questions you have now. Or if you have questions later, you may contact the researcher via (xxx) xxx-xxxx and/or xxxx@gmail.com. If you want to talk privately about your rights as a participant, you can call Dr. Leilani Endicott. She is the Walden University representative who can discuss this with you. Her phone number is 612-312-1210. Walden University's approval number for this study is **05-12-14-0120274** and it expires on **May 11, 2015.** The researcher will give you a copy of this form to keep.

Statement of Consent:

I have read the above information and I feel I understand the study well enough to make a decision about my involvement. By replying to this email with the words "***I Consent***", I understand that I am agreeing to participate.

Appendix E: Emailed Consent Form for Nonteaching Staff

Hello,

I am doing a research study on the early adopter program in the one-to-one classroom. Please read the consent form below and let me know if you are willing to participate by returning this email to me with ***"I Consent"*** in the body of the email.

Title of Research: Technology Professional Development – A Case Study of Teachers' Perceptions of Technology Integration with a One-to-One Digital Conversion

You are invited to take part in a research study of examining the use of technology integration in two School Improvement Grant (SIG) schools. You are invited to take part in the study because you are a part of the one-to-one initiative at one of the two schools. This form is part of a process called "informed consent" to allow you to understand this study before deciding whether to take part.

This research study is being conducted by Alfreda Smith, who is a doctoral student in the Administrator Leadership for Teaching and Learning at Walden University. You may already know the researcher as an Instructional Technology Facilitator for Hometown High School, but this study is separate from that role. The experience, thoughts, and input are important to the study and could assist the District in improving professional development and technology integration.

Background Information:
The purpose of this case study is to explore the perceptions of teachers in HHS and HMS in integrating and enhancing instructional technology practices through professional development. There is little to no research that has examined how technology is integrated and teachers' perceptions and beliefs about technology professional development.

Procedures:
If you agree to be in this study, you will be asked to:

- Participate in a face-to-face interview with the researcher lasting about 30-45 minutes at your school at a convenient time for you. Interviews may be recorded, if permitted.
- Review your respective data and the preliminary analysis for validation, prior to submission of study and, if necessary, provide clarifying input. A copy of your data and the preliminary analysis will be sent to you in electronic form for validation and you will be requested to add, delete, or clarify statements and comment on preliminary analysis.

Here is a sample of the interview protocol:

- What do you feel is the general attitude of the teachers regarding technology use,

especially the implementation of the one-to-one laptop program?

- How have you modified professional development to change teachers' attitudes and perceptions of effective technology integration in the classroom?
- What evidence do you use to determine the quality of technology related professional development that is provided to the teachers?

Voluntary Nature of the Study:
Your participation in this study is strictly of a voluntary basis. Your decision to participate will be respected. You will not be treated any differently if you decide not to be in the study. If you decide to join the study now, you can still change your mind during or after the study. You may stop at any time. Your opinions and input are voluntary and confidentiality is a top priority. Your identity and information will be protected at all times.

Risks and Benefits of Being in the Study:
The risks of this study are small. Time is the biggest factor. The purpose of this study is to examine the perceptions, attitudes, and beliefs of teachers in the Early Adopter pilot program. Professional development is the means to addressing and conquering these perceptions, attitudes, and beliefs. The results of this study will assist with implementing an effective professional plan that will enable teachers to adjust pedagogical methods using technology along with knowledge of content. Confidentiality is a priority and all data collected will be disguised by use of pseudonyms and kept in a secured location. Participants as well as other educators can benefit from study by gaining knowledge from research and best practices. Your participation is beneficial to our students, schools, and districts. This study will address needs and challenges of 21st century learning.

Payment
There will be no payment or reimbursement for participating in this study.

Privacy
Any information you provide will be kept confidential. Pseudonyms will be used to disguise identity of individual schools, the school district, and the participants. The researcher will not use personal information for any purposes outside of this research project. Your name will not be used on anything that could identify you in the study. Electronic data will be secured on a password-protected external hard drive that is only accessible to me. All written data and audio recordings will be stored and locked in a file cabinet. Data will be kept for a period of at least 5 years, as required by the university.

Contacts and Questions
You may ask any questions you have now. Or if you have questions later, you may contact the researcher via (xxx) xxx-xxxx and/or xxxx@gmail.com. If you want to talk privately about your rights as a participant, you can call Dr. Leilani Endicott. She is the Walden University representative who can discuss this with you. Her phone number is 612-312-1210. Walden

University's approval number for this study is **05-12-14-0120274**and it expires on **May 11, 2015.** The researcher will give you a copy of this form to keep.

Statement of Consent:

I have read the above information and I feel I understand the study well enough to make a decision about my involvement. By replying to this email with the words "***I Consent***", I understand that I am agreeing to participate.

Appendix F: Looking for Technology Integration (LoFTi)

16. Technology is being used as a tool for…
(Check either Teacher or Student, or both)

	Teacher	Students
Problem-Solving (e.g., graphing, decision support, design)	□	□
Communication (e.g., document preparation, email, presentation, web development)	□	□
Information Processing (e.g., data manipulation, writing, data tables)	□	□
Research (e.g., collecting information or data)	□	□
Personal Development (e.g., e-learning, time management, calendar)	□	□
Group Productivity/Cooperative Learning (e.g., collaboration, planning, document sharing)	□	□
Formative Assessment	□	□
Summative Assessment	□	□
Brainstorming	□	□
Computer-assisted instruction	□	□
Face to face classroom discussion	□	□
Face to face group discussion	□	□
Asynchronous discussion	□	□
Drill and practice	□	□
Generating and testing hypotheses	□	□
Identifying similarities and differences	□	□
Project-based activities	□	□
Recitation	□	□
Summarizing and note-taking	□	□

17. Technology hardware is in use by…
(Check either Teacher or Student, or both)

	Teacher	Students
Assistive Technology	□	□
Audio (e.g., speakers, microphone)	□	□
Art/Music (e.g., drawing tablet, musical keyboard)	□	□
Imaging (e.g., camcorder, film or digital camera, document camera, scanner)	□	□
Display (e.g., digital projector, digital white board, television, TV-link, printer)	□	□
Media Storage / Retrieval (e.g., print material, DVD, VCR, external storage devices)	□	□
Math / Science / Technical (e.g., GPS, probeware, calculator, video microscope)	□	□
Desktop computer	□	□
Laptop computer (including tablets)	□	□
Other (please specify): _____	□	□

18. Technology software is in use by…
(Check either Teacher or Student, or both)

	Teacher	Students
Administrative (e.g., grading, record-keeping)	□	□
Assessment / Testing	□	□
Assistive (e.g., screen reader)	□	□
Computer-Assisted Instruction / Integrated Learning System	□	□
Thinking tools (e.g. visual organizer, simulation, modeling, problem-solving)	□	□
Hardware-Embedded (e.g. digital white board, GPS/GIS, digital interactive response system)	□	□
Multimedia (e.g., digital video editing)	□	□
Productivity Software (e.g., database, presentation, spreadsheet, word processing)	□	□
Programming or web scripting (e.g., Javascript, PHP, Visual Basic)	□	□
Graphics / Publishing (e.g., page layout, drawing/painting, CAD, photo editing, web publishing)	□	□
Subject-specific software	□	□
Web Browser (e.g., MS Internet Explorer, Netscape, Firefox)	□	□
Web Applications		
Course management software (DyKnow, etc.)	□	□
Database systems	□	□
Discussion boards	□	□
Libraries, E-publications	□	□
Search engine	□	□
Video, voice, or real-time text conference	□	□
Web logs, blogs	□	□
Web mail	□	□
Wiki	□	□
NC-Specific Web Resources		
Learn NC	□	□
NC Wise Owl	□	□
SAS in School	□	□
Other (please specify): _____	□	□

For the following item, please indicate the percentage of students in the classroom showing positive student engagement.

19. Student engagement is shown by…

Positive indicator of ***Engagement***	*Circle your best estimate of the percentage of students showing each positive indicator of engagement*						*The opposite is* ***Disaffection***
Sustained behavioral involvement	100%	80%	60%	40%	20%	0%	Tendency to give up easily in the face of challenges
Positive emotional tone—cheerful, calm, communicative	100%	80%	60%	40%	20%	0%	Negative emotional tone—boredom, depression, anxiety, anger, withdrawal, or rebellion
Selection of tasks at the border of their competencies	100%	80%	60%	40%	20%	0%	Selection of tasks well within their comfort zone
Initiation of action when given the opportunity	100%	80%	60%	40%	20%	0%	Passivity, lack of initiative
Exertion of effort and concentration	100%	80%	60%	40%	20%	0%	Laziness, distraction

****OPTIONAL ADDITIONAL ITEMS****

20. How was technology used in this classroom? (RAT framework; Hughes, et al., 2006; Adapted from Wilder Research's Technology Integration Observation Protocol, Maxfield, Huynh, & Mueller, 2011)

(CHECK ALL THAT APPLY and type a brief description in the corresponding text box)

□ **Replacement.** "Technology used to replace and in no way change established instructional practices, student learning processes, or content goals. The technology serves merely as a different means to the same instructional end. Most of the learning activities might be done as well or better without technology." (*Example*: Using an interactive whiteboard for the same purposes as a chalkboard)

□ **Amplification.** "Technology used to amplify current instructional practices, student learning, or content goals, oftentimes resulting in increased efficiency and productivity. The focus is effectiveness or streamlining, not fundamental change." (*Example*: Using a word processor rather than written materials for instructional preparation)

□ **Transformation.** "Technology used to transform the instructional method, the students' learning processes, and/or the actual subject matter. Technology is not merely a tool, but rather an instrument of mentality. The focus is fundamental change, redefining the possibilities of education. Most technology uses represent learning activities that could not otherwise be easily done." (*Example*: Using StorySpace software to write hypertext narratives)

21. Classroom Agenda:

22. Other comments regarding teacher (e.g. demeanor, comfort with technology, interactions with students):

23. Other comments regarding students (e.g. comfort with technology, peer interactions):

24. Other comments regarding learning environment:

25. Please enter the time:

Time (hh:mm): _____

Appendix G: Teacher Interview Questions

Name of Teacher _____ Content Area _____

1. What is your educational and teaching background?

Describe your use of technology in your (a) personal life (b) work.

2. Describe your beliefs, attitudes, and perception about technology integration in the classrooms. What perceived barriers prevent teachers from effectively integrating technology?

What role does professional development play in your beliefs, attitudes, and perception? Explain.

3. Describe your experiences with integrating technology in a one-to-one classroom.

What professional development opportunities, education, or training have you had regarding technology integration?

How has the training you have received prepared you to integrate technology effectively? Explain your answer.

4. Describe in details what strategies you would like to learn or improve in order to effectively integrate technology into your classroom.

What can professional development trainers do to assist you with improving these strategies?

5. How can the principal, instructional technology coach, and instructional technology facilitator continue to support you?

What positive things are being done at the present time?

What changes would you like to see in professional development?

6. Describe ways you use technology to communicate with colleagues, students, and parents.

How can training parents to effectively use technology have a positive effect on parental involvement and student outcome?

7. What benefits have you encountered as a result of the one-to-one laptop implementation during classroom instruction?

How has professional development contributed to those benefits?

8. What frustrations and problems have you encountered as a result of the one-to-one laptop implementation?

Has professional development addressed or caused any of those frustrations and problems? Explain.

Appendix H: Nonteaching Staff Interview Protocol

1. What is your educational background?
2. Describe how you feel about technology in general. Tell about ways you use computers for your own personal and professional use.
3. What do you feel is the general attitude of the teachers regarding technology use, especially the implementation of the one-to-one laptop program?
4. How have you modified professional development to change teachers' attitudes and perceptions of effective technology integration in the classroom?
5. What evidence do you use to determine the quality of technology related professional development that is provided to the teachers?
6. Describe some of the ways you have observed your teachers using technology in their classrooms.
7. How do you ensure teachers get the ongoing support they need to continually improve instructional practices for 21st century teaching and learning?
8. How do you think the one-to-one digital conversion and continuous technology use have affected the culture and climate of the classroom?
9. How do you think communication among parents, teachers, and students throughout the school and community changed as a result of technology integration?
10. Have teachers made you aware of any benefits they have perceived as a result of the one-to-one laptop technology integration? If so, what are they?
11. Have teachers made you aware of any problems they have perceived as a result of the one-to-one technology integration? If so, what are they?

Appendix I: Permission to Use

As long as I (Frances LeAnna Bryant-Anantaraman**)** am sited as the source, using the survey is fine. Glad that it helped you to read my research.
Frances

Sent from my iPhone

On Sep 7, 2013, at 11:46 AM, "Alfreda" < email address> wrote:

Hello Frances,

My name is Alfreda Smith and I am a student at Walden University. I am doing a study on technology integration and teachers' perception of it. I read through your study and I commend you on a job well done. I am writing this email to request permission to use your interview questions as a guide in developing my interview protocol. I will appropriately cite you as the source. I would appreciate if you respond to this email at your earliest convenience so that I can resume my study.

Thanking you in advance.

Sent from my iPad

Thanking you in advance.

Sent from my iPad

Note. From "Elementary teachers' experiences with technology professional development and classroom technology integration: Influences of elements of diffusion and support," by F. L. Bryant, 2008. *Early Childhood Education Dissertation.* Paper 6. Copyright 2008 by Bryant, Frances LeAnna. Reprinted with permission (Appendix D).

Appendix J: Permission to Use

Hi Alfreda,

We're happy to allow you to republish this chart as long as you properly credit ProPublica and offer a link to the site (http://projects.propublica.org/recovery/locale/north-carolina/halifax).

Please let us know if you have any further questions. And best of luck on the dissertation.
-Minhee

Appendix K: Emailed Reminder Consent Form (Nonteaching Staff)

Approximately a week ago, you were invited to take part in a research study of examining the use of technology integration in two School Improvement Grant (SIG) schools. You are invited to take part in the study because you are a part of the one-to-one initiative at one of the two schools. This form is part of a process called "informed consent" to allow you to understand this study before deciding whether to take part (See Attachment).

The purpose of this case study is to explore the perceptions of teachers in HHS and HMS in integrating and enhancing instructional technology practices through professional development. There is little to no research that has examined how technology is integrated and teachers' perceptions and beliefs about technology professional development.

If you agree to be in this study, you will be asked to:

- Participate in a face-to-face interview with the researcher lasting about 30-45 minutes at your school at a convenient time for you. Interviews may be recorded, if permitted.
- Review your respective data and the preliminary analysis for validation, prior to submission of study and, if necessary, provide clarifying input. A copy of your data and the preliminary analysis will be sent to you in electronic form for validation and you will be requested to add, delete, or clarify statements and comment on preliminary analysis.

Participation in this study is strictly voluntarily. If you decide to participate and sign and return the consent form, you may withdraw at any time, thereafter, if you decide to do so. If you have already signed and returned the consent form, please accept my sincere thanks. If not, please consider reading over the attached consent form. By completing and returning the attached form, you have given consent to participate in the study.

If you have any questions or concerns, please do not hesitate to contact me (Alfreda Smith) at (XXX) XXX-XXXX, or by email at alfreda.smith@waldenu.edu. You may also contact my committee chairperson, Dr. Daniel Baer by email at Daniel.baer@waldenu.edu or tonnsen@email.wcu.edu. If you have any concerns about your treatment as a participant in this study, you may contact Walden IRB at IRB@waldenu.edu.

Thank you for your assistance.
Alfreda Smith

Attachment

Appendix L: Email Reminder of Consent Form (Teachers)

Approximately a week ago, you were invited to take part in a research study of examining the use of technology integration in two School Improvement Grant (SIG) schools. You are invited to take part in the study because you are a part of the one-to-one initiative at one of the two schools. This form is part of a process called "informed consent" to allow you to understand this study before deciding whether to take part (See Attachment).

The purpose of this case study is to explore the perceptions of teachers in HHS and HMS in integrating and enhancing instructional technology practices through professional development. There is little to no research that has examined how technology is integrated and teachers' perceptions and beliefs about technology professional development.

If you agree to be in this study, you will be asked to:

- Participate in a face-to-face interview with the researcher lasting about 30-45 minutes at your school at a convenient time for you. Interviews may be recorded, if permitted.
- Participate in two announced classroom observations where field notes are used in data collection. The first observation will take place at the beginning of a 6 week grading period and the second observation will take place at the end of the grading period.
- Review your respective data and the preliminary analysis for validation, prior to submission of study and, if necessary, provide clarifying input. A copy of your data and the preliminary analysis will be sent to you in electronic form for validation and you will be requested to add, delete, or clarify statements and comment on preliminary analysis.

Participation in this study is strictly voluntarily. If you decide to participate and sign and return the consent form, you may withdraw at any time, thereafter, if you decide to do so. If you have already signed and returned the consent form, please accept my sincere thanks. If not, please consider reading over the attached consent form. By completing and returning the attached form, you have given consent to participate in the study.

If you have any questions or concerns, please do not hesitate to contact me (Alfreda Smith) at (XXX) XXX-XXXX, or by email at xxxx@gmail.com. You may also contact my committee chairperson, Dr. Daniel Baer by email at Daniel.baer@waldenu.edu or tonnsen@email.wcu.edu. If you have any concerns about your treatment as a participant in this study, you may contact Walden IRB at IRB@waldenu.edu.

Thank you for your assistance.
Alfreda Smith

Appendix M: Permission to Use TPACK Model

The TPACK Image (rights free). Read below to learn how to use the image in your own works. Right click to download the high-resolution version of this image.
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