2015

Improving Educational Technology Integration in the Classroom

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COLLEGE OF EDUCATION

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2015

Abstract

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MA, Walden University, 2010

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Doctoral Study Submitted in Partial Fulfillment

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Abstract

Teachers' ability to integrate technology is a topic of growing concern given the importance of technology and 21st century skills readiness in both academics and the global society of 2014. This study investigated the technology integration barriers that educators faced, the training the educators received, and support needs of educators at a large, prominent, 30-year old international school located in Central America offering grades Pre-K 3 to 12. The social learning theory of Bandura, the constructivist theories of Piaget and Dewey, and the technology constructionism of Papert provided the theoretical framework. The research questions focused on understanding technology integration by assessing key aspects of the teachers' technology proficiency and needs. A nonexperimental quantitative cross-sectional study design was used to examine the educational technology integration practices and deficiencies at the focus school. A Likert-style instrument, comprised of parts from 3 existing instruments, was completed electronically by 62 purposefully sampled certified teachers at the focus school. Descriptive statistics identified technology integration levels, training factors, and support needs of focus school educators. Correlational analyses failed to reveal any significant relationships between technology integration levels of the focus school teachers and the variables of interest: self-perceived barriers to technology integration, self-perceived confidence using technology, and participation in onsite professional development. In light of the survey findings, a 3-phase technology integration improvement plan was designed. The study yields social change for the focus school by improving their technology integration practices based on empirical evidence.

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Dedication

This work from start to finish is dedicated to my son, Jordan, who not only understood my educational obligations and workload but also supported me with love, encouragement, understanding, and the best double chocolate fudgy brownies ever. We make a great team. I am forever grateful of your support and encouragement. I am proud of the young man you have become.

It is my hope that through sharing my doctoral pursuit, I have encouraged others to recognize the value of being a life-long learner. As I have often told my students, I have fallen, I have failed, and I have made mistakes. I have served my country, become a widow, beaten cancer, and raised a son, all the while putting myself back through college from a bachelors to doctorate degree. If I can do it, you too can graduate from college.

Acknowledgments

I would like to acknowledge the numerous people who were involved in supporting and encouraging me in my pursuit to achieve my professional goal of earning a doctorate degree in education. From my well-qualified Walden professors and committee members to my students, colleagues, and family, it definitely takes a village to complete this amazing and challenging personal journey.

I would like to express my thanks and appreciation to my committee chair, Dr. K. Claggett, who supported me along the journey from beginning to end. She was instrumental in my clarity and understanding of the process and procedures. She was always there with recommendations and resources at the ready. Dr. W. LaRue, a valuable committee member, was the eagle eye needed to spot scholarly improvement areas. Dr. B. Chen's contribution as my URR chair, challenged me and supported my deeper understanding of quantitative statistical analysis. A special thank you and deep appreciation to Susan Blatnik for her endless support. I wish to thank my school administration and fellow educators for their professional and personal support. I am grateful for the opportunity to conduct my project study at such a premier international school with outstanding and professional educators. Lastly, I wish to acknowledge my parents, family around the world, and close friends whose understanding and support made completing my degree possible.

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Section 1: The Problem

Technology forms an intricate part of today's society that is rapidly evolving and advancing on multitiered levels (Newbill & Baum, 2013). Despite global advancements in the span and availability of technology, schools rarely maintain the same momentum in access to equipment, educator professional development, and onsite educational support (Lee & Spires, 2009; Ritzhaupt, Dawson, & Cavanaugh, 2012). Despite these drawbacks, educators as a community carry the responsibility for preparing students for a future that includes 21st century technology readiness skills (Hohlfeld, Ritzhaupt, Barron, & Kemker, 2008; Jones, Fox, & Douglas, 2011; Larson & Miller, 2012; Voogt & Roblin, 2012).

An investigation of past research has revealed common education-related barriers on both institutional and personal levels that have negatively impacted the integration of technology in the classroom. Solutions to these identified barriers were also found in educational research. Additionally, educational researchers identified factors for integrating technology that were recognized as efficient and effective for improving technology integration practices. Training of technology skills, new and old, has remained a strategic factor for the success of technology integration (Boud & Hager, 2011; Loveland, 2012; Potter & Rockinson-Szapkiw, 2012). An and Reigeluth (2011) emphasized the importance of supporting educators' technology integration needs with professional growth, training opportunities, and continuous support from technology specialists.

Through this project study, I focused my research on the technology integration needs of an international school located in Central America, Central America Academy or CAA, the pseudonym for the research site. My research addressed both training and on-going technology integration support needs of CAA educators. In Section 1 of this project study, the scope of the problem at CAA and the rationale for its examination are explained. The definitions of specific terms in relationship to this project study are also included. Guiding research questions and explanations of the theoretical frameworks follow. Finally, clarification of the significance and implications of the intended investigation are presented before addressing the methodology section of the project study.

Definition of the Problem

The educational administration team at CAA indicated the barriers to implementing technology integration strategies have resulted from a lack of staff confidence and proficiency with regard to technology (personal correspondence, CAA Division Principal 3, September 5, 2013). Teaching staff requested 130 professional development opportunities from August 2011 to November 2013. Of these requests, 25% focused on technology integration needs with only 2% approved for professional development support and funding. According to meeting agendas and minutes, administrators discussed the need for technology integration training on 12 different occasions during a period of 6 months. More specifically, with the implementation of 42 SmartBoards school wide, 88% of the 42 educators with a SmartBoard in their classroom have requested additional SmartBoard-specific training, including six of the eight teachers from the 2011-12 SmartBoard Pilot program. The RenWeb school management program and Canvas virtual portal prompted requests for eight different training sessions. Forty-eight percent of the requests logged by the Educational Technology Teams' service tracker involved "how to" questions and requests for teacher usage support for the software and devices themselves, whereas other 52% of support requests fell into the category of operational issues regarding student enrollment, rosters, and password resets (personal correspondence, CAA Ed Tech Supervisor, May 10, 2014).

CAA was founded in 1982 and is a well-established private international school in the Central American region. Both the World School International Baccalaureate program (IB) and AdvancEd Association have accredited CAA for more than 2 decades, consequently providing CAA with a dual high school diploma track. Additionally, to be officially recognized as a school, CAA is a member of its host country's educational system (MEDUCA). Through this membership with MEDUCA, CAA offers a third high school diploma track that is specifically recognized across Latin America. As a large international school in Central America, CAA is home to 1,200 students from grades prekindergarten 3 (Pre-K3) to 12. CAA privately employs approximately 300 employees, of which 60% or 180 are certified teachers, academic specialists, or classroom assistants. English is the language of the curriculum; however, the host-country's educational law requires Spanish to be studied from kindergarten to 12th grade (personal correspondence, CAA MEDUCA Administrative Representative, January 23, 2014).

Although technically one school, CAA operates as three smaller schools, referred to as divisions. Each division functions under the traditional educational administrative structure with its own division principal, assistant principal, office staff, and teaching staff. Principals supervise their own school's budget and staff under the all-encompassing umbrella of CAA's human resources department and schoolwide budget. The three divisions' administrators report to the school's director, similar to that of a superintendent in U.S. public school system. There is a Board of Directors who oversees CAA policies and general governance but not daily operations. The three divisions also share a set of administrators similar to districtwide employees. These shared administrators are the curriculum director, professional development coordinator, technology integration coordinator, IT manager, and accounting manager.

School educators, within each division, have access to a diverse array of technological devices and software that, according to division principals, is being underutilized at the classroom level (personal correspondence, CAA IT Manager, August 9, 2012). When CAA educators answered questions about their lack of technology use, through informal school technology inquiry surveys, their responses created a list of barriers. The primary barrier repeatedly expressed by 82% of responding educators pinpointed a lack of technology training or opportunities to acquire technology training. The second most common barrier, reported by 59% of respondents, indicated a personal lack of confidence in using the technology or an anxiety of appearing ignorant in front of students. The third barrier teachers at CAA reported to their department heads and division principals pertained to the limited time to design special technology projects. The third barrier could imply that CAA teachers view technology as an independent topic rather than as a tool to be integrated into their current curriculum (Cauley, Aiken, &

Whitney, 2009; Guzey & Roehrig, 2009; Hammonds, Matherson, Wilson, & Wright, 2013).

Teachers wanting staff development for any curriculum or topic are expected to find the professional development options, gather training information, and submit a request. Until the 2011-12 school year, the individual division principals had been responsible for approving their divisional teachers' individual requests. CAA principals have explained their reluctance to approve technology training requested because of their own lack of expertise in the area of technology and lack of confidence in knowing if a requested training was of value or quality (personal correspondence, CAA Division Principal 2 & CAA Division Principal 3, May 15, 2012). Principals explained that when funds were available, and they felt confident in the educator or the training opportunity, they would approve the request. According to the professional development coordinator, when approved training occurs, it has typically been a 1- or 2-day, stand-alone event without any post event follow up or usage monitoring.

During the 2011-12 school year, only three of technology-focused, off-site professional development requests were approved. If educators did not seek out off-site professional development opportunities, they only received the general weekly division-specific training on various topics as determined by the principals. Of the 40 division-focused Wednesday afternoon training sessions across the year, only two sessions schoolwide and two additional sessions in middle school were allocated to technology in the 2011-12 school year, and two sessions schoolwide and four additional sessions in the elementary division were allocated for the 2012-13 school year.

Rationale

The issue of technology integration practices and shortfalls in training and support are not isolated to CAA. Studies worldwide have indicated the lack of technology integration staff development courses, and continuous technology support services have become a more substantial issue in the last 5 years. Despite researchers having identified the problem, a permanent solution remains undetermined (Castle & McGuire, 2010; Sawchuk, 2010). Global educational researchers have recognized similar integration barriers to those of CAA teachers (Gu, Zhu, & Guo, 2013; Kurt, 2013; Meyer, Abrami, Wade, & Scherzer, 2011). The top four barriers included teachers' lack of confidence in their technology skills, anxiety over technology competency, fear of ignorance in front of their students, and not understanding technology as a tool (Glazer, Hannafin, Polly, & Rich, 2009; Hammonds et al., 2013; Hixon & Buckenmeyer, 2009; Kopcha, 2012; Owens, 2009).

The best practice to remove these barriers has been through providing technology-specific focused training along with in-school, onsite support with technology integration coaches (ITCs) and specialists and coaches (Kurt, 2013; Meyer et al., 2011; Plair, 2008; Smith, 2012). Gumbo, Makgato, and Muller (2012) and Ritzhaupt et al. (2012) found educators' use of technology increased in the classroom when training and professional development in technology integration was provided or obtained. Through training, teachers are able to acquire technology confidence, competency, and skills (Gumbo et al., 2012; Uslu & Bumen, 2012). Researchers have advocated that professional development has a direct impact on educators' use and comfort with technology as well as their confidence (Anthony, 2012; Kopcha, 2012; Potter & Rockinson-Szapkiw, 2012; Uslu & Bumen, 2012). Through multiple studies, researchers have identified that best practice employ technology as a tool rather than as an independent activity or lesson (Cauley et al., 2009; Hammonds et al., 2013; Project Tomorrow, 2011; Thompson, 2013).

Evidence of the Problem at the Local Level

Central America Academy is home to nearly 1,200 students in grades Pre-K3 to 12 and 300 employees hailing from 40 different countries. According to the publically released annual director's report (2013), the school operates on a 13 million U.S. dollar annual budget. Of that 13 million, CAA spent 4% on technology hardware and software across the three divisions (elementary, middle, and high school) and another 2% was spent on professional development. Under the 2% budget allowance for professional development, only 0.15% was spent on technology topic training.

Prior to November 2011, technology purchasing practice had been at the classroom level. Educators submitted requests for their desired technology to their respective principal, similar to the professional development process discussed earlier. From the requests, division principals determined what to include in their division's budget. These administrators typically do not possess the technology integration education or technology expertise needed to make these decisions (personal correspondence, CAA Division Principal 2 & CAA Division Principal 3, November 20, 2012). Technology integration researchers claimed that the practice of an administrative-level decision-maker lacking the necessary technology expertise, yet responsible for making the decision, was common practice in education, as was the practice of narrowfocused divisional or department only decision making versus larger-focused schoolwide decision making (Banoglu, 2011; Davis, 2008; Jones & Healing, 2010). Banoglu (2011) expressed the necessity of a decision-maker possessing the proper knowledge in the area related to the decisions he or she is responsible for making or relying on content specific expert advice prior to making the decisions.

CAA currently has an eclectic collection of technological devices and software programs. According to the finance manager, there has been little coordination as to technology plans, purchases, or programs among departments or divisions. Per the IT manager of CAA, this variety has created a shortfall in the ability of the IT department to provide support. Furthermore, per the IT manager, the IT help desk staff has received training on fewer than 50% of the latest technology devices purchased by CAA. The professional development coordinator indicated the excessive variety of technology created training challenges as well as limitations for collegial support since only a few teachers have the same equipment. Breslow (2007), based on his 6-year research study at MIT's Teaching and Learning Laboratory (TLL), suggested that similar issues with too many technology options were detrimental to student learning as to proficiency and application time. Kennedy, Judd, Dalgarno, and Waycott (2010) further examined the concept of overabundance. They evaluated the actual level of usage by students and found only 14% of students were skilled and frequent users of a wide variety of technologies and thus classified them as power users. The other 86% of students were limited in skills, volume, or nonsocial usage of technology. From the extensive technology diversity at CAA, educators have reported feeling overwhelmed by options similar to that of the students in Breslow's (2007) TLL study. It is most likely that only a small portion of CAA educators would resemble power users as discussed in the study by Kenny et al. (2010).

Professional development (PD) requests have followed a similar process to that of technology device and software purchase requests, explained earlier. The educators, however, were required on their PD request to include a rationale for the training need and indicate their history of other school-funded PD received. According to the CAA administration, until August 2011, division principals were again responsible for approving their divisional PD request on a case-by-case basis. The principal approval process, like technology purchase request approvals, failed to clarify or provide criteria for the results of the decision process. Teachers requesting professional development simply received an email stating the approval or denial of their request without explanation. Like Banoglu (2011), Jones and Healing (2010) too expressed the importance of decision-makers possessing the appropriate knowledge of the concepts related to the decisions they are responsible for making or relying on area experts to advise them prior to decision making.

Evidence of the Problem from the Professional Literature

According to researchers, technology integration has not been occurring effectively or efficiently in the classroom due to barriers reported by teachers and other school staff (An & Reigeluth, 2011; Hammonds et al., 2013). Worldwide, the most commonly reported barriers are a combination of low self-confidence, deficiencies in technology competency, and anxiety regarding usage, appearances, and curriculum time

(Al-Khatib, 2011; Inan & Lowther; 2010; Kopcha, 2012; Ritzhaupt et al., 2012). Additional barriers include limited access to technology training opportunities and the lack of support in schools without educational specialists (Kurt, 2013; Potter & Rockinson-Szapkiw, 2012; West, 2011).

Researchers Bauer and Kenton (2005), through their mixed-method study of the technology usage phenomenon occurring at four schools involving 192 teachers who serve 3,732 students, defined two key factors about teachers' training and technology usage in the classroom. First, Bauer and Kenton concluded what teachers do in their classroom was a direct reflection on their training. Second, they noted for teachers an important resource was technology workshops and other unique technology professional development offerings. Bauer and Kenton also identified the placement of technology coordinators in schools as members of the administrative team who provided expertise in the selection of programs, software, and technology equipment appropriate to the needs of schools and students.

A solution to this established lack of support and shortfalls in teachers' technology competencies and confidence has been identified to be technology integration training and direct onsite educational technology support in the classroom (Anthony, 2012; Hsu 2010; Smith, 2012). According to educational researchers, technology integration training and onsite coaching from an ITC has been a common request by teachers (Darling-Hammond, 2010; Plair, 2008; Project Tomorrow, 2012). Following off-site training and professional development courses, a key component to furthering teachers' success with application of the recent training has been through continued onsite support (Aldunate & Nussbaum, 2013; Beglau et al., 2011; Bumen, 2009; Uslu & Bumen, 2012). Plair (2008) advised educational technology specialists, when strategically placed in schools, also conveniently provided a means for posttraining support. In this way, hiring a technology specialist benefits the school daily with on-going integration support and technology mentoring onsite, thus cutting back on the need for expensive professional development funding for past tech purchases. Researchers have indicated that traditional workshops and seminars are less effective in the long term as they do not allow for the opportunity for practice, follow-up training, and reflection (Bumen, 2009). Convention-style professional development and short-term classes serve as a means of introducing emerging technology and initial concept (Uslu & Bumen, 2012). However, researchers determined conventions were not ideal for long-term skill acquisitions or profound cognitive learning (An & Reigeluth, 2011; Bumen, 2009; Uslu & Bumen, 2012).

Although born into a technologically advanced society, students' use of technology in education correlates to that of their classroom teachers (Al-Khatib, 2011; Anthony, 2012; Darling-Hammond, 2010; Inan & Lowther; 2009). When students do not observe their teachers using technology, students are inclined to shy away from using technology for educational purposes (Ritzhaupt et al., 2012). By removing the teachers' barriers, students' technology integration productivity is positively affected (An & Reigeluth, 2011; Kopcha, 2010). Preparing students for their future is the ultimate goal of educators (Larson & Miller, 2012; Project Tomorrow, 2011; Ritzhaupt et al., 2012). By today's standards, a student's future is vested in technology (Newbill & Baum, 2013).

Schools need to acknowledge and address roadblocks in their commitment to prepare their students for the technology rooted present and future.

Purpose Statement

Researchers have well explored the importance of technology integration in education along with the barriers to integration and the best practices for the improvement of technology integration (An & Reigeluth, 2011; Buckenmeyer, 2012; Kurt, 2013; Ritzhaupt et al., 2012). At the research site of this project study, no prior research had been conducted to (a) identify the levels of technology integration among its educators, (b) explore the personal and institutional barriers of its educators to integrating technology, (c) determine whether or not technology related onsite training being offered was impacting technology integration practices, or (d) ascertain the specific technological support CAA educators required. For this reason, I created this quantitative cross-sectional correlation survey project study to examine the technology integration practices of the research site. The primary purpose was to identify the levels of technology integration occurring at the classroom level. The second purpose was to determine the technology-integration-related barriers, personal and institutional, at the research site. The third purpose was to verify if the technology training provided by CAA was being attended, if not then why, and its effect on teachers integration of technology. The fourth and final purpose of this project study was to discover the specific technology training and support needs of CAA educators. To guide this exploration, I developed a series specific research questions including a set of hypotheses. The specifics of the five research questions and three hypotheses are discussed in detail later in this section.

Definitions

The following terms as they relate to the focus of this particular study are defined as follows:

21st century learning skills: Critical thinking, problem solving, communication collaboration, creativity, and innovation (Partnership for 21st Century Learning Skills, 2011).

Bring Your Own Device program: A current option used in schools where one-to-one programs (programs that assign a dedicated computer to each student) are not readily available. Instead, students are encouraged or required to bring their own technology device (most commonly a laptop, iPad, or tablet) for use in the classroom and to access the Internet (K12 Blueprint, 2014).

Coaching in education: A one-to-one conversation focused on the enhancement of learning and development through increasing self-awareness and a sense of personal responsibility where the coach facilitates the self-directed learning of the mentee (teacher or educator) through questioning, active listening, and appropriate challenges in a supportive and encouraging climate (International Centre for Coaching in Education, 2013).

Digital immigrants: “Those who were not born into the digital world but have, at some later point, become fascinated by and adopted many or most aspects of the new technology” (Prensky, 2001, p. 1).

Digital natives: “Generations who grow up with technology. They have spent their entire lives surrounded by and using computers, videogames, digital music players, video cams, cell phones, and all the other toys and tools of the digital age" (Prensky, 2001, p. 1).

Educational technology: According to Ball and Levy (2008), computers and other new electronic technologies that, when applied to educational settings, can be used to significantly change education. Examples for such emerging educational technology include (a) tools to generate course materials, (b) planning and organizational tools for concept mapping and lesson planning, (c) electronic research and reference tools, (d) tools to support specific content areas, as well as (e) tools to record class lectures and notes (p. 431).

Institutional barriers: "Barriers created by schools and administrators of schools" (Levin & Wadmany, 2008, p. 256). These "may include: (a) leadership, (b) school time-tabling structure, and (c) school planning" (Hew & Brush, 2007, p. 228).

Instructional Technology Coach (ITC): "A qualified and knowledgeable individual who models research-based strategies and explores with teachers how to increase these practices" (Sailors & Shanklin, 2010, p. 1) in the educator's own teaching environment and who sustains continuous support. Special to an ITC is the emphasis on nonevaluative and individualized relationships (Taylor, 2008), unlike a specialist, who is both an expert and a mentor as well as a supporter of schoolwide technology improvement (Neumerski, 2012; Walpole & Blamey, 2008).

Personal barriers: "Barriers real and perceived by teachers such as lack of competency, self-confidence, and priority of curriculum" (Levin & Wadmany, 2008, p. 256).

Professional development: "Activities that develop an individual's skills, knowledge, expertise, and other characteristics as a teacher" (Organization for Economic Co-operation and Development, 2009, p. 49).

Technology integration: "Technology is an instructional tool; using it in an integrative fashion is an instructional strategy. . . . It is a tool for delivering content to learners" (Woodbridge, 2004, p. 1). Examples of technology integration can range from simply accessing laptops for creating documents or using specific computer programs to more advanced uses of technology to create multimedia projects or broadcast live online. The key to technology integration is that the technology being used is a tool or a means to creating the end results and not the focus of the lesson (Cauley et al., 2009; Project Tomorrow, 2011; Thompson, 2013). Similar to using a graphing calculator in a math course, the focus is the graph created by the student through the technology device and not the graphing calculator itself.

Technology integration specialist: Certified teacher with 3 of more years of classroom experience with training in technology integration and a master's degree in educational technology (CAA, 2012).

Virtual classroom: Classrooms delivered electronically through the Internet that allow instructors and students to interact online either synchronously or independently (Martin, Parker, & Deale, 2012). Most of the virtual classroom technologies have a content frame to share the instructors' PowerPoints, an e-board on which an instructor can write, breakout rooms for group activities, text chat so the instructor and other students in the class can interact using words and emoticons, and audio chat to talk via microphone or telephone with the instructor and other students (Martin et al., 2012). Instructors can administer student polls, share their desktop, or have the students share their own desktops through application sharing (Martin et al., 2012).

Significance

Today's students are being prepared for a future rich in technology and requiring 21st century learning skills (Newbill & Baum, 2013; Ritzhaupt et al., 2012). The rapid innovation and development of technology has created the necessity for employees to possess new job skills in large scale (Christensen, Horn, & Johnson, 2008). Employers are searching for employees with skills in problem solving, critical thinking, collaboration, and effective communication (Wagner, 2008). Technology continues to be a driving force for the way business operates, government works, communication and society function, and recent generations are learning (Berners-Lee, 2008).

The mandates of today's job market compel schools and educators to prepare students to arrive equipped at their future professions (Jones et al., 2011; Ritzhaupt et al., 2012). For schools to deliver on this goal, it is necessary that educators be properly trained and continually supported in their teaching environments (Anthony, 2012). The necessary training reaches beyond basic levels of computer usage (Gumbo et al., 2012; Morgan, 2011). The United States Department of Education ([USDOE] 2009) reported that the majority of teachers used technology to develop lesson plans, align to curriculum, organize and monitor student data, create presentations, and communicate with students, parents, and colleagues. Although this is progressive, educators need to advance their technological skills and usage to align with the increasing demand of 21st century technology advancements (Kusano et al., 2013; Newbill & Baum, 2013). Best practice for successful technology integration indicated usage of technology as a tool or manipulative rather than a stand-alone curriculum (Cauley et al., 2009; Project Tomorrow, 2011; Thompson, 2013).

This phenomenon of limited integration technology by teachers beyond basic skills has been noticed at CAA. Though some technologically advanced educators have integrated technology at a progressive level comparable to the expectations of 21st century skills through means of e-portals, video streaming, threaded discussions, and real-time online assessments (Chell & Dowling, 2013), the majority of CAA educators do not integrate technology at this level. According to CAA's technology usage surveys and principal reports, the barriers discussed earlier in this study apply to a majority of CAA teachers. Research-based solutions described earlier are reasonable options for CAA to implement given the survey data collected.

The results of this project study were beneficial in validating a program for technology integration to use at CAA. Through past research, researchers have indicated that ITCs were beneficial in training and coaching educators in best practice of technology integration and removal of barriers preventing integration (An & Reigeluth, 2011; Hammonds et al., 2013; Steinke & Putnam, 2011). The results and conclusions drawn from this project study have provided a framework that can be applicable to other schools in similar positions with educators in need of technology integration training. The creation of the technology integration support program in Section 3, created as a result of this study, has the potential as an agent of change to increase best practice technology integration in other schools, reduce institutional and personal barriers, and ensure students are being adequately 21st century skill ready.

Guiding/Research Question

The overall focus of this project study was to examine the technology integration practices and support needs of educators at CAA. Five research questions helped guide this study toward that focus:

1. To what extent are classroom teachers using or accessing onsite technology at CAA?

2. What are the self-perceived personal and institutional barriers preventing technology integration by CAA teachers?

3. What technology professional development or support is available to CAA educators and to what degree are educators accessing these opportunities?

4. What is the educators' ideal support system in relation to their desired educational technology integration outcomes?

5. Is there a significant relationship between technology integration (access of programs and use of devices) and

a. self-perceived barriers to technology integration?

$H_0 1$. There is no significant relationship between technology integration (access of programs and use of devices) and self-perceived barriers to technology integration.

H_a1. There is a significant relationship between technology integration (access of programs and use of devices) and self-perceived barriers to technology integration.

b. self-perceived level of technology confidence?

H_02. There is no significant relationship between technology integration (access of programs and use of devices) and self-perceived level of technology confidence.

H_a2. There is a significant relationship between technology integration (access of programs and use of devices) and self-perceived level of technology confidence.

c. participation in technology focused professional development?

H_03. There is no significant relationship between technology integration (access of programs and use of devices) and participation in technology focused professional development.

H_a3. There is a significant relationship between technology integration (access of programs and use of devices) and participation in technology focused professional development.

The purpose of the first question was to determine the actual use of technology by the teachers at CAA. The purpose of the second research question was to examine why teachers at CAA were not integrating technology routinely or regularly. Although researchers have identified common barriers to technology integration, it was necessary to confirm the specific teacher-perceived personal and institutional barriers of CAA teachers. The purpose of the third research question was to investigate availability and the teachers' attendance of onsite technology integration training. The purpose of the fourth research question was to ascertain the educators' ideas on their specific support needs in relationship to their desired technology integration outcomes. The purpose of the fifth research question and its three hypotheses was to compare groups of CAA educators based on their levels of technology integration versus their integration barriers, confidence in using technology, and professional development attendance. The inferential analysis of the data collected, from the fifth research question, provided the opportunity to establish a measurable difference and possible correlation between high level technology integration teachers and low level technology integration teachers.

Review of the Literature

To perform the search for literature for this review, I used electronic databases: EBSCOhost, Education Research Complete, the Education Resources Information Center (ERIC), ProQuest Central, Computers & Applied Science Complete, and Safari Tech Books. Sources included scholarly journal articles, electronic and on-line-only articles, conference presentations, white papers, government reports, and papers from national and private organizations as well as educational books and dissertations. Although the majority of the research I used in this literature review was conducted in the United States, approximately a dozen international studies were included. The research applied to this project study was published between 2008 and 2015. The inclusion of international studies and literature published before 2008 was done because the research either represented a significant contribution to the field of study or because the inclusion demonstrated vital evidence in support to educational technology developments or advancements. Search terms included *21st century technology skills, barriers to technology integration, digital native and digital immigrants, educational technology, educational coaching, professional development, student engagement, technology competencies, technology integration,* and *technology integration models*.

In this section, I review the literature on the educational technology—more specifically, technology's effect on education, teachers, and students. Topics of discussion related to educational technology and its impact include digital natives versus digital immigrants, schools' responsibilities to be teaching 21st century technology skills, and existing technology integration models. From there, the review of professional literature expands to address barriers to integrating technology, solutions to these identified barriers, and the use of technology coaches to provide technology training support. Before presenting the literature on educational technology as detailed above, I discuss the learning theories pertaining to the foundation of this project study. By conducting this review, I was able to construct an essential understanding of the responsibilities, challenges, and best practices of infusing technology in education. Organization of this literature review also identified the potential impact and positive outcomes of applying the best practices to integration of technology in education.

Theoretical Foundation

The main theories underlying this capstone project study are Bandura's social learning theory of modeling, the constructivist theories of Piaget and Dewey, and Papert's technology constructionism theory. Bandura's theory of modeling stated that children learn through observing, imitating, and modeling (Bandura, 1977). In education, similar to how a teacher models best practice for their students, an educational coach models the techniques educators then observe, mimic, and apply in their classrooms. Beyond modeling, coaches are able to provide examples, ideas, and recommendations on technology integration methodology and practice. From these examples and ideas, teachers explore and sample different technology integration methods and tools. Working from Piaget's self-learning theory, educators learn through constructing logical steps (Piaget, 1980), one after another based on what they already know and have recently learned.

Adding Dewey's belief that learning was grounded in life experiences (1938), technology blends with the constructivist's theory of learning through doing. Technology integration provides learning by trying, exploring, inquiring, and experiencing. Building on Dewey's (1938) constructivist theory, Papert (1999), during his tenure at MIT, pioneered the technology constructivist approach with the creation of the Logo Learning program for teaching children math. According to Papert (1993), constructionism was "built on the assumption that children will do best by finding ("fishing") for themselves the specific knowledge they need" (p. 139). Papert's (1999) groundbreaking work was the foundation for today's widespread use of the computer in the constructivist learning environment.

Russian philosopher and constructivist theorist Vygotsky (1986) expanded on Piaget's work to emphasize how quality instruction affected student experience and development. The use of technology as an instructional tool aligns with Vygotsky's quality instructional impact. Building further on the constructivist's theory that students construct knowledge through accommodation and assimilation, technology connects students with information and each other for collaboration. November (1998), an internationally recognized technology educational leader, explained the constructivists' use of technology in education is to *informate* or dispense information to students for the purpose of learning, not *automate* or reproduce their learning experience. Through the use of technology as a tool, constructivist educators have been able to positively affect the cognitive development of students (Gu et al., 2013; Mims-word, 2012; Ntuli & Kyei-Blankson, 2009).

Digital Natives and Digital Immigrants

Nicknamed digital natives, students are entering the world with technology as a main component in their lives (Prensky, 2001). The educational technology forefathers named the current net-generation as digital natives to establish a title that refers to people born after 1980 or in the posttechnology boom. Growing up initially with computers, followed by the Internet and the current explosion of mobile devices, digital natives learn and use technology as a cultural tool (Franciosi, 2012; Jones, 2012). Digital natives view technology as an extension of themselves or an appendage (Bennett, Maton, & Kervin, 2008; Gu et al., 2013; Lei, 2009; Thompson, 2013). Darling-Hammond (2010) explained that digital natives tend to use technology without much forethought or consideration of alternative nontechnology methods. For digital natives, technology is so ingrained in their lives that when not allowed to use technology, students tend to encounter roadblocks, self-perceived or actual (Darling-Hammond, 2010; Dawson, 2012). Eventually, digital natives perceive the technological lacking methods as less familiar or perceive themselves as less skilled in using them; this perception can cause roadblocks as digital natives reveal a preference for technologically-based approaches (Thompson, 2013). Educational technology research has indicated that technology is one of the best tools to help educators engage student learners (Project Tomorrow, 2011; Sheehan & Nillas, 2010). While students today consider technology an essential tool of life (Lei, 2009), their predecessors, digital immigrants, view technology differently.

Digital immigrants refer to those born prior to 1980 when technology was either nonexistent or in its infancy stage (Prensky, 2001). Having grown up without computers, the Internet, and other mobile devices, digital immigrants have a traditional approach by today's standards to accomplishing the same task in comparison to digital natives (Tapscott, 2008). Today's technology-global society is indoctrinating digital immigrants to the new technology world surrounding them (Darling-Hammond, 2010). Similar to a foreign immigrant from another culture or country, digital immigrants face a different culture in the classroom. Accustomed to completing tasks without technology tools, digital immigrants naturally view the need and use of technology differently than their students, digital natives (Prensky, 2001; Tapscott, 2008). Though digital immigrants can become skilled technology users and professionals, they are not natives of technology, tend to have a different approach to technology, and have a more significant learning curve than digital natives (Gu et al., 2013; Morgan, 2011; Roberts-Holmes, 2013). Yet for digital immigrants to become skilled technology integrators, Jones (2012) advocated that they need access to and opportunity for technology integrations and technology competency training along with on-going support.

Currently, researchers have reported teachers indicating their digital native students are providing the needed support and mini-trainings directly in class (Hammonds et al., 2013; Ritzhaupt, et al., 2012; West, 2011). Although this may appear an obvious solution, research has indicated that caution must be used in assuming digital natives to be technology experts (Li & Ranieri, 2010; West, 2011). Merely growing up with technology surrounding students does not translate to expertise (Selwyn, 2009). Researchers have noted while one would expect digital natives' daily, self-directed, high volume technology use in nonacademic settings would translate into a self-directed high-volume use within the classroom, this is not the tendency of students (Corrin, Benner, & Lockyer, 2010; Ritzhaupt et al., 2012; Selwyn, 2009). Research has indicated that without educator guidance and support, students are less likely to use technology in educational assignments (Corrin et al., 2010; Ritzhaupt et al., 2012; West, 2011). Research has further indicated teachers' confidence, competencies, and willingness to use technology directly affects students' engagement and productivity in the classroom with technology (Uslu & Bumen, 2012; Yu, 2012). Darling-Hammond (2010) and Ritzhaupt et al. (2012) advocated that the more educators use technology in the classroom, the more productive their students become with technology. They further suggested the more apprehensive, constraining, or reserved the educator is with technology, the more stifled the students. How teachers integrate technology into the classroom across the curriculum corresponds with the students' application of technology in their learning (Al-Khatib, 2011; Anthony, 2012; Dawson, 2012; Inan & Lowther; 2010; Ritzhaupt et al., 2012).

Schools' Responsibility to Prepare Students for the Future

Today's students are growing up in a world where technology is an inescapable key component of daily life (Ito et al., 2008; Lee & Spires, 2009). From transportation and communication methods to banking and shopping activities, technology is rooted at the core of most daily life actions. According to Newbill and Baum (2013), the way the world works is being revolutionized by technology. By today's standards, technology envelops the future for which schools are charged with preparing their students (Ritzhaupt et al., 2012). With the advancements of technology into mainstream life, technology integration has rapidly become a driving force in education (Dougherty, 2012; Lowther, Ian, Strahl, & Ross, 2008; Project Tomorrow, 2012). Because education coexists on a sociocultural level, there is an expectation and necessity for education to adjust to the emergent needs of the progressively digital public (Franciosi, 2012; Jenkin, 2009). Current research reported implementing computer technology at the classroom level remained top priority of educational administrators (Crook, 2012; Ian & Lowther, 2009; Kurt, 2013); meanwhile, additional research reports numerous schools are actively engaged in the integration of technology into the curriculum (Cakir, 2012; Iscioglu, 2011; Lei, 2009). Educational administrators recognize the evolution of technological integration as a logical step toward educational reform (Berrett, Murphy, & Sullivan, 2012) because students are now born into our currently and rapidly advancing digital world.

Direct teacher accounts contradicted the research statements regarding implementing technology at the classroom level. Researchers have reported low levels of technology integration and irregular intervals with integration (Gumbo et al., 2012; McGarr, 2009; Pan & Franklin, 2011; Ritzhaupt et al., 2012). Researchers have advised that schools are purchasing devices and placing technology equipment in classrooms, libraries, and labs (Ian & Lowther, 2009: Iscioglu, 2011; Ritzhaupt et al., 2012); nonetheless, teachers are reporting a shortfall in training and lack of competency in using current educational technology (Kusano et al., 2013; Potter & Rockinson-Szapkiw, 2012; Rana 2012). A school may possess adequate technology installations, but merely having technological tools available does not necessarily result in effective technological integration. Researchers Fletcher (2014), Herlihy (2011), and Morgan (2011) implied that technology integration was a teaching method and process, it was not a curriculum or computer skills. Integration was more than providing devices or teaching the latest software program (Cauley et al., 2009; Corrin et al., 2010; Kurt, 2013).

Using technology as a tool similar to how math and science teachers use manipulatives and lab equipment is necessary for true integration. A key component to effective technology integration is for technology to be a tool rather than a stand-alone skills course (Cauley et al., 2009; Guzey & Roehrig, 2009; Hammonds et al., 2013; Kurt, 2013; Sawchuk, 2010). Genuine technology integration requires making the technology practically invisible while creating visible impact (Sawchuk, 2010; Trujillo, 2009) on student performance and productivity. Integration of technology into current curriculum can reform established practices as a means to developing students’ 21st century learning skills (Partnership for 21st Century Skills, 2011). Sheehan and Nillas (2010) have established that integration of technology, in situations when students are first-hand users, led to an increase of student engagement, critical thinking, and engagement. The U.S. Department of Education (2009) and Project Tomorrow (2011) researchers found that the use of technology as a tool in schools created more authentic experiences and engaged learning for students.

Technology Integration Models

Technology integration is more than simply using a device to perform a task (Cauley et al., 2009; Guzey & Roehrig, 2009). It is more than assigning a website to use for research or showing a video in class. Technology integration is the application of technology to facilitate learning through different mediums, provide opportunities for student-centric learning, engage learners, and allow for differentiation and learning preferences (Ertmer, Ottenbreit-Leftwich, Sadik, Sendurur, & Sendurur, 2012; Hsu, 2010; Ritzhaupt et al., 2012; Ottenbreit-Leftwich, Glazewski, Newby, & Ertmer, 2010). Without this continual focus of technology as a method for achieving desired learning outcomes, technology simply becomes an extraneous, disconnected entity (Thompson, 2013). The technology integration standards, written by International Society of Technology Education ([ISTE] 2014), were created as a means to provide educators with guidelines for these types of application, rather than analyzing the quantity of technological tools available to students and teachers. As with many educational programs, there are options and different models. Research on technology integration models has resulted in information on the importance of schools selecting a model that is a good fit for that school's curriculum, including learning styles, grade levels, and desired results (Davis, 2008; Harris & Hoffer, 2011; Pan & Franklin, 2011). Ntuli and Kyei-Blankson (2009) clarified that one model does not fit all educational settings. Three of the most commonly established technology integration models currently in are substitution augmentation modification redefinition (SAMR), technological pedagogical content knowledge (TPACK), and technology integration matrix (TIM) (Chell & Dowling, 2013; Florida Center for Technology Instruction, 2012; Harris & Hoffer, 2011; Puentedura, 2013).

SAMR was founded on Puentedura's (2013) research on what types of technology have the greatest effect on student learning. Chell and Dowling (2013) explained the SAMR model was grounded in project-based learning with the concept of technology being the mechanism that identified the model level. More specifically, SAMR supported use of technology to engage and drive student learning (Puentedura, 2013). Substitution in the SAMR model occurred when an educator substituted a classic activity such as reading a biography with watching a video biography or asked students to use a web tool to research rather than use a print-based encyclopedia. Two levels of the SAMR model can be simultaneously achieved based on how technology was used in the lesson. For example, the use of a word processer rather than a typewriter achieved the substitution level. However, when the students used the spell check feature of the word processing program, they also achieved the second level, augmentation, simultaneously (Oostveen, Muirhead, & Goodman, 2011). The second level, augmentation, progressed technology integration by the involvement of applications in the learning process such as highlighting, underlining text, and inserting images or shapes (Chell & Dowling, 2013). Augmentation focused on technology not just being a substitution but a functional improvement (Puentedura, 2013). The third level, modification, was achieved when educators used technology to involve the students in the learning process (Hos-McGrane, 2011). For example, students employ the interactive tools of virtual portals and online learning environments such as blogs, discussion boards, and journals, where they are expected to publish work and receive peer and teacher feedback (Oostveen et al., 2011). The final level, redefinition, was achieved when an educator's students use technology to create something new or complete previously inconceivable tasks (Puentedura, 2013). Examples of redefinition achievement are student created movies, presentations, and other products that can be shared or presented with peers or other audiences (Hos-McGrane, 2011).

TPACK was based on the conceptual framework of educational psychologist Shulman (1986) and his philosophies of pedagogical content knowledge (PCK). Shulman identified a seven-layer knowledge base spanning from content, curriculum, and general pedagogical knowledge to knowledge of learners, their characteristics and educational context, and goals. Within this multilayered structure, Shulman included PCK. TPACK concentrated on these seven aforementioned components including the three principal forms of knowledge: content, pedagogy, and technology (Guzey & Roehrig, 2009; Harris & Hofer 2011; Koehler & Mishra, 2009). Building on this foundation, Guzey and Roehrig (2009) emphasized how additional learning is found at the crossroads of these three principal forms.

The TIM model provided teachers with a framework for how to use technology to enhance K-12 learning (Florida Center for Instructional Technology, 2012). Created by the Florida Center for Instructional Technology and Florida Department of Education, the TIM system functioned through a five by five matrix as a descriptive and evaluating tool. According to the Florida Center for Instructional Technology (2012), the TIM model is an incorporation of five interdependent characteristics of learning environments: active, collaborative, constructive, authentic, and goal directed with the five levels of technology integration: entry, adoption, adaptation, infusion, and transformation. Together the matrix, the characteristics of the learning environment, and the levels of technology integration create a 25-cell table that provides teachers and schools a guide to assist them in evaluating the level of technology integration in their curriculum and to provide models of how technology can be integrated into instruction (Florida Center for Technology Instruction, 2012).

Efficient technology integration for pedagogy requires developing and understanding of the transactional relationship between the components of knowledge and unique dynamics of the school’s framework and goals. The grade-levels, teachers, school factors, and demographics, along with culture and desired learning outcome, help guide the selection of the best fit of a technology integration model.

Barriers to Technology Integration in the Classroom

Though technology integration is considered a best practice, the reality is educators are not integrating technology as effectively or efficiently as expected or needed (Gumbo et al., 2012; Ritzhaupt et al., 2012). The reason for the lack of or low levels of integration was barriers of different proportions. These barriers to technology integration were divided into two distinct categories: personal barriers and institutional barriers (Ertmer, et al., 2012; Kopcha, 2010). Personal barriers are internal obstacles and directly connected to the educator (Kim, Kim, Lee, Spector, & DeMeester, 2013), and institutional barriers are those created by educational institutions: districts, individual schools, or administrators (An & Reigeluth, 2011).

The most common personal barriers reported by educators fell into three levels of concern (Aldunate & Nussbaum, 2013; Kopcha, 2012; Morgan, 2011; Smith, 2012; Uslu & Bumen, 2012). The first barrier level was the educators' self-perceived lack of competency, knowledge, and self-confidence with technology (Kim et al., 2013). According to Aldunate and Nussbaum (2013), teachers commonly reported not being computer smart, tech savvy, or a technology capable person. They further express a lack of uncertainty on how to use a program or being able to resolve issues if they arise while using a program (Kurt, 2013). These type of issues create the most common barriers for teacher integration of technology. The second barrier level was anxiety or inner fear of technology being difficult combined with appearing ignorant in front of students (An & Reigeluth, 2011; Inan & Lowther, 2010). Teachers expressed concerns about looking uneducated in front of their students or becoming frustrated when a student were better able to use the technology in the classroom (Bennett & Manton, 2010; Teo, 2011). The third barrier level was focused on the personal perception of their curriculum being overloaded, and a priority of meeting standardized testing benchmarks (Hsu, 2010). Frequently nontechnology-using teachers expressed a frustration with a lack of time to create additional lessons for technology integration or explained that in order for them to integrate technology into the lesson, they had to recreate the whole lesson (Keengwe, Onchwari, & Wachira, 2008). Commonly teachers add that have no time for more or new activities to be added into their existing curriculum because they are overwhelmed with meeting standardize tests requirements (Biancarosa & Griffiths, 2012).

Institutional barriers were categorized into three levels as well (Levin & Wadmany, 2008; Pan & Franklin, 2011; Potter & Rockinson-Szapkiw, 2012). The first level of institutional barriers pertained to the limited emphasis by administration on technology integration (Kopcha, 2012; Teo, 2011). These types of limitations most often relate to the lack of support and limited recognition of the importance of technology integration by administration and supervisors (Plair, 2008). The second level relates to limited training opportunities provided through districts and school (Kurt, 2013; Potter & Rockinson-Szapkiw, 2012). This level of limitation to training includes access to training, paid professional leave for attending technology-focused training or conferences, and lack of funding for course or workshop registration fees. The third level applies to nonexistence of technology specialists or coaches on campus (Plair, 2008; Smith, 2012; Wachira & Keengwe, 2011). Outside of basic infrastructure IT support, most schools do not employee technology specialists to work one-to-one or in small groups with teachers on technology integration (Plair, 2008). In districts and schools that do employ technology specialists for teacher support, it is common those coaches are assigned to an unrealistic number of teachers to support (Plair, 2008). Furthermore, the third institutional barrier level pertains to the limited channels for IT support beyond an email or phone number of a helpdesk (Teo, 2011).

Solution to Barriers

Researchers identified the barriers, personal and institutional, and educators' justifications for the lack of technology integration in the classroom. The solution to these identified technology integration roadblocks was to break down barriers (Ebert-May et al., 2011; Kurt, 2013; Kopcha, 2010; Kopcha 2012). The best approach to remove or reduce these barriers was through education and onsite support of educational technology (Beglau et al., 2011). Kopcha (2012) supported Beglau et al.'s (2012) belief that in order to achieve successful and sustainable technology integration in schools, organized technology-focused professional development and ITC support was paramount. Tournaki, Lyublinskaya, & Carolan (2011) also identified professional development as a critical mechanism to increase student success in education.

Professional development was already a well-established and accepted practice in other content areas (Beglau et al., 2011; Plair, 2008), therefore logically would translate into an acceptable solution for technology integration. Iscioglu (2011) and Jones et al. (2011) both claimed that educational institutions were striving to enrich their teaching-learning environment with both technology hardware and software programs in an effort to establish a 21st century infrastructure. However, schools remained lacking in adequate long-term staff development programming concentrated on technology competency and classroom level integration methods (Aldunate & Nussbaum, 2013; Ritzhaupt et al., 2012). This type of programming would educate teachers in technology competency shortfalls thus removing the primary level of barriers (Gumbo et al., 2012; Uslu & Bumen, 2012).

Similar to students, teachers were able to acquire technology skills and knowledge through education. Studies indicated reductions of the barriers described previously were achieved through technology-focused training (Gumbo et al., 2012; Ritzhaupt et al., 2012). In schools and districts providing in-service technology training, the personal barriers of lacking confidence, inadequate technology content knowledge, and personal perceptions of technology are lower (Uslu & Bumen, 2012). At a university level, preservice programs offering technology integration courses and training opportunities are graduating qualified teachers with significantly reduced personal barriers regarding technology integration (Anthony, 2012; Uslu & Bumen, 2012; Williams, Foulger & Wetzel, 2009).

The second level of personal barriers, anxiety of technology and fear of incompetence in front of their students, was also best addressed through training. When challenged with technology in the classroom, a population of teachers was willing to rely on tech-savvy students (Lei, 2009) for help and guidance. It is common in today's digital world for students or digital natives to possess more technology knowledge than their teachers (Luthra & Fochtman, 2011). As Lei (2009) voiced, from these tech-savvy students, teachers were acquiring a mini-lesson or the essential skills for survival at that immediate moment to accomplish the lesson. The other portion of the teaching population was more commonly unwilling to admit technology ignorance in front of their students (Lei, 2009). Those unwilling to ask students for help were less likely to use unfamiliar technology in any lesson (Lei, 2009). Through their attitude and actions, educators were sending silent messages to their students about the importance of learning and supporting digital natives' technology culture. Research indicating how the attitude of educators towards today's technology culture impacts students' engagement has been well-established in recent years (Anthony, 2012; Gumbo et al., 2012; Holden & Rada, 2011; Ottenbreit-Leftwich et al., 2010; Project Tomorrow, 2012).

Whether educators are willing to ask students for help or are refusing to admit their lack of technology competency, participating in training reduced the anxiety of not knowing (Franklin & Pan, 2011; Tournaki et al., 2011). Teachers who participated in training were armed with technology skills and integration knowledge they could demonstrate and apply to the classroom (Uslu & Bumen, 2012). Subsequent to professional development, educators demonstrated an increased uses of technology through software and hardware in their learning environment (Glazer et al, 2009; Juuti, Lavonen, Aksela, & Meisalo, 2009). When observing attendees following technology professional development programs, an improved attitude about technology integration can be observed and an appreciation for the training opportunity as well as their newly-acquired skills is commonly expressed (Anthony, 2012; Uslu & Bumen, 2012).

To address the third common personal barriers of technology integration, training focused on technology as a tool rather than a stand-alone curriculum is the solution (Franciosi, 2012; Kurt, 2013; Morgan 2011). Hixon and Buckenmeyer (2009) reported that educators were able to acquire technology skills and knowledge focused on technology as a tool, then return to their classrooms to apply these skills. This type of focused pedagogical training provided educators with an ability to integrate technology into their current curriculum rather than detract from the curriculum or add to the workload of teachers or students (Boud & Hager, 2011; Kopcha, 2012). Potter and Rockinson-Szapkiw (2012) supported this need through their research on professional development of technology integration and the integral part of technology in a functioning classroom. Through integrating technology as a manipulative or resource, teachers were able to expand the breadth and depth of their lessons and curricular focus (Project Tomorrow, 2011). As a tool, technology opened the pathway for student engagement and learning. Engaging students and enhancing learning transpired with effective integration of technology in the classroom (Pan & Franklin, 2011; Project Tomorrow, 2011). Teachers first needed to be trained on best practices for integrating technology as tools and resources for their existing curriculum as well as be supported throughout their teaching.

Tech Coaches Fulfill Training Support Roles

In sports, and games like chess, deliberate and repetitive practicing to improve skills and performance levels is common training (Tucker & Collins, 2012). Educators apply that same practice philosophy with students in the classroom (Boud & Hager, 2011). Change takes time as does perfecting skills (Uslu & Bumen, 2009; Tucker & Collins, 2012). Researchers, Ostashewski, Moisey, and Reid (2011) and Hayes and Noonan (2008) supported this knowledge theory with their research on better practice. Their research explained that providing professional development training and adequate job-embedded support was essential.

Technology training was not immune to this philosophy. Researchers have shown integration of technology was not acquired overnight (Uslu & Bumen, 2012). Currently technology integration professional development offerings are commonly one-day workshops or multiday conferences. Participants from singular workshops and professional development conference events often report a feeling of being overwhelmed due to the cramming of too much information into a short time period (An & Reigeluth, 2011; Overbay, Mollette, & Vasu, 2011). Additionally, singular workshops did not allow for the application of practice, follow-up, and reflection of the newly learned information (Bumen, 2009). Participants were acquiring a wealth of information but at a speed and volume too large to absorb or apply when they return to the classroom (An & Reigeluth, 2011; Overbay et al., 2011).

Research on continuing professional development indicated the need for frequency in technology integration training as a series or tiered plan (Beglau et al., 2011; Thornton, Crim, & Hawkins, 2009). Giordano (2008), based on his mixed-method study on the long-term effect of technology-focused professional development in schools, reported an increase of instructional use of technology over time once training became embedded. The study included both quantitative survey data and direct teacher interviews and observations. Giordano’s 3-year study included interviews and observations of 88 teachers selected by their administrator. These 88 teachers were representatives from 44 schools in the district spanning grades prekindergarten to 12. Through on-going professional development, educators were able to build on their training with classroom practices for continued application and improvement (Hammonds et al., 2013; Thornton et al., 2009). Recurring structured training provided educators time to put into practice the newly acquired skills systematically (Giordano, 2008). After applying the knowledge in their classroom, teachers returned to the next training session to reflect, learn additional skills, and improve upon the topic. For many educators, technology is a new language similar to learning a foreign language such as French, Russian, or Japanese (Plair, 2008). In order to become technology-proficient and tech-literate, training needs to be recurring, and usage support needs to be in place (Boud & Hager, 2011; Hammonds et al., 2013; Project Tomorrow, 2012; Plair, 2008).

A key component of technology integration success in schools is through job-embedded technology integration support. This support can be supplied through employing technology specialists as nonsupervisory mentors or coaches for classroom teachers. Mentors and coaches in education have long been established as a benefit for other curriculum and new teacher programs (Hammonds et al., 2013; Project Tomorrow, 2012; Owens, 2009; Plair, 2008). This same philosophy should apply to technology integration. As technology specialists are trained and artful in their ability to increase technology activities and leadership within their schools, their existence is vital (Banoglu, 2011). Technology specialists or tech coaches, as they are more commonly known in schools, have the ability and knowledge to influence beyond the schools' device selection, policy guides, and tech organization (Beglau et al., 2011). Tech coaches can be key to technology support, classroom integration, and staff coaching (Beglau et al., 2011; Plair 2009; Project Tomorrow, 2012)

Summary

Ultimately, the factors limiting efficient and effective technology integration were directly related to personal self-perceived teacher barriers and institutional barriers. From the anxiety of unknown technology and fears of appearing unintelligent to lack of knowledge and the need for mentoring, these common barriers were not limited to a small population of schools. Research indicated these teacher-reported barriers as common and reoccurring issues around the world (Hsu, 2013; Kim et al., 2013; Pan & Franklin, 2011; Ritzhaupt et al., 2012). Current educational research established the solution to decreasing or removing these barriers was through technology-integration-focused professional development and job-embedded technology support (Kovalik, Kuo, & Karpinski, 2013; Loveland, 2012; Overbay et al., 2011; Tournaki et al., 2011). Practice, time, and support were key influences in the successful acquisition of new skills. As Uslu and Bumen (2012) have consistently contended integration does not occur overnight and it was through on-going technology mentoring or coaching educators were able to acquire the needed skills and ability for best practice (Hayes & Noonan, 2008; Sawchuk, 2010).

Implications

CAA administration is focused on ensuring its students are best prepared for their future. This future includes 21st century technology readiness. To achieve this 21st century readiness focus of CAA, educators must first be technologically knowledgeable and technology integration trained.

The results of this project study could be helpful in inspiring social change by possibly creating a program for technology coaching across the curriculum from Pre-K3 to grade 12. Potentially a program guide could be applicable to CAA and could be adaptable to other similar designed schools. The data collected could reveal a significant need of technology specialists in a coaching role to mentor and support educators with best practice for technology integration. The results could also provide a compilation of ways to best integrate technology into existing standards and subject related curriculum.

Conclusion

The technology integration support for educators has improved during the past 3 three years at CAA through the hiring of a technology integration coordinator, increased onsite technology training, and establishment of the educational technology department. There is still, however, a need of increased training for its educators concentrated on best practice for technology integration as well as expanded onsite technological support. The research indicated that the best method of support was through the use of onsite technology specialists as coaches and trainers. A quantitative cross-sectional survey study was conducted to evaluate CAA's technology integration practices in relations to integration levels, teacher perceived barriers, confidence in using technology, professional development offerings and participations as well as technological support needs. The social learning theory of Bandura and the constructivist theories of Piaget and Dewey were the theoretical framework applied to shape the project study design. Papert's theories combined with Vygotsky's historical views strengthen the theoretical framework with its connection to technology in education. I completed a review of the literature regarding technology integration best practice, barriers of technology integration, and the role of technology specialist coaches as presented in Section 1. In Section 2, I will explain my methodology and study design including the details on the sample and setting, the instrument, data collection and analysis, the survey results and outcomes.

Section 2: The Methodology

To contribute to the discussion on how to best affect the integration of technology into the classroom, I completed a project study of the onsite technology integration needs and technology skills of CAA's educators. Additionally, I explored teachers' perceptions of (a) barriers and confidence levels related to integrating technology as well as (b) technology professional development and support services offered at the research site. In order to investigate CAA's technology tendencies and deficits, I used a quantitative research approach and a cross-sectional survey design to electronically collect data from certified teachers at the research site.

According to Creswell (2012), researchers can help establish the overall validity of a study by clearly identifying the research methods employed to conduct the study. For this reason, the research methods used to conduct this study have been discussed in detail in this section. Specifically, the remainder of this section includes details about the research methods as well as a presentation and discussion of the study results. With regard to the methods in particular, I explain the design and approach, setting and sample, instruments and measures, data collection and analysis processes, assumptions, limitations, scope, delimitations, and ethical safeguards.

Research Design and Approach

To develop this study, I mirrored methods demonstrated in previous studies on technology integration (see Abbitt, 2011a; Inan & Lowther, 2010; Kopcha, 2010; Wozney, Venkatesh, & Abrami, 2006). By doing so, I contributed to the overall reliability of this study and conclusions drawn from data analysis. This study was quantitative in design. A quantitative research design is typically used when a researcher wants to explain a trend or a phenomenon (Creswell, 2013) and may be beneficial when a researcher's goal is to "measure a community's need of educational services as related to program and courses" (p. 378). Because the purpose of this study was to explain the conditions associated with technology integration at CAA, including teacher needs associated with technology integration at CAA, a quantitative study design was appropriate.

According to Lodico, Spaulding, and Voegtle (2012), a cross-sectional survey approach to data collection is one that focuses on collecting data at a single point in time at a specific location. It is also used when researchers want to collect data to "examine current attitudes, beliefs, and opinions or practices about a specific group of people" (Creswell, 2012, p. 377). Because I collected data at a specific point in time at a specific location to examine the current attitudes, beliefs, and opinions of a specific group of people, educators at CAA, this approach was appropriate for my study. Creswell (2012) further explained that researchers prefer to use the cross sectional research design because of the economy of the design and the simplicity of surveys used to collect data, and also because it allows for quick turnaround in data collection and the option to compare different groups of participants based upon attitude, beliefs, and opinions with a single instrument. Although I did not compare groups of participants, the three other qualities noted by Creswell were desirable in this study.

Setting and Sample

The setting for this study was a large international Pre-K3 to 12 school located on a 36-acre campus in Central America, 15 kilometers from a major international metropolitan city. CAA is one of the largest and oldest international schools in the Central American region and is well recognized nationally and regionally. Following the U.S. school calendar of mid-August to mid-June, CAA is home to nearly 1,200 students and 300 staff, including local and international teachers, para educators, administrators, and other support staff. Because CAA is a private school, none of their employees are employed by a district, city, or government agency. Teachers range in age from 25 to 60 years and have between 2 to 21+ years of experience in education. Additionally, the ethnic diversity of the educators spans the globe.

Of the 180 education staff members at the school, 110 are certified teachers. The teachers teach at 15 grade levels: Pre-K3, Pre-K4, kindergarten, and Grades 1 to 12. These grades are divided in three divisions: elementary (Pre-K3 through Grade 5), middle (Grades 6-8), and high (Grades 9-12). There are 48 (44%) teachers at the elementary school level, 26 (24%) at the middle school level, and 36 (32%) at the high school level. Elementary teachers belong to one of three subject areas: (a) self-contained or homeroom classes, (b) foreign language (Spanish), or (c) technology. In the middle school and high school divisions, subject areas are organized by departments and include English, math, hard science, social science, foreign language (Spanish and French), arts, (visual and performing), physical education, and technology. In the high school division, some departments are more expansive then in middle school. For example, in middle school, social science only refers to social studies, while in high school, social science includes economics, history, global politics, and psychology. Additionally in middle school, hard science is general (i.e., life, earth, and physical), while in high school hard science includes specific science subjects such as biology, physics, and chemistry. Foreign language at CAA includes Spanish, French, Mandarin, and German. Though Spanish and French are taught by 17 full-time teachers from kindergarten to 12th grade, Mandarin and German are offered only through an online K12 language program. The K12 language program employs part-time native speakers as tutors in a supporting role.

CAA has invested a substantial amount of funds into providing technology resources and programs for the teachers, staff, and students. As of August 2014, the technology capital inventory (see Table 1) included 490 computers, including laptops, to be in use at CAA. Of those 490 computers, 92%, or 450 devices, were in locations for educational purposes, some of which were available for student use. The remaining 8% of computers not for educational purposes were located in the business and administrative offices of the school and were not related to the scope of this study.

At the time of this study, CAA provided all instructional staff and classroom teachers with a school laptop for use in creating instructional material, delivering lessons, and performing teacher-related duties. There were four computer labs at CAA located across the campus in different divisions: two at the elementary level and one each at the middle and high school levels. Each computer lab had 23 desktop computers. The two divisional libraries (elementary and secondary) each had five desktop computers for direct student use in addition to the laptops assigned to the librarians.

Table 1

Computer and Laptop Inventory at CAA (August 2014)

	Rooms (*n*)	Average computers (*n*)	Total computers (*n*)	Accessible by students for educational use
Computer labs	4	23	92	Yes
Libraries (desktops)	2	5	10	Yes
Library (laptops for checkouts)	1	25	25	Yes
Teacher issued laptops	110	1	110	Yes
Education staff issued laptops	70	1	70	Yes
Workstation desktops	25	1	25	No
Employee laptops	15	1	15	No
Classrooms	86	2	143	Yes
Total			490	

Each elementary school classroom also had an interactive whiteboard, mounted ceiling projector, document camera, and digital camera. Each homeroom classroom also had one desktop or laptop computer dedicated for instructional use. Each of the four upper elementary level classrooms (Grade 5) also had a set of five laptops for direct student use. All instructional classrooms at the middle school level, including foreign language and science labs, had an interactive whiteboard, mounted ceiling projector, and instructional desktop computer. At the high school level, all classrooms had a ceiling mounted projector and a classroom dedicated laptop or desktop for instructional purposes; 60% of instructional classrooms and all science labs had interactive whiteboards. Based on the curriculum, select middle and high school classrooms had additional dedicated student-use computers (desktop or laptop). For example, the Spanish as an additional language and French language programs both require the use of software programs for delivery of individual student lessons and practice; therefore, these classrooms had five permanently placed student-use computers in them. In high school classrooms, the dedicated computer science classroom (different from the computer lab) had 10 computers, including laptops permanently located in the classrooms for direct student use. The assignment of computers to the computer science classrooms also was a function of the curriculum. The CAA campus was 100% Wi-Fi accessible, and all classrooms had a dedicated Ethernet junction box for a dedicated landline connection of the instructional computer, projector, and interactive whiteboard if applicable.

CAA also had three mobile carts of 20 to 30 laptops available for student use and two mobile carts with 25 iPads each located in different divisions. In addition, there were 20 laptops available for check out for student use in the secondary (shared middle and high school division) library. Furthermore, the school provided each elementary level classroom from Pre-K3 to 5th grade with a set of four iPads.

To choose an appropriate sample for a study, it is important to examine the characteristics of the sample that are essential for answering the research questions (Fink, 2006). For this study, all teachers currently employed at CAA were invited to participate in the study. No teachers were excluded based on age, gender, subject matter taught, or years of experience. The target population for this study was the 110 certified teachers at the school (including seven teacher specialists). Part-time tutors in the K-12 language program are not certified teachers and, therefore, were not invited to participate in the survey. The desired sample size was 55, which required a response rate of 55%. Creswell (2012) recommended a sample size in educational research be at least 30. According to Lodico et al. (2010), samples sizes over 30 are best practice for correlation studies as well as recommended for studies using the Pearson product-moment correlation test.

A purposive sampling process was used to recruit participants for this study. Babbie (2002) argued that in research, it was "appropriate to select a sample on the basis of knowledge of a population, its elements, and the purpose of the study" (p. 178). Although purposive sampling is more commonly used in qualitative studies (Creswell, 2012), this method of sampling was appropriate in this study because a particular population was needed to address the research questions. Specifically, to determine the technology integration habits of teachers at CAA, it was necessary to survey teachers who teach at CAA. This sampling process was not considered a process of convenience because all teachers at the research site were invited to participate in the study.

To recruit participants, I contacted them via email using the school's email system. As the technology integration coordinator at CAA, I had access to the e-mail addresses of all teaching staff through the school network. Evidence of permission to use the site's e-mail system for contacting the target audience is located in Appendix B. The e-mail invitation was sent blind carbon copy so that the recipients were unaware of others invited. All e-mail invites included participation instructions and disclosure of the research project and guidelines (see Appendix C). A reminder e-mail was sent to teachers 5 days before the data collection window closed. The reminder e-mail was a duplicate of the original invitation with a short reminder at the beginning of the invitation (see Appendix D).

Instrumentation

Creswell (2012) advocated the collection of data in quantitative research using the most current version of available, preestablished instruments that have been used extensively in other studies. For this reason, the electronically-delivered Educational Technology Integration Questionnaire (ETIQ; see Appendix E) was created using sections of three published surveys. Individually, each of the surveys was focused on one or two of the variables addressed in the five research questions developed for this study. Because no one survey was sufficient to collect the needed data to answer all five research questions, it was necessary to use selected portions of multiple surveys. The three published surveys were the (a) Public School Teachers Use of Computers and the Internet Survey (PSTUCIS; USDOE National Center for Education Statistics [NCES], 1999), (b) Technology Proficiency Self-Assessment (TPSA; Ropp, 1997), and (c) Technology Implementation Questionnaire (TIQ) Version II (The Centre for the Study of Learning and Performance [CSLP]), n.d.a.) and III (The Centre for the Study of Learning and Performance [CSLP]), n.d.b.). The validity and reliability of these preestablished surveys is discussed in the subsequent Reliability and Validity subsections.

Permission to use all three of these instruments was secured prior to using them for data collection in this study. Permission to use the PSTUCIS was granted on The USDOE NCES' website (see Appendix F). Permission to use Dr. Ropp's TPSA survey for nonprofit and educational research was granted on the Institute for the Integration of

Technology into Teaching and Learning website (see Appendix G). Dr. Abrami of CSLP granted permission to use both Version II and III of the TIQ for the purpose of this study via an email dated December 1, 2013 (see Appendix H).

Public School Teachers Use of Computers and the Internet Survey

The PSTUCIS is a 21-item instrument delivered as a single section survey; of the 21 items on the instrument, 11 are made up of subitems so that the total number of items on the survey is 90 (USDOE NCES, 1999). Items are either fill-in-the-blank (*n* = 6), yes/no (*n* = 8), yes/no/don't know (*n* = 7), multiple choice (*n* = 4), based on a Likert-styles scales (*n* = 39), or a combination of one or more of these options (*n* = 26; USDOE NCES, 1999). The 6 Likert-style scales vary from 3-point scales to 5-point scales. The one 3-point scales is 1 (*not at all*), 2 (*a little*), and 3 (*a lot*). There are five 4-point scales:

- 1 (*not at all*), 2 (*rarely*), 3 (*sometimes*), and 4 (*often*).
- 1 (*not at all*), 2 (*small extent*), 3 (*moderate extent*), and 4 (*large extent*).
- 1 (*0 hours*), 2 (*1-8 hours*), 3 (*9-32 hours*), and 4 (*more than 32 hours*).
- 1 (*not at all prepared*), 2 (*somewhat prepared*), 3 (*well prepared*), and 4 (*very well prepared*).
- 1 (*not a barrier*), 2 (*small barrier*), 3 (*moderate barrier*), and 4 (*great barrier*).

The one 5-point scale was 1 (*not at all*), 2 (*small extent*), 3 (*moderate extent*), 4 (*large extent*), and 5 (*NA*). Overall scores for each item were calculated by determining mean scores for the participants' responses. The nominal scales *yes/no* and *yes/no/don't know* were assigned numeric values so that mean scores also can be calculated for those items.

Technology Proficiency Self-Assessment

The TSPA instrument was developed by Ropp (1999) in an effort to measure educators' confidence when integrating technology in their academic practices. Ropp intentionally designed the instrument to reflect the four domains of the International Society for Technology in Education's national educational technology standards for teachers. TSPA is a 20-question, self-rating scale with four subscales used to measure proficiency with (a) e-mail, (b) the World Wide Web, (c) integrated applications, and (d) teaching with technology (Ropp, 1999). The questions covered topics from basic skills such as sending an e-mail and searching a website to more advanced technology skills like using collaboration software and integrating technology into lessons (Ropp, 1999). The questions were phrased so that respondents indicated their level of agreement with statements about their confidence in performing particular tasks (Ropp, 1999).

Participants indicated agreement on a 6-point Likert-style scale: 1 (*strongly disagree*), 2 (*disagree*), 3 (*mildly disagree*), 4 (*mildly agree*), 5 (*agree*), and 6 (*strongly agree*; Ropp, 1999). To score the responses, the sum of each respondent's 1 to 6 ratings for all 20 questions were tallied and averaged to determine each respondent's mean score (Ropp, 1999). The mean score was then used to assign an educational technology confidence level to the respondent. Additionally, cumulative means for each subscale were calculated (Ropp, 1999). Although the TPSA questions were aligned to learning and teaching with computers, the TPSA was essentially a contextualized gauge of a computer self-efficiency (Gençtürk, Gökçek, & Güneş, 2010; Robinson & Gilliam, 2014).

For the purposes of this study, I used a version of the instrument provided by the Institute for the Integration of Technology into Teaching and Learning. This version of the instrument is based on a 5-point Likert-style scale: 1 (*strongly disagree*), 2 (*disagree*), 3 (*undecided*), 4 (*agree*), and 5 (*strongly agree*). Participant responses were scored in the same manner as described for the original instrument. I chose to use this version of the instrument because it better aligned with the other Likert-style questions from the other two preestablished instruments selected for this project study.

Technology Implementation Questionnaire

According to Meyer et al. (2011), the overall purpose for developing the TIQ was to evaluate educational technology relating to three distinct belief categories: (a) expectancy of success, (b) perceived value of technology use, and (c) perceived cost of technology use. There are three iterations of the TIQ. Both Version II and Version III of the TIQ were used in this study because neither one alone contained all the appropriate questions needed to collect data to answer the research questions posed in this project study. In particular, Version II contained questions about the use of general technologies as opposed to Version III, which was focused on one particular technology, the Learning Toolkit. In addition, Version II contained questions focused on the support needs of educators, a particular topic of interest in this project study and one expressed in Research Questions 3 and 4. Because Versions II and III were used to develop the instrument used in this study, I discuss these versions in more detail here.

The second iteration of the instrument, Version II, was created from the framework of the original TIQ, a series of 55 closed-ended and two open-ended questions grouped into five sections (CSLP, n.d.a.). The general purpose of this instrument (TIQ Version II), as stated by CSLP (n.d.a.) was "to learn more about the reasons why teachers do or do not integrate computer technology in their classrooms" (p. 1). Version II contains 74 close-ended questions divided into the same five subscales as the original TIQ (CSLP, n.d.a.): Section 1. Your Professional View on Computer Technology, Section 2. Your Background, Your Teaching Style, and Resources Available to You, Section 3. Your Experience with Computer Technologies, Section 4. Your Process of Integration, and Section 5. Additional Comments (CSLP, n.d.a.).

Other than the two open-ended questions at the end of the survey, the questions are either multiple choice or based on a 6-point Likert-style scale of some sort (CSLP, n.d.a.). For Section 1, Your Professional View on Computer Technology, the scale is used to measure agreement; this scale ranged from 1 (*strongly disagree*) to 6 (*strongly agree*; CSLP, n.d.a.). For Section 2, Your Background, Your Teaching Style, and Resources Available to You, the scale is used to measure the quality of access to technology; this scale ranged from 1 (*extremely poor*) to 6 (*excellent*; CSLP, n.d.a.). For Section 4, Your Process of Integration, the scale is used to measure frequency of use, the scale ranged from 1 (*never*) to 6 (*almost always*; CSLP, n.d.a.). To calculate scores, each respondent's answers are summed by section in order to assign a total score for each category for each respondent (CSLP, n.d.a.).

A third iteration of the instrument, Version III, was created to study why teachers use or do not use a particular learning tool (Learning Toolkit) in their classrooms (CSLP, n.d.b.). Version III is made up of 68 questions divided into four sections: Section 1.Your

Professional Views on Computer Technology, Section 2. Your Background and Resources Available to You, Section 3. Your Experience with the Learning Toolkit, and Section 4. Your Experience with the Learning Toolkit: Comments (CSLP, n.d.b.).

Other than the three open-ended questions at the end of the survey, the questions are either multiple choice or based on a 6-point Likert-style scale of some sort (CSLP, n.d.b.). For Section 1, Your Professional View on Computer Technology, and Section 3, Your Experience with the Learning Toolkit, the scale is used to measure agreement; this scale ranged from 1 (*strongly disagree*) to 6 (*strongly agree*; CSLP, n.d.b.). Scores for Version III of the TIQ are calculated in the same way as they are for Version II, by summing each participant's score by subscale (CSLP, n.d.b.).

Educational Technology Integration Questionnaire

The ETIQ was developed using items from the PSTUCIS, TPSA, and TIQ instruments. The majority of items on the ETIQ were taken from the PSTUCIS. The PTSA and both the TIQ Versions II and III were used to supplement the questions from the PSTUCIS in areas that were lacking. The ETIQ is a 29-item instrument delivered electronically as an eight-section survey. Because some of the items have sub-items, there are at total of 127 items on the ETIQ instrument. The item formats vary: Likert-style (n = 90), multiple choice (n = 9), yes/no (n = 7), fill in the blank (n = 5), open ended (n = 4), and combined formats (n = 12). The survey took participants approximately 45 minutes to complete. In the remainder of this section, I explain in detail which survey questions applied to which of my research questions, their instrument source, and their response rating options or scale. The discussion is organized according to the eight sections of the survey: Technology Access, Technology Usage, Confidence with Using Technology, Technology Barriers and Concerns, Technology Training and Professional Development, Technology Support, Participant's Expanded Responses (open ended responses), and Survey Participant's Biographical Background.

The Technology Access section of the ETIQ is made up of Items 1-5 (total of eight items, including sub-items) and are related to teachers' and students' access to technology both in and out of the classroom. Five of the eight items in this section are fill-in-the-blank style items, two items are *yes/no* items, and one item is a multiple-choice item. All of these items were taken from the PSTUCIS. Data collected from the items in the Technology Access section of the ETIQ were used to answer Research Question 1, "To what extent are classroom teachers using or accessing onsite technology at CAA?"

The Technology Use section of the ETIQ is made up of Items 6-10 (total of 50 items including sub-items), all of which are related to the availability of technology and teachers' use of the technology they reported as available. All the items in this section were taken from the PSTUCIS. Data collected using the items in this section were used to answer Research Question 1. All 12 sub-items that make up Item 6 require two responses. Participants first must indicate the availability of specific technology by indicating *yes/no*; then participants indicate the extent to which they use the identified technology using a 4-point Likert-style scale: 1 (*not at all*), 2 (*small extent*), 3 (*moderate extent*), 4 (*large extent*). Of the 50 items in this section, 38 are Likert-style items and 12 are a combination of *yes/no* items and Likert-style items. To keep the ETIQ current, I added four additional technologies to the list of technologies provided in the associated item on the original PSTUCIS. Item 6 including the sub-items focused on the topic of *use of technology with students* and pertained to respondent's technology integration use cumulative sum for this study.

Items 7, 8, 9, and 10 are made up of 10, 6, 11, and 11 sub-items, respectively. All 10 sub-items that make up Item 7 require only one participant response based on a 5-point scale: 1 (*not at all*), 2 (*small extent*), 3 (*moderate extent*), 4 (*large extent*), and 5 (*NA*). To keep the ETIQ current, I added one additional technology action to the list of actions provided in the associated item on the original PSTUCIS. Item 7 including the sub-items focused on the topic of *assigning students with tasks using technology* and pertained to respondent's technology integration use cumulative sum for this study. Item 8 is based on a 4-point scale: 1 (*not at all*), 2 (*rarely*), 3 (*sometime*), and 4 (*often*). To keep the ETIQ current, I removed one outdated technology use activity from the list of actions provided in the associated item on the original PSTUCIS. Item 8 including the sub-items focused on the topic of *frequency of using technology in education* and pertained to respondent's technology integration use cumulative sum for this study. Items 9 and 10 are based on a 4-point scale: 1 (*not at all*), 2 (*small extent*), 3 (*moderate extent*), and 4 (*large extent*). No changes were made from the associated items on the original PSTUCIS. Items 9 and 10 including the sub-items focused on the topic of *uses of technology at school or home, respectively, for teacher tasks* and pertained to respondent's technology integration use cumulative sum for this study.

The Confidence With Using Technology section of the ETIQ is made up of Item 11 (total of 11 items including sub-items), which is related to teachers' perceived confidence using technology. Item 11 was taken from the TPSA. Data collected using items from this section were used to answer Research Question 5, “Is there a significant difference in technology integration (access of programs and use of devices) between (a) those who rate barriers high and those who rate barriers low, (b) those who report a high level of technology confidence and those who report a low level of technology confidence, and (c) those who have participated in technology focused professional development and those who have not participated in technology focused professional development?” All 11 sub-items that make up Item 11 require only one participant response based on a five-point scale: 1 (*strongly disagree*), 2 (*disagree*), 3 (*undecided*), 4 (*agree*), and 5 (*strongly agree*). To keep the ETIQ current, I added two additional technology integration practices to the list of practices provided in the associated item on the original TPSA because they were directly associated with programs available and tasks expected of educators at the research site. I also deleted 10 practices from the list of technology integration practices provided in the associated item on the original TPSA because they were not applicable to the current use of technology or practices of the educators at the research site. The potential for low ratings on these unrelated technology practices could have led to skewed results.

The Technology Barriers and Concerns section of the ETIQ is made up of Item 12 (total of 18 items including sub-items), which is related to the teachers’ perceived barriers with integrating or using technology in education. Item 12 was taken from the PSTUCIS. Data collected using items from this section were used to answer Research Question 2, “What are the self-perceived personal and institutional barriers preventing technology integration by CAA teachers?" All 18 sub-items that make up Item 12 require only one participant response based on a 4-point, Likert-style scale: 1 (*not a barrier*), 2 (*small barrier*), 3 (*moderate barrier*), and 4 (*great barrier*). To keep the ETIQ current, I added five additional barriers to technology integration to the list of technology integration barriers and concerns provided in the associated item on the original PSTUCIS. The five additional barriers to technology integration were identified in current research reviewed for this study. The 18 sub-items of Item 12 were a combination of personal and institutional barriers as defined in literature and discussed earlier in the Review of Literature, Section: Barriers to Technology Integration in the Classroom. Five sub-items were categorized as personal barriers and 12 sub-items were categorized as institutional barriers. One sub-item was titled "other" and allowed the respondent to enter barrier of their own, this sub-item would apply to either category depending on the participant's entry if any.

The Technology Training and Professional Development section of the ETIQ is made up of Items 13-18 (total of 22 items including sub-items), all of which are related to the teachers' feeling of preparedness to use technology and professional development relating to technology at the research site. Items 13-17 were taken from the PSTUCIS. Item 18 was an additional item created specifically for the ETIQ. Data collected using survey Items 13 and 14 were used to get a better understanding of teacher preparedness to use computers and the Internet, and survey Items 15-17 were used to answer Research Question 3, "What technology professional development or support is available to CAA educators and to what degree are educators accessing these opportunities?"

Of the 22 items in this section, 15 are Likert-style items, four items are *yes/no* items, and three items are multiple choice items. Items 13 and 15 are multiple choice items taken directly from the original instrument. All six sub-items that make up Item 14 require only one participant response based on a 4-point scale: 1 (*not at all*), 2 (*small extent*), 3 (moderate extent), and 4 (*large extent*). To make Sub-item 14b (professional development activities) more specific with regard to location, I duplicated the question and added the descriptors *outside of school* and *at your school*, thus altering one question and creating one additional question in this section. The four sub-items that make up Item 16 require only one participant response based on a *yes/no* option. To make Sub-item 16b (encourage technology training) more specific with regard to incentives, I duplicated the question and added the descriptors *without incentives* and *with incentives*, thus altering one question and creating one additional question in this section. Item 17 contains nine sub-items and requires only one participant response based on a 4-point scale: 1 (*I don't know if it is available*), 2 (*No, not available*), 3 (*Yes, but I do not participate*), and 4 (*Yes, and I participate*). To better align the training opportunities provided in the associated item on the original PSTUCIS with those available at the study site, I added three additional training integration opportunities. Item 18 is an original multiple choice item that was created for this instrument in order to collect data to supplement those collected in Item 17. While Item 17 is focused on what technology integration training is available and whether or not the teachers have participated in the training, Item 18 is focused on the reasons that teachers may have for not having participated in the available training.

The Technology Support section of the ETIQ is made up of Items 19 and 20 (total of nine items including sub-items), both of which are related to the teachers' sense of support from various staff at the research site. Items 19 and 20 were taken from the PSTUCIS. Data collected using these items were used to answer Research Question 3, "What technology professional development or support is available to CAA educators and to what degree are educators accessing these opportunities?" Of the nine items in this section, 8 are Likert-style items and one item is a *yes/no* item. Item 19 is a single question and required one *yes/no* response. Item 20 contains eight sub-items and requires only one participant response based on a 6-point scale: 1 (*use of computers*), 2 (*use of the internet*), 3 (*technical support*), 4 *(integrating technology*), 5 (*locating software*), and 6 (*setting up educational programs*). To better align the support trainer positions provided in the associated item on the original PSTUCIS with the support trainer positions available at the study site, I added three additional positions.

The Participant's Expanded Responses section of the ETIQ is made up of Items 21-24 (total of four items with no sub-items), all of which are related to the teachers' opinions and viewpoints on their technology integration needs, ideal technology integration support system, and ideal technology use outcomes. Items 21-24 were taken from the TIQ Version II, Section V. Data collected using these items were used to answer Research Question 4, "What is the educators' ideal support system in relation to their desired educational technology integration outcomes?" Items 21-24 required an open-ended response for each item. The open-ended response design of these questions provided the participants with an opportunity to freely express their perspectives.

The Participant's Biographical Background section of the ETIQ is made up of Items 25-29 (total of five items with no sub-items), all of which are related to the teachers' gender and educational background, including years of teaching experience, grade level, and subject area. Items 25, 26, 28, and 29 all appear in some form in both the TIQ Version III, Section II and the PSTUCIS. Item 27, was taken from the TIQ Version III, Section II. Data collected using these survey items were used to provide descriptive statistics for the study sample. All items in this section are multiple choice items. Item 25 was a multiple choice item that required one response from the participant in selecting the range of years of teaching experience. To facilitate data analysis, I changed the original fill-in-the blank response option for Item 25 to a multiple choice format. Item 26 was a single question and required the participant to choose one of two gender options: 1 (*male*) 2 (*female*). Item 27 was a single multiple choice item and required the participant to choose from three options: 1 (*English*) 2 (*Spanish*), 3 (*other*). There were no modifications to Items 26 or 27. Item 28 was a single multiple choice item and required one participant response to the five options: 1 (*pre-kinder & kinder program*), 2 (*elementary level*), 3 (*middle school level*), 4 (*high school level*), 5 (*specialist or coordinator across multiple grade levels*). To facilitate data analysis, I changed the original fill-in-the blank response option for Item 28 to a multiple choice format. Item 29 was a single multiple choice item and required one participant response to the 10 options. There were no modifications to Item 29.

Reliability

Reliability, the consistency of test scores, is the degree to which a test consistently provides the same results when taken multiple times (Lodico et al., 2010). In essence, a test of reliability is used to establish that a test or survey is measuring what it was intended to measure (Wellington, 2015) and is valuable for determining the usefulness of an instrument when similar measures are demonstrated over time (Hinton, 2014). According to Creswell (2012), the use of an existing survey with an established reliability that has been verified through repetitive historical use provides transference of the reliability.

The use of Cronbach's alpha coefficient is a means of establishing an instrument's reliability (Multon & Coleman, 2010). According to Multon and Coleman (2010), the strength of the relationship between a survey's expected measurements and actual measurement is represented by Cronbach's alpha coefficient. The range for Cronbach's alpha coefficient values is between .0 and .99, with lower Cronbach's alpha coefficient scores indicating weaker correlations between items of the instruments (Tavakol & Dennick, 2011). According to Multon and Coleman (2010), Cronbach's alpha coefficients between .70 and .79 demonstrate good internal consistency for variables, those between .80 and .89 demonstrate very good internal consistency, and those between .90 and .99 demonstrate high internal consistency. As explained by Hinton (2014), Cronbach's alpha coefficients between 0.50 and 0.69 demonstrate an average or moderate reliability rating, and therefore, a Cronbach's alpha coefficient value below 0.70 is typical not considered to be reliable. The reliability of each of the three established instruments used for this study are discussed here. In addition, the results of the scale reliability analysis I conducted for the ETIQ are presented.

Public School Teachers Use of Computers and the Internet Survey. The USDOE's NCES (1999) did not discuss having conducted scale reliability analysis when it reported results of studies using the PSTUCIS. Furthermore, no additional studies have been located in which the PSTUCIS has been used. For this reason, no published data are available regarding the reliability of the PSTUCIS. However, because this instrument was published by a reputable source, used to collect data for analysis and publication on more than one occasion, and contained items appropriate for the collection of data in my study, I chose to use the instrument without clear evidence of its reliability.

Technology Proficiency Self-Assessment. In Ropp's (1997) study of technology integration self-efficacy among 53 pre-service teachers enrolled in post-baccalaureate teacher training courses, she found an overall Cronbach's alpha coefficient of 0.94. In a later study of technology integration self-efficacy among 506 pre-service teachers, Ropp (1999) found an overall reliability alpha of .95. Ropp (1999) also calculated Cronbach's alpha coefficients for each of the four subscales and found them all to be good or very good: Electronic Mail, .78; World Wide Web, .81; Integrated Applications, .84, and Teaching with Technology, .88.

Gençtürk, Gökçek, and Güneş (2010) conducted a study on the validity and reliability of the TPSA scale with 205 elementary level teachers from 10 primary schools. To test for reliability of the instrument, Gençtürk et al. conducted scale reliability analysis and found a very high (.95) Cronbach's alpha coefficient for the overall scale.

The researchers suggested that the scale's high rating was indicative of its value as a reliable source for assessing an individual's technology self-efficiency (Gençtürk et al., 2010). In addition, Gençtürk et al. stated that the TPSA survey has been used for numerous years in educational technology integration studies and that it had been translated into several languages; in each study, high validity ratings were found. Specifically, in a 2001 study of 3,600 students from 50 public schools in Texas, researchers reported Cronbach's alpha coefficients for subscales ranging from .73 (e-mail) to .87 (integrating applications); in a 2004 study of 877 teachers in Texas, researchers reported an overall Cronbach's alpha coefficient of .93 and Cronbach's alpha coefficients for subscales ranging from .73 (e-mail) to .88 (integrating applications); and in a 2005 study of 799 teachers in Mexico City, Mexico, researchers reported an overall Cronbach's alpha coefficient of .97 (Gençtürk et al., 2010).

Technology Implementation Questionnaire. Because Version II of the TIQ (CSLP, n.d.a.) is essentially the same as the original TIQ (Wozney et al., 2006), results of scale reliability analysis for items on the original TIQ can be used as evidence of the reliability of Version II of the TIQ. With regard to the original TIQ, Wozney et al. (2006) conducted scale reliability analysis on Items 1-33 pertaining to teacher attitudes, values, and beliefs related to computer technology integration. Results indicated that for each of the three categories, Cronbach's alpha coefficients were either moderate or high (Wozney et al., 2006). Wozney et al. also conducted scale reliability analysis for Items 44-53. The Cronbach's alpha coefficient for these combined items as .86.

Sipilä (2011) also used the original TIQ to measure technology integration, specifically, the difference in frequency and nature of technology use by primary and secondary teachers in Finland in an educational setting. Because it was necessary to translate the TIQ into Finnish, Sipilä conducted scale reliability analysis to ensure the internal consistency of the constructs measured by the instrument in its new form. For the construct Functional Use and Proficiency Levels of Using ICT in Teaching Activities (made up of 10 items), Sipilä found a Cronbach's alpha coefficient of .79. For the construct Teachers' Values and Perceived Costs Toward Integrating ICT Into Teaching, Sipilä found a Cronbach's alpha coefficient of .88 for the 12 items related to values and a Cronbach's alpha coefficient of .68 for the 7 items related to cost.

Educational Technology Integration Questionnaire. To establish reliability of the instrument specifically designed for this study (ETIQ), I ran a Cronbach's alpha for the overall scale as well as the four subscales pertaining to my research questions; technology integration use, confidence using technology, barriers to technology integration, and participation in onsite technology related professional development. In addition, I calculated the Cronbach's alpha coefficient for each of the five technology integration use variables (ETIQ Items 6 to 10 including their sub-items) based on their respective instrument titles. Table 2 shows the Cronbach's alpha coefficients for the instrument and its subscales. These Cronbach's alpha coefficients indicated that the scale and subscales of the ETIQ were reliability for the population in this study.

Table 2

Summary Statistics of Research Variables (ETIQ)

Variable	*M*	*SD*	α[a]	Items (*N*)
Complete ETIQ survey	290.38	20.61	.83	123
Technology integration use				
Barriers to technology integration[a]	34.77	9.77	.88	17
Confidence using technology[b]	48.18	7.10	.88	11
Professional development participation[c]	21.82	6.33	.82	9
Preparedness to use computers in education[d]	37.60	5.25	.70	6

Note. *N* = 62 for all variables.
[a]Alpha scores were standardized. [b]Scores ranged from 1(*not a barrier)* to 4 (*great barrier).* [c]Scores ranged from 1 (*strongly disagree)* to 5 (*strongly agree).* [d]Scores ranged from 1 (*I don't know if it is available)* to 4 (*yes, and I participated).* [e]Scores ranged from 1 (*not at all)* to 4 (*large extent).*

Validity

Creswell (2012) advocated the collection of data in quantitative studies using instruments with established validity. Creswell (2009) further explained that validity refers to an instrument's significance with regard to a researcher's ability to formulate productive analyses based on the data collected using that instrument. In other words, a valid instrument is one that measures what the researcher intended to measure (Lodico et al., 2010). Validity is "typically established by the team experts a part of the process of developing a preestablished instrument" (Lodico et al., 2010, p. 89). To truly demonstrate the validity of an instrument, however, accuracy of measurement must be demonstrated across various populations (Kimberlin & Winterstein, 2008). Of the various types of validity that can be demonstrated with regard to instruments (face, content, predictive [empirical], concurrent, convergent, discriminant; Trochim, 2006), the most applicable for the scope of this study is content validity.

According to Trochim (2006), content validity refers to the thoroughness of an instrument with regard to the inclusion of items that cover all aspects of the variable being measured, evidence of which can be determined by the researchers using the instrument. For each of the three pre-established instruments I used in my study, researchers have claimed or demonstrated the validity of the instruments.

When discussing the design of the PSTUCIS, the USDOE NCES (2000) indicated that the developers of the PSTUCIS made an effort to ensure that survey responses would be interpreted consistently and that questions were clearly presented. In addition, the NCES and the USDOE's Office of the Secretary reviewed the survey items extensively (USDOE NCES, 2000). Such efforts could be considered contributions to valid survey content.

Ropp (1999) claimed validity of the TPSA stating that it was based on an established instrument developed by a team of experts who employed rigorous standards during its construction. In addition, Ropp demonstrated construct validity of the TPSA by showing a correlation between the TPSA and the Computer Self-Efficacy scale, an instrument developed to measure technology-based tasks in educational environments.

Wozney et al. (2006) suggested that the TIQ was valid with regard to content because the researchers consulted with experienced teachers and researchers to confirm the applicability of the survey content. Content validity for the TIQ also has been demonstrated through its use in other studies to generate valid data. For example, Sipilä (2011) used the original TIQ to measure technology integration. In Sipilä's study, the researcher looked at the difference in frequency and nature of technology use by primary and secondary teachers in Finland in an educational setting. Despite concerns over the translation of the instrument to Finnish, Sipilä (2011) reported generating valid data regarding the integration of technology among teachers in the study. In addition, Meyer et al. (2011) used the original TIQ to study the use of electronic portfolios by teachers from 16 classrooms in a region of Canada. Using the TIQ, Meyer et al. (2011) claimed to have found valuable results that could be used to generate change in the educational setting.

Data Collection

Data were collected through SurveyMonkey, a freely accessible online data collection software program. Data collected using this software are protected using a secure encryption protocol and are screened for viruses and malware using Norton and TRUSTe (SurveyMonkey, 2015). Because of the ease of using the program for survey construction and data analysis, the security built into the data collection process, and the decreased chance of human error while entering data for analysis, this method for collecting data was appropriate and the most feasible for this study. Data were collected during a 2-week window from November 15 to November 30 of 2014.

Prior to the collection of data from participants, however, participants had to acknowledge informed consent. A statement of confidentiality and voluntary consent was provided in both the invitation to participate in the study and at the start of the electronic survey. Prior to starting the survey, participants confirmed consent in three ways. First, participants indicated their understanding of the informed consent by checking the box marked "Yes, I acknowledge and understand the information explained above." Participants who selected the box marked "No, I do not acknowledge the information above and will contact the researcher for clarification before completing the survey," were automatically exited from the survey and directed to a page where they were thanked for their time and provided with my contact information. Participants who agreed to the first level of consent then indicated their understanding of the requirements for completing the survey by selecting the box marked "Yes, I agree." Participants who selected the box marked "No, I do not agree and will NOT complete the survey any further," were automatically exited from the survey and directed to a page where they were thanked for their time. Finally, participants who agreed to the first two levels of consent then provided an electronic signature (their initials). Those participants who did not wish to provide this final level of consent were free to exit the survey manually. At any time during the survey, participants were free to close SurveyMonkey and exit the survey. Because the participants' initials were not included in the data downloaded from SurveyMonkey, the data remained anonymous. After confirming their informed consent, participants were directed to the online survey. The types of questions on the ETIQ to which the participants were expected to respond were described previously in the Instrumentation section.

Data Analysis

Once the data collection window had closed, the data were downloaded from SurveyMonkey in an Excel spreadsheet for analysis. The data were analyzed using both descriptive and inferential statistics. Descriptive statistics were used to answer Research Questions 1, 2, 3, and 4. Inferential statistics were used to answer Research Question 5 (cross group comparisons).

For Research Question 1, "To what extent are classroom teachers using or accessing onsite technology at CAA?," the descriptive variable was teachers' reported levels of technology integration (use of devices and access of programs). This variable was measured using data from ETIQ items 1-10 including their respective sub-items. The associated scales were interval for Items 1-2, ordinal for Item 3, nominal for Item 4, and ratio for Item 5. The scales for Item 6 were nominal and ordinal due to the contingency design of the Item. The scales for Items 7-10 were ordinal. Frequency, mean, and standard deviation were calculated and used to answer Research Question 1.

For Research Question 2, "What are the self-perceived personal and institutional barriers preventing technology integration by CAA teachers?" the descriptive variable was barriers to technology integration (personal and institutional). This variable was measured using data from ETIQ Item 12, including its 18 sub-items. The associated scale for those 18 items was interval in nature. Frequency, mean, mode, and standard deviation were calculated and used to answer Research Question 2.

For Research Question 3, "What technology professional development or support is available to CAA educators and to what degree are educators accessing these opportunities?," the descriptive variable was availability of technology integration support (professional development). This variable was measured using data from ETIQ Items 13-18, including their respective sub-items. For Items 13- 14, the scale was ordinal; for Item 15, the scale was ratio; and for Items 16-18, the scale was nominal. Frequency, mode, and mean were calculated and used to answer Research Question 3.

For Research Question 4, "What is the educator's ideal support system in relations to their desired educational technology integration outcomes?," the descriptive variable was characteristics associated with the ideal technology integration support system. This variable was measured using data from ETIQ Items 21-24. There was no scale associated with these open-ended-question items. Frequency was calculated and used to answer Research Question 4.

Research Question 5 was, "Is there a significant relationship between technology integration (access of programs and use of devices) and (a) self-perceived personal and institutional barriers, (b) self-perceived level of technology confidence, and (c) participation in technology focused professional development?" The independent variable for Research Question 5a was reported technology integration barrier level (high vs. low). This variable was measured using data from ETIQ Item 12, including its sub-items. The associated scale for those items was interval in nature. The independent variable for Research Question 5b was reported technology integration confidence level (high vs. low). This variable was measured using data from ETIQ Item 11, including its sub-items. The associated scale for those items was interval in nature. The independent variable for Research Question 5c was reported technology training attendance category (participated vs. did not participate). This variable was measured using data from ETIQ Item 17, including its subitems. The associated scale for those items was nominal in nature. The one dependent variable for Research Question 5 was level of technology integration, which was the descriptive variable for Research Question 1. This variable was measured in the same manner and using the same scales as was appropriate for Research Question 1.

Inferential statistics were conducted to answer Research Question 5. Specifically, a Pearson product-moment correlation coefficient was calculated to evaluate to answer Research Questions 5a, 5b, and 5c. According to Lodico et al. (2010), Pearson product-moment correlation test are appropriate for evaluating correlation studies where data is interval in nature, when two variables are both measured and the sample is 30 or greater. Creswell (2012) explained the Pearson's correlation coefficient was appropriate to use when there is only one independent variable being studied and a multiple regression coefficient was necessary when "more than one independent variable is needed to be studies to explain the variability of the dependent" (p. 357). In this study the data collect for Research Question 5 was interval in nature, there were two variables for each hypothesis measured, each hypothesis had only one independent variable, and the sample size was 62. Based on these facts and established research guidelines, using a Pearson product-moment correlation coefficient was appropriate in the study to test whether the relationship between variables was greater than by chance. Lodico et al. (2010) also stated using the Pearson product moment correlation is the "most stable test with the smallest amount of error" (p 229).

In addition to establishing overall validity for a study by clearly identifying the research methods employed to conduct the study, as just provided here, researchers also can help establish overall validity by reducing the chance of researcher bias (Creswell, 2012). Although typically used in qualitative research, one method for reducing the chance of researcher bias is to conduct peer debriefing (Creswell, 2009). According to Lodico et al. (2010), peer debriefing is a process whereby the researcher requests an exploratory examination of the overall research process and outcomes from a peer who is not associated with or participating in the research project itself. Peer debriefers typically examine the study methodology and the results of data analysis, specifically the researcher's interpretations of the study findings (Lodico et al., 2010).

In this study, peer debriefing was conducted with a doctoral colleague at CAA. The peer evaluator provided feedback on the initial plans for conducting the study (i.e., the methodology), which were taken into consideration as the study developed. In addition, the peer debriefer examined the results of the data analysis to identify (a) evidence of researcher bias or assumptions, (b) aspects of the analysis that were under- or overemphasized, (c) vague or incomplete descriptions, and (d) obvious errors in data reporting.

Assumptions and Limitations

While developing this study, four assumptions were made. The first assumption was that participants in this study truly were certified teachers as indicated by the public records describing the qualifications of teachers at the study site. The second assumption was that the educators completing the survey would answer the survey questions honestly so that their unique viewpoints and opinions could be captured. The third assumption was that those completing the survey would complete the survey only one time. The fourth assumption was that the participating teachers would honor the integrity of the research study by keeping the contents of the survey private (i.e., not discuss the survey items or their responses with their colleagues at the study site).

During the development of this study, two limitations were identified. The first limitation was the inability to generalize results to the larger population. Primarily, results from this study were not generalizable because the population was not chosen randomly. In addition, because the study site was an international school located outside the United States, the study population was more ethnically diverse than typical teacher populations in the United States. In addition, because of the location of the study site, teachers' work conditions were atypical and often posed challenges in the educational setting. For example, teachers regularly experienced limited Internet connection, water and power outages, and protests in the community that caused delays and cancelations of teacher training sessions, student transportation, and school. Work conditions for the teachers in this study also were atypical because of the generous technology resource allowance, a condition not typically found in schools in the United States. For these reasons, the results of this study are not generalizable to teachers in other geographic locations.

The second limitation was the inability to claim causation for the differences in technology integration between the identified groups. Causation only can be claimed when researchers conduct tests such as the Granger causality test (Schwert, 1979). However, determining causation between variables was beyond the scope of this study.

Scope and Delimitations

The scope of the study was limited to seven variables. The variables for Research Questions 1-4 (descriptive) were teachers' reported levels of technology integration (use of devices and access of programs), barriers to technology integration (personal and institutional), availability of technology integration support (professional development), and characteristics associated with the ideal technology integration support system, respectively. For Research Question 5, there were three independent variables, all related to participant characteristics: reported technology integration barrier level (high vs. low), reported technology integration confidence level (high vs. low), and reported technology training attendance category (participated vs. did not participate). The one dependent variable was level of technology integration (the independent variable for Research Question 1).

I delimited the participants to the certified teachers employed at the research site because the purpose of this project study was to identify technology integration issues for the teachers at this specific location. I did not include noncertified teachers, teaching assistants, or other staff in educational positions because those staff members have little direct contact with technology equipment supplied in classrooms nor do they have access to the curriculum software, electronic textbooks, or educational subscription programs associated with the students in general. Technology integration among teachers at the school is important because extensive funds have been invested in technology equipment for teacher and student use both in and out of the classroom as a means of supporting student learning in general and in particular curriculum delivery through virtual classrooms, electronic-portals, and electronic-textbooks.

I delimited technology integration to laptops, iPads, interactive whiteboards, document cameras, video and audio recording devices, electronic platforms, virtual classroom portals, technology-based communication systems, and subscription-based educational programs because these technology devices are provided in all research site classrooms and all teachers have access to the platforms, portals, and programs examined. I did not include 3D printers, scanners, and printers because they were either not easily accessible or available to all teachers or are not used at the school. I did not include technology that was outdated, such as tape recorders, overhead projectors, and film cameras.

I delimited the barriers to inclusion to both personal and institutional barriers because these categories covered a wide variety of potential barriers. To help improve rates of technology integration at the study site, school administrators may target identified barriers to technology integration. For this reason, it was important to collect as much data about barriers to technology integration as possible. I did not include barriers related to physical or learning disabilities because these barriers potentially could have risked the anonymity of the study participants.

I delimited the availability of technology integration support to professional development provided at the school because the study was focused on the topic of onsite support and training opportunities funded by the school. This aspect was especially important to this study because it is a feature of the study site over which school administrators have control. By collecting data delimited to support provided at the school site, school administrators may more likely be able to implement positive change in this regard.

With regard to technology integration support, I did not include offsite training opportunities because among those opportunities, few address barriers such as language, location, and cost, all likely barriers at the study site. In addition, offsite training opportunities may not have been available equally to all teachers from the research site. Additionally, I did not include online training opportunities because there are too many options with varying levels of support, cost, and required investment of time. Thus, offsite and online training opportunities were beyond the feasible boundaries of this study.

Ethical Considerations

Throughout the entirety of my study, as well as after its completion, I maintained ethical research practices. To ensure I was prepared to conduct ethical research, I completed the National Institutes of Health (NIH) certification on ethical practices for conducting research. In addition, no data were collected prior to gaining approval to conduct my study from Walden University's Institutional Review board (#11-14-14-0079070), the research site, and the original developers of the three data collection instruments. All electronic instruments, raw and analyzed data, and the final research study will be stored on a password-protected external USB thumb in a fireproof safe in my home for 5 years after which time they will be destroyed in compliance with Walden University guidelines.

I also considered the ethical treatment of my participants. Lodico et al. (2010) identified measures to ensure the ethical protection of participants, including the attainment of informed consent from all participants, the employment of measures to guarantee that all participants are protected from harm, and the safeguarding and maintenance of participant and data confidentiality during and after the study. Based on these recommendations, I required participants to complete an informed consent prior to completing the electronic survey. In addition, the information regarding informed consent, voluntary participation, anonymity, confidentiality, and my role as the researcher were provided in the invitation to participate in the study that I sent to potential participants electronically; an appropriate method for ensuring ethical protection according to Creswell (2009), Lodico et al. (2010), and Merriam (2011). Moreover, only deidentified data were collected. The electronic data collection process did not include the recording or tracking of any identifying information such as web addresses, Internet service provider addresses, or users' personal identification. In this way, I maintained participant anonymity. Finally, participants completed the study voluntarily. No financial or comparative compensation was offered for their participation. In addition, although I was an employee at the study site, I was not in a supervisory position at the time of data collection; therefore, participants should not have felt pressured to complete the study.

Results of Data Analysis

Because the target population was reasonably small, no teachers in the school were excluded, and all 110 teachers were invited to participate in the study. When conducting correlational research, Creswell (2012) indicated a sample size of at least 30 is recommended. Of the 110 participants invited to take part in this study, 62 teachers responded, more than double that suggested by Creswell. This represents a 57% response rate. In this section, I provide results of the data analysis for the participants' demographics and the background information on access to computers and the Internet as well as for each of the five research questions.

Demographics

Table 3 shows the breakdown of teacher participants by gender. Of the 62 participants, 52 (84%) were female teachers and 10 (16%) were male teachers. These gender demographics found for the study participants mirror those for the entire body of teachers at the school, 83% and 17% respectively. For this reason, it is reasonable to say that the sample in this study reflects the overall population of teachers in the district with regard to gender.

Table 3

Participant Demographic: Gender

	Teachers							
	By division						Total	
	Elementary		Middle		High			
Characteristic	*n*	%	*n*	%	*n*	%	*N*	%
Female	17	33	15	29	20	38	52	84
Male	2	20	3	30	5	50	10	16

As shown in Table 4, the 62 respondents possessed a minimum of 2 years and a maximum exceeding 21 years of teaching experience. Of the respondents, over 77% reported having 7 or more years teaching experience. Less than 4% of respondents had fewer than 3 years of teaching experience.

Table 4

Participant Demographic: Years of Teaching Experience

	Teachers							
	By division						Total	
	Elementary		Middle		High			
Characteristic	*n*	%	*n*	%	*n*	%	*N*	%
2 – 3 years	1	50	0	0	1	50	2	3
4 – 6 years	4	33	3	25	5	42	12	19
7 – 10 years	5	22	9	39	9	39	26	37
11 – 15 years	2	25	4	50	2	25	8	13
16 to 20 years	7	64	1	9	3	27	11	18
21 or more years	0	0	1	17	5	83	6	10
Total	19	31	18	29	25	40	62	100

Of the 62 respondents, 19 (31%) were from elementary division, 18 (29%) were from middle school division, and 25 (40%) were from the high school division. No teachers at the Pre-K3, Pre-K4, or kindergarten levels participated in this study. Of the 110 certified teachers in the larger target population, 48 (44%) teachers at the elementary school level, 26 (24%) at the middle school level, and 36 (32%) at the high school level. With the exception of teachers at the Pre-K3, Pre-K4, and kindergarten levels, based on these data, it is feasible to say that the sample population in this study was a fair representation of the overall teacher population at the study site. A comparison of these data are presented in Figure 1.

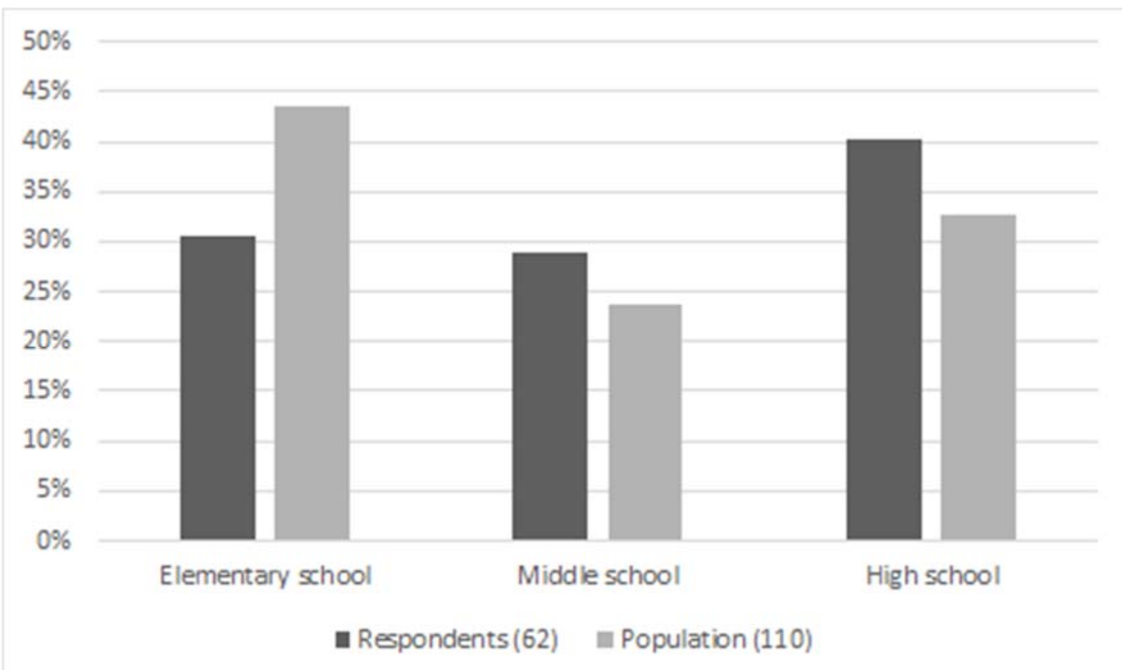

Figure 1. Comparison of teachers in the study sample and target population divided by division assignment.

The nonparticipation of teachers at the Pre-K3, Pre-K4, and kindergarten levels may have been the result of that division having the least amount of technology available to them when compared to the middle and high school divisions. (CAA assigns technology to divisions based, in part, on the level of difficulty of the curriculum.) Teachers in the high school division accounted for 32% of the target population (second largest of the three groups), yet they accounted for 40% of the sample population (largest of the three groups). This outcome may have been the result of the lack of participation by teachers at the Pre-K3, Pre-K4, and kindergarten levels.

Table 5 shows the breakdown of the specific subject areas taught by the teachers by division as well as the cumulative totals. As identified on the ETIQ, an elementary homeroom teacher was ask to consider him/herself as a self-contained teacher if the teacher "teaches all or most academic subjects to the same group of students all or most of the day." At CAA, self-contained classrooms only exist in the elementary and pre-kinder kindergarten divisions.

With regard to subject area, the self-contained elementary teachers accounted for the largest (25%) group of respondents, followed by teachers of English (18%) and teachers of social science (16%). No teachers of the arts participated in the study. Teachers of physical education represented the smallest group of respondents. Teachers of technology (6%) and foreign language (8%) were the next two highest participating groups, respectively. The low number of responses from teachers of technology and foreign language is logical considering these groups of teachers are the least represented in the target population.

Table 5

Participant Demographic: Teaching Assignment

	Teachers							
	By division						Total	
	Elementary		Middle		High			
Characteristic	*n*	%	*n*	%	*n*	%	*N*	%
Arts	0	0	0	0	0	0	0	0
English	0	0	6	55	5	45	11	18
Foreign language[a]	1	20	1	20	3	60	5	8
Mathematics	0	0	3	38	5	63	8	13
Physical fitness	0	0	0	0	1	100	1	2
Science	0	0	3	43	4	57	7	11
Self-contained	16	100	0	0	0	0	16	25
Social sciences	0	0	4	40	6	60	10	16
Technology	2	50	1	25	1	25	4	6
Total	19	31	18	29	25	40	62	100

Note. [a]Teachers of French and Spanish only.

Table 6 shows participants' language of instruction. Of the participants, 94% indicated English as their primary language of instruction. No other languages were indicated.

Table 6

Participant Demographic: Language of Instruction

	Teachers							
	By division						Total	
	Elementary		Middle		High			
Characteristic	*n*	%	*n*	%	*n*	%	*N*	%
English	19	33	16	28	22	39	58	94
Spanish	0	0	1	25	3	75	4	6

Student Access to Computers and the Internet

Table 7 shows the location and quantity of computers to which the 62 participants reported they and their students had access ($N = 261$). That the reported number of computers in each class ranged from 3-10 made sense because different programs require different levels of access to computers in the classroom. For example, the Spanish as an additional language course includes that use of an online program for practice and support lessons. For this reason, those classrooms have more ($n = 5$) computers than other classrooms. Similarly, the classroom in which the high school computer programing class is taught is assigned more computers due to the computer-focused curriculum on which the class is based. Of the total 261 computers the teachers reported being available, 45% were reported as being used by educators for instructional purposes, while 55% were reported as being used by students. Almost all of the computers (98%) were reported as having access to the Internet.

Table 7

Location and Quantity of Computers to Which Students Have Access (Including Laptops)

	Rooms (*n*)	Computers (*n*)	Total computers (*n*)
Computer labs	3	23	69
Libraries	2	5	10
Classrooms	57	3-10	182

When asked the percentage of students who had access to computers and the Internet at home, teachers reported that 96% of students had access to both. As shown in Table 8, of all the teachers in this study, 89% assigned work in the classroom that required students to use technology. Of all the teachers, 91% assigned work outside of classroom that required students to use technology.

Table 8

Participant Assignment of Student Work Using Computers

	Teachers							
	By division						Total	
	Elementary		Middle		High			
Type of work	*n*	%	*n*	%	*n*	%	*N*	%
Inside the classroom	13	23	19	35	23	23	55	89
Outside	12	21	19	33	26	46	57	91

Research Question 1

Research Question 1 was, “To what extent are classroom teachers using or accessing onsite technology at CAA?” As shown in Table 9, no teachers reported not integrating technology at all. This finding was not surprising considering the significant volume of technology resources at the study site in addition to the requirement to use specific technological platforms for student management, grading, communication, and teacher preparation practices in general. Only 8% of teachers indicated integrating technology often or to a great extent. In their study, Wang, Hsu, Campbell, Coster, and Longhurst (2014) found that of teachers, 14% were power-users, 27% were ordinary users, 14% were irregular users, and 45% were basic users. Compared to the users in Wang et al.’s study, teachers at CAA were almost 50% less likely to be power-users and 25% more likely to be basic users.

Table 9

Frequency and Percentages for Technology Integration Rating Average by Division

Cumulative technology integration average	Not at all (1)		Rarely / small extent (2)		Sometimes / moderate extent (3)		Often / large extent (4)		Total	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%
Elementary school	0	0	6	32	13	68	0	0	19	31
Middle school	0	0	5	28	12	66	1	6	18	29
High school	0	0	4	16	19	76	2	8	25	40
Total	0	0	15	24	44	71	3	5	62	100

Despite the fairly low number of teachers who reported integrating technology often or to a great extent, the majority (71%) of teachers reported integrating technology sometimes or to a moderate extent. It is likely that these outcomes are the result of teacher level. The majority of respondents (69%) are from the middle and high school divisions. In the middle and high school divisions there are more technology integration opportunities through the mandatory BYOD program, the use of a virtual portal for student's submission of work, and use of electronic textbooks in three of the eight required student courses.

That the majority of teachers indicated integrating technology sometimes or to a moderate extent also may be the result of the survey design. The survey items in Sections 9 and 10 were identical except for the location of the activity, which essentially was irrelevant to the task. In addition, three of the survey items in each of the two sections were related to the same task, communication. Teachers who integrated technology to communicate with parents from school were likely to use the same technology to communicate with parents from home, and teachers who integrated technology to communicate with parents were likely to use technology to communicate with colleagues. Therefore, the design of the survey items may inadvertently resulted in higher levels of reported integration of technology.

Table 10 shows technology integration based on teachers' subject area. As indicated in the data, no department reported lower than 62% for the sometimes/moderate extent of technology integration. Of the eight subject categories, no one subject area reported not integrating technology at all. It is likely that these outcomes were the result of CAA's required use of online grading, communication, and student database access. Interestingly, of the five respondents categorized as often or larger extent users, two thirds were from the English department.

Table 10

Frequency and Percentages for Technology Integration Rating Average by Subject Area

Cumulative technology integration average	Not at all (1)		Rarely / small extent (2)		Sometimes / moderate extent (3)		Often / large extent (4)		Total	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%
English / language arts	0	0	2	18	7	64	2	18	11	18
Foreign language	0	0	0	0	5	100	0	0	5	8
Mathematics / economics	0	0	2	25	5	62	1	12	8	13
Physical education	0	0	0	0	1	100	0	0	1	2
Science	0	0	2	29	5	71	0	0	7	11
Self-contained	0	0	6	37	10	63	0	0	16	26
Social sciences	0	0	2	20	8	80	0	0	10	16
Technology	0	0	1	25	3	75	0	0	4	6
Total	0	0	15	24	44	71	3	5	62	100

This finding is surprising because the math and science departments are two of the three departments with electronic textbooks and the science department is the only department with interactive whiteboards in 100% of labs and classrooms, in both middle and high school. Therefore, it would have been likely that results indicated higher integration from math and science teachers. However, more than one-third of the survey items were focused on teacher tasks using technology rather than student-related technology tasks, 44% versus 56% respectively. Therefore, it is possible that English teachers used more of the technology available to them for lesson preparation, grading student work, editing papers, and communication compared to science and math teachers.

Mean, median, and standard deviation of reported levels of technology use are presented in Table 11. The technology use category with the highest mean cumulative sum score was uses of technology with students (38.3) followed by use of technology at school for teacher tasks (35.3). Data from the literature support these findings. Researchers routinely report teachers' high level of use of technology related to teacher activities such as lesson prep, research, and assignment creation (Banoglu, 2011; Ertmer, 2005; Hixon & Buckenmeyer, 2009; Ritzhaupt et al., 2012; Teo, 2011; West, 2011). The technology use category with the lowest mean cumulative sum score was using technology in education (17.5).

The low cumulative sum score (28%) may have been the result of too few items (two items out of six) being applicable to all teachers in all subjects. The remaining four items were specific to programs at different levels or facilities that are not frequently used by all grade levels. For example, two of the items were about frequency of computer use in labs and libraries; however, the BYOD program at the middle and high school level has essentially made the two labs obsolete. Furthermore, one item was about frequency of using a virtual portal; this item would not have been applicable to the 19 (31%) elementary teachers in the study because elementary level teachers do not have virtual portal classrooms at CAA. Lastly, one item in the series was about frequency of using graphic calculators; this item would have only been applicable to approximately 15 (24%) of the respondents, those who teach math and science.

Table 11

Descriptive Statistics for Technology Integration Among CAA Teachers

Cumulative technology integration average	*M*		*Mdn*		Mode		Minimum		Maximum	
	Sum	Avg.	Sum	Avg.	Sum	Avg.	Sum	Avg.	Sum	Avg.
Use of technology with students	38.3	3.2	39.0	3.3	36.0	3.0	24.0	2.0	47.0	3.9
Assigning students with tasks using technology	24.2	2.4	25.0	2.5	27.0	2.7	8.0	0.8	39.0	3.9
Frequency of using technology in education	17.5	2.9	17.0	2.8	17.0	2.8	12.0	2.0	23.0	3.8
Uses of technology at school for teacher tasks	35.5	3.6	37.0	3.7	40.0	4.0	26.0	2.6	40.0	4.0
Uses of technology at home for teacher tasks	29.5	2.9	30.0	3.0	27.0	2.7	14.0	1.4	40.0	4.0
Totals	145	3.0	145	3.0	145	3.0	99	2.1	182	3.8

Research Question 2

Research Question 2 was, “What are the self-perceived personal and institutional barriers preventing technology integration by CAA teachers?” Teachers’ self-perceived personal (n = 5) and institutional (n = 12) barriers were measured using a 4-point scale: 1 (*not a barrier*), 2 (*small barrier*), 3 (*moderate barrier*), and 4 (*great barrier*). Because there were 17 questions, the range of potential responses was 17-68; however, no cumulative sums fell in the Rating 4 category, indicating an overall lack of great barriers to technology integration. The cumulative sums for each of the three levels of barriers accounted for approximately one third of all teacher responses and indicated that overall, teachers least often reported that barriers were moderate barriers (see Table 12). While cumulative sums of responses from elementary school teachers were more equally distributed among the three reported levels of barriers, overall, middle school teachers more heavily weighted the barriers as small barriers. In contrast, cumulative sums for high school teachers were more strongly divided between barriers not being a barrier and being only a moderate barrier.

Table 12

Cumulative Sums and Ratings of Barriers to Technology Integration by School Division

	Cumulative sums				
Teacher division	17-29 (Rating 1)	30-41 (Rating 2)	42-54 (Rating 3)	55-68 (Rating 4)	Total teachers (*n*)
Elementary	5	8	6	0	19
Middle	5	10	3	0	18
High	11	4	10	0	25
Total	21 (34%)	22 (35%)	19 (31%)	0	62

Note. Scale range 1-4. $N = 62$.

No data from the literature support these findings specific to barriers to technology integration by grade level or division categories; however, this outcome was not surprising considering teachers at the high school division had the largest volume and diversity of technology used on a daily basis. For example, high school teachers typically used interactive whiteboards and ceiling mounted projectors but also were required to support the mandatory Bring Your Own Device program for students. In addition, high school students used Internet-dependent, electronically delivered textbooks and a virtual portal for submission of assignments. In contrast, daily technology use by elementary school teachers was mainly focused on one of three specific devices; interactive whiteboard, mounted projector, and document camera, all of which connect to their school-issued laptop or classroom desktop.

Table 13 shows the cumulative sums of barriers to technology integration as percentage by subject taught. No teacher group had a cumulative sum of 4 for any of the institutional barriers. For the most part (77%), teachers rated their overall level of technology barriers as not a barrier at all or a small barrier. More than any other group, teachers of science and social science more often had cumulative totals in the moderate range. No data from the literature support these specific findings; however, these findings were not surprising considering that teachers of science and social science use an electronic textbook and therefore have more technology at their disposal. (At the middle and high school levels, 100% of the science labs and classrooms have interactive whiteboards.) Because of the use of the electronic textbooks, teachers of science and social science also depend on Internet connections to a greater extent than teachers of other subjects.

Table 13

Cumulative Sums and Ratings of Barriers to Technology Integration by School Division (Percentages)

Subject area[a]	Not a barrier at all (1)	Small barrier (2)	Moderate barrier (3)	Great barrier (4)	Total teachers (*n*)
English/language arts	18	54	18	0	18
Foreign language	40	40	20	0	8
Mathematics/economics	50	50	0	0	13
Physical education	100	0	0	0	2
Science	14	43	43	0	11
Self-contained[a]	7	75	18	0	26
Social sciences[b]	20	40	40	0	16
Technology	25	75	0	0	6
Total	23	55	22	0	100

Note. Subject area data based on the teaching assignment that constitutes 75% or more of teacher time. [a]Self-contained refers to elementary classrooms. [b]Social sciences include history, social studies, global politics, and psychology.

Personal barriers to technology integration. Frequency data of reported personal barriers to technology integration are presented in Figure 2. Of the barriers, hesitation due to lack of personal knowledge was the only personal barrier rated as a moderate barrier more often than it was rated as either a small barrier or not a barrier at all. However, although concern with limited experience using specific software was rated as a moderate barrier the same amount of times as hesitation due to lack of personal knowledge, concern of limited experience was rated as a great barrier more than any of the other personal barriers. Interestingly, the personal barrier with the lowest barrier rating and the greatest difference in rating range was concern of student tech skills exceeding that of the teacher. With this barrier, the number of respondents rating this barrier as a not a barrier at all (*n* = 35) was more than the combined number of ratings for the other three ratings combined (*n* = 27). Data from the literature support these findings (see Buabeng-Andoh, 2012; Ertmer & Ottenbreit-Leftwich, 2010; Moore-Hayes, 2011; Pan & Franklin, 2011).

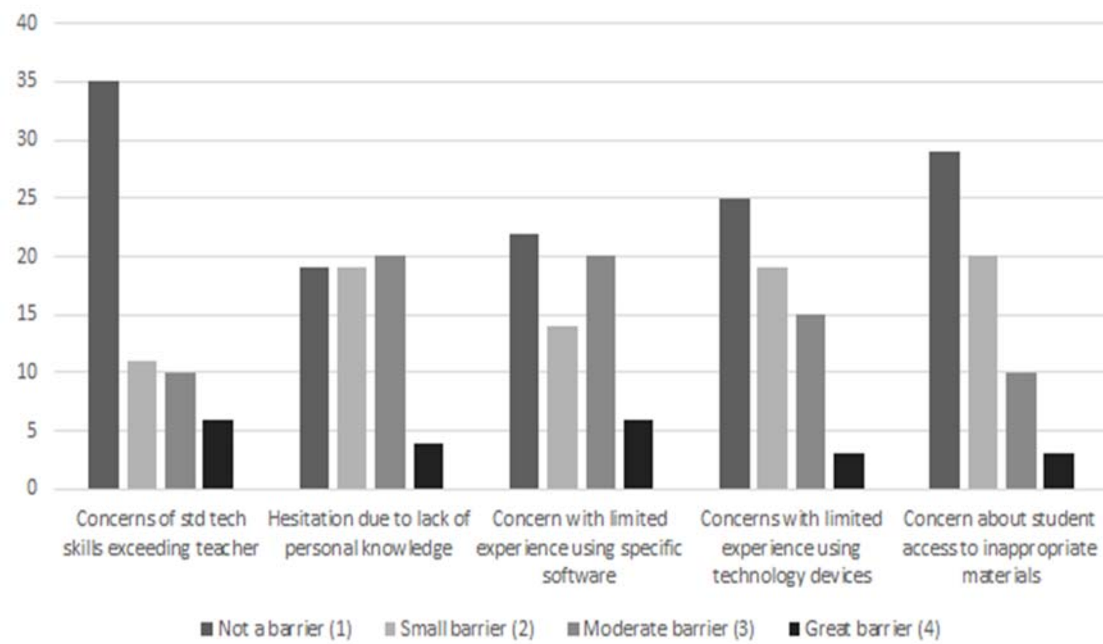

Figure 2. Comparison of ratings frequencies for personal barriers.
Note. Scale range 1-4. *N* = 62

The mean, median, and standard deviation of reported personal barriers to technology integration are presented in Table 14. As demonstrated in the table, the two most concerning of the five personal barriers were hesitation due to lack of personal tech knowledge and concern with limited experience using specific software. The two least concerning of the five personal barriers were concern of student tech skills exceeding that of the teacher and concern about students accessing inappropriate material.

Table 14

Mean, Median, and Standard Deviation of Reported Personal Barriers to Technology Integration

Personal barrier	*M*	*Mdn*	*SD*
Hesitation due to lack of personal tech knowledge	2.50	3.0	1.08
Concern with limited experience using specific software	2.16	2.0	1.03
Concern with limited experience using specific technology devices	1.94	2.0	0.92
Concern of student tech skills exceeding that of the teacher	1.79	1.0	1.04
Concern about students accessing inappropriate material.	1.79	2.0	0.89
Cumulative average of personal barriers	2.04	2.0	0.74

Note. Scale range 1-4. $N = 62$.

Frequency data in Table 15 support the results presented in Table 14. Specifically, the data in Table 14 show that hesitation due to lack of personal tech knowledge (38%) and concern with limited experience using specific software (42%) were the two barriers most often rated as a moderate or great barrier and that concern of student tech skills exceeding that of the teacher (25%) and concern about students accessing inappropriate material (21%) were least often rated as a moderate or great barrier.

Table 15

Frequencies and Percentages of Reported Personal Barriers to Technology Integration Rated as Moderate (3) and Great (4)

Personal barrier	(*n*)	%
Hesitation due to lack of personal tech knowledge	24	38
Concern with limited experience using specific software	26	42
Concern with limited experience using specific technology devices	18	29
Concern of student tech skills exceeding that of the teacher	16	25
Concern about students accessing inappropriate material.	13	21

Note. Scale range 1-4. $N = 62$.

Data from the literature are mixed with regard to the findings indicated in Table 14 and Table 15. Researchers consistently report teachers' lack of technology competency, limited experience, and technological skill knowledge as substantial barriers to integrating technology into learning practices (Anthony, 2012; Gumbo et al., 2012; Mouza, 2011). However, although teachers in this study reported that anxiety over students being more technology competent than teachers was a small barrier, results from other studies indicated that it was a strong barrier (Buabeng-Andoh, 2012; Wachira & Keengwe, 2011). No data from the literature support students' accessing inappropriate materials as a great barrier. However, according to the International Society of Technology Education (2012), this barrier is a topic of concern regarding digital citizenship and safe Internet use when working with technology and children.

Institutional barriers to technology integration. Frequency data of reported institutional barriers to technology integration are presented in Figure 3. Not surprisingly, the institutional barriers most often rated as not a barrier at all were the barriers relating to resources, not enough computers, and lack of funding to purchase desired technology. Things findings were surprising considering CAA has a generous technology budget, makes technology available, and has a generous computer and laptop replacement policy (every 3 years).

Mean, median, and standard deviation of reported institutional barriers to technology integration are presented in Table 16. As seen in the table, the barrier with the highest mean score was lack of release time for teachers to learn/practice/plan ways to use computers or the Internet, followed by inadequate training opportunities and Internet connection being irregular, unstable, and not dependable.

The institutional barrier most often rated as a great barrier was lack of release time (n = 24). This result is supported in the literature. Although identified as a personal rather than an institutional barrier in the literature, researchers have reported the highest barrier among teachers as feeling overloaded with curriculum, planning, and a need to prioritize standardized testing Aldunate & Nussbaum, 2013; Morgan, 2011; Uslu & Bumen, 2012). When teachers do not have enough time to complete necessary tasks, such as integrate technology into their classrooms and lessons, they may feel overwhelmed.

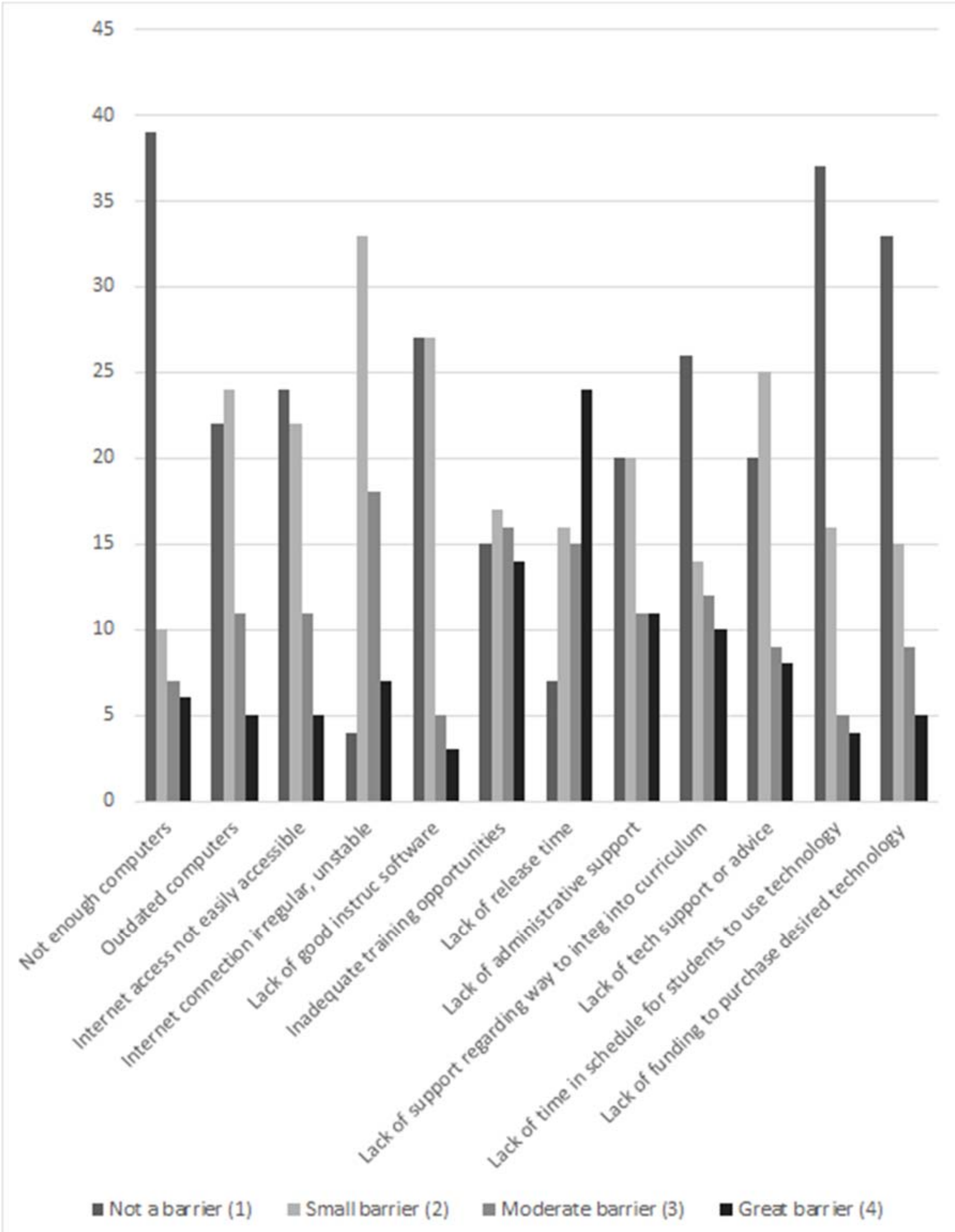

Figure 3. Comparison of ratings frequencies for institutional barriers.
Note. Scale range 1-4. *N* = 62.

Table 16

Mean, Median, and Standard Deviation of Reported Institutional Barriers to Technology Integration

Institutional barrier	*M*	*Mdn*	*SD*
Lack of release time for teachers to learn/practice/plan ways to use computers or the Internet	2.90	3.0	1.05
Inadequate training opportunities	2.47	2.0	1.10
Internet connection is irregular, unstable, or not dependable	2.45	2.0	0.78
Lack of support regarding ways to integrate technology into the curriculum	2.39	2.0	1.19
Lack of administrative support	2.21	2.0	1.09
Lack of technical support or advice	2.08	2.0	0.99
Outdated, incompatible, or unreliable computers	1.98	2.0	0.93
Internet access is not readily accessible	1.95	2.0	0.95
Lack of funding to purchase desired technology	1.77	1.0	0.98
Lack of good instructional software	1.74	2.0	0.81
Not enough computers available	1.67	1.0	1.02
Lack of time in schedule for students to use computers in class	1.61	1.0	0.89
Cumulative average of institutional barriers	2.10	2.1	0.64

The next institutional barrier most often rated as a great barrier was inadequate training opportunities (n = 14). This result is supported in the literature. Researchers have reported teachers are experiencing low or basic skill levels regarding technology and that they have limited training opportunities; in particular, teachers have expressed concern over training not being relative to their subject area or grade level, the low frequency of training opportunities, and the presentation of too much information into too small of a timeframe or workshop session (An & Reigeluth, 2011; Pan & Franklin, 2011; Uslu & Bumen, 2012). The barriers lack of support regarding ways to integrate into the curriculum and lack of administrative support also were equally reported to be a great barrier, *n* = 10 and *n* = 11, respectively. This result is supported in the literature. Researchers have suggested that lack of general support from schools' technology teams and administration are highly reported barriers (Anthony, 2012; Gu et al., 2013; Potter & Rockinson-Szapkiw, 2012).

Data in Table 17 support the finding presented in Table 16. Lack of release time for teachers to learn/practice/plan ways to use computers or the Internet, inadequate training opportunities, and Internet connection is irregular, unstable, or not dependable were the top three survey items examples respondents ranked as either a moderate or a great barrier, 63%, 48%, and 40%, respectively. Data from the literature support these findings as described previously with regard to lack of time for planning and inadequate training opportunities (see An & Reigeluth, 2011; Kopcha, 2012; Wachira & Keengwe, 2010). No literature is available with regard to Internet connection as a barrier; however, that the barrier Internet connection is irregular, unstable, or not dependable was among the top three examples rated as a moderate or great barrier by the teachers in this study may be the result of the international location of the study site rather than the administration of technology at the study site.

Table 17

Frequencies and Percentages of Reported Institutional Barriers to Technology Integration Rated as Moderate (3) and Great (4)

Institutional barrier	*n*	%
Lack of release time for teachers to learn/practice/plan ways to use computers or the Internet	39	63
Inadequate training opportunities	30	48
Internet connection is irregular, unstable, or not dependable	25	40
Lack of support regarding ways to integrate technology into the curriculum	22	35
Lack of administrative support	22	35
Lack of technical support or advice	17	27
Outdated, incompatible, or unreliable computers	16	26
Internet access is not readily accessible	16	26
Lack of funding to purchase desired technology	15	24
Not enough computers available	13	21
Lack of time in schedule for students to use computers in class	9	15
Lack of good instructional software	8	13

Research Question 3

Research Question 3 was, "What technology professional development or support is available to CAA educators and to what degree are educators accessing these opportunities?" Participation in technology-related professional development was measured using a 4-point scale: 1 *(I don't know if it is available*), 2 (*No, not available*), 3 (*Yes, but I did not participate*), and 4 (*Yes, and I participated*). Because there were nine questions used to answer this research question, the range of potential responses was 9-

36; however, the lowest cumulative sum of scores was 11, which indicated respondents did not know of any professional development being offered. A minimum cumulative sum of 12 would have been needed to indicate that the respondent knew of at least one training topic being offered although the participant did not attend.

Figure 4 reports the frequency of respondents' cumulative sum of scores from ETIQ Item 17 including the 11 sub-items. As shown in Figure 4, there were respondents (n = 6) with cumulative sum scores of 36, indicating these respondents knew of and attended all onsite technology professional development offered. No data from the literature support these findings specific to professional development offerings and teachers' recognition of offerings. However, it is likely that this outcome occurred because the study site established an educational technology department 2 years prior to this study, the focus of which was to offer and promote technology training opportunities.

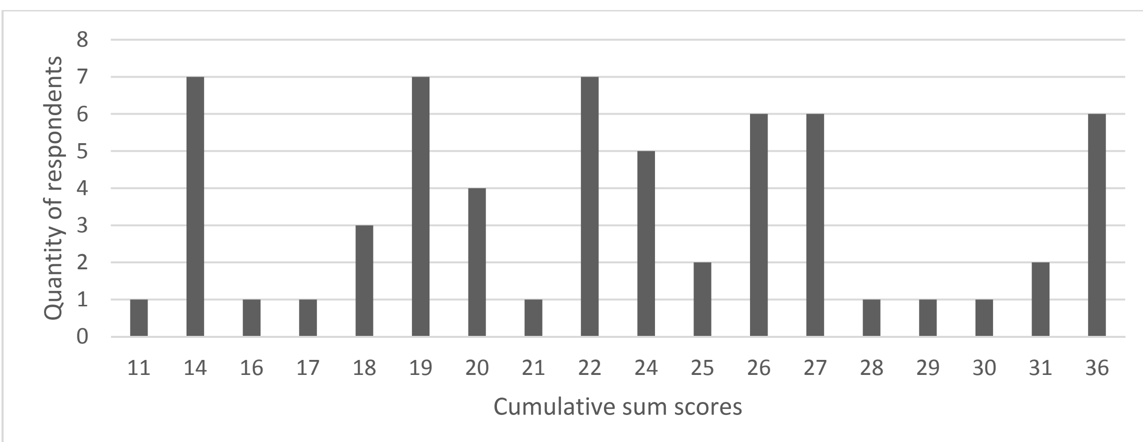

Figure 4. Frequency of cumulative sum scores for teachers knowing about and attending professional development.

Frequency data of reported acknowledgement and attendance of onsite technology integration training opportunities are presented in Table 18. Of the training offered, only three topics were recognized and attended by over 50% of the respondents; educational platforms (81%), use of technology devices (53%), and integration of technology into the curriculum (53%). Although educational platforms were recognized by a substantial number of respondents, use of other advanced telecommunications and use of the Internet were the least recognized. Interestingly, participants indicated that they did not attend professional development opportunities almost as often as they recognized and/or attended them, 51% versus 49%, respectively. With regard to training on software applications in particular, the number of respondents not recognizing the training opportunity (n = 40, 64%) was nearly twice the number of respondents who recognized and/or attended this training (n = 22, 36%).

No data from the literature support these findings regarding one training topic being more recognized or attended over another. However, it is possible that these differences may be the result of promotional efforts on behalf of the educational technology department. While it is expected that the educational technology department will equally promote training opportunities through various avenues (recruitment emails, divisional faculty announcements, Tech Tuesday training session calendars, and their technology resource website), it is possible that the department more aggressively promoted certain programs due to the importance of the platform or its role/effect in/on a teacher's job/responsibilities.

Table 18

Technology Focused Professional Development Available at CAA

Training topics	I don't know if it is available (1)		No, not available (2)		Yes, offered but do not attend (3)		Yes, offered and attended (4)	
	n	%	*n*	%	*n*	%	*n*	%
Use of computers in general	21	34	11	17	6	10	24	39
Software applications	20	32	20	32	11	18	11	18
Educational platforms	4	6	0	0	8	13	50	81
Educational subscriptions	25	40	13	21	9	15	15	24
Use of technology devices	5	8	3	5	21	34	33	53
Use of the Internet	28	45	18	29	4	7	12	19
Use of other advanced telecommunications	31	50	22	36	2	3	7	11
Integration of technology into the curriculum	12	19	13	21	4	7	33	53
Follow-up and/or advanced training	15	24	15	24	17	28	15	24

Another reason for the differences between acknowledgement of and attendance ratings for various training topics may have to do with the time frame in which the study was conducted. The survey window for this project study was during the first semester of the school year when the focus of training topics being offered tends to be on learning management software; the virtual classroom portal; and general use of the school issued computer, along with the school's network. These three topics each received moderate to high response levels of yes, offered and attended; 81%; 53%, and 39%, respectively. The training topics of lower recognition or attendance (e.g. Internet, advance telecommunication, and educational subscriptions) are typically offered in the second semester; therefore, any teacher new to CAA during the 2014-2015 academic school year would not know of these offerings. Lastly, it is possible that training on topics such as the Internet or telecommunication may seem unimportant or basic and therefore be ignored or undervalued by the teachers, in which case it is likely they would not choose to participate in the training.

The mean, median, and standard deviation of reported recognition and attendance of onsite technology integration training opportunities are presented in Table 19. In general, the descriptive statistics showed an issue with teachers' awareness of onsite training opportunities and identified reasons for the respondents' nonparticipation of known training. The cumulative sums mean was 23.2 (range of 9-36). The median of the cumulative sum of scores was 22. As indicated in Figure 4, the modes of the cumulative sum of scores were 14, 17, and 21; with seven respondents per mode for a total of 21 scores. While both mean and median of the cumulative sum of scores were greater than the midpoint of the full range (i.e., 18 on the scale of 9-36), the low modes of 14 and 17, which represented two-thirds (n = 14) of the most frequent score (n = 21) on the range, were below the midpoint, indicating a high number of respondents reporting low ratings on the sub-items.

Table 19

Descriptive Statistics of Professional Development Offered at CAA

Training topics	Mean	Median	Mode	*SD*
Educational platforms	3.7	4.0	4	0.78
Use of technology devices	3.3	4.0	4	0.90
Integration of technology into the curriculum	2.9	4.0	4	1.24
Follow-up and/or advanced training	2.5	3.0	3	1.11
Use of computers in general	2.5	2.0	4	1.32
Educational subscriptions	2.2	2.0	1	1.22
Software applications	2.2	2.0	1	1.08
Use of the Internet	2.0	2.0	1	1.15
Use of other advanced telecommunications	1.8	1.5	1	0.97

As reported in Table 19, the two most recognized and attended training topics were educational platforms and uses of technology devices, with means of 3.7 and 3.2, respectively. It is likely that these findings are the result of the mandatory use of the school software programs for student management, attendance, grading, and communication by all teachers as well as the virtual classroom portals used by all middle and high school classroom teachers. Annual training for newly hired teachers on these platforms and school devices are required during orientation, and returning staff are strongly encouraged by administration to participate in refresher training through onsite professional development opportunities. Training on the use of advanced telecommunications was the least recognized and only topic with a mean in the rating range of 1, which indicated nearly zero recognition of this training topic. As discussed earlier, this topic is typically offered in the second semester of the academic school year and may be unknown to new teachers. Additionally this topic maybe disregarded by teachers in general due to a lack of understanding of the topic's integration potential to education.

An area of concern within these results is that for 78% of the items, the mean of teachers' responses was below 3.0, which indicated that on average these topics were unrecognized and poorly attended. Despite 10% (n = 6) of respondents having reported attending training on all nine training topics, none of the training topics had a 4.0 mean. That overall participation in training was low is supported by other ETIQ survey data; 48% of respondents (n = 30) reported moderate or great barriers due to inadequate training opportunities (Item 12), 61% reported (n = 38) reasons for not being able to attend onsite training offered for specific reasons (Item 18), and 29% of respondents (n = 18) requested more training opportunities (Item 21). No data from the literature includes evidence on specific topics of technology training versus other training topics being recognized or attended at a higher rate; however, these findings are not surprising considering the school's mix of requirements for training on some technology but not all, inconsistency in encouragement and recognition, and a general lack of clear expectations for administrators.

Reasons for nonparticipation in onsite technology training. Frequency data from the follow-up question regarding why educators did not attend training that they knew was offered are presented in Table 20. From multiple choice response options, the most common response was training topics are not what I need training for (24%). The next most common response was other school commitments (18%). The findings related to training not being what the teachers needed is supported by other ETIQ data collected, particularly that 48% (n = 30) of teachers indicated training was inadequate (Item 12), 29% (n = 18) wanted more training opportunities (Item 21), and 16% (*n* = 10) to 23% (*n* = 14) wanted ITCs (Item 21 & Item 23, respectively). Interestingly, for the six respondents who selected other for their reason, each entered a custom response in which they referenced more than one of the response options provided from the multiple choice format, indicating that 16% (n = 6) of respondents had similar reasons as their colleagues for not attending training but with more frequency.

Data from the literature support these findings regarding why teachers do not attend training. Researchers frequently have reported issues affecting a teacher's attendance of professional development, including schedule conflicts, other obligations (both personal and work related), training topics, and class sizes of training courses (see Anthony, 2012; Capo & Orellana, 2011; Gumbo et al., 2012; Ritzhaupt et al., 2012; Uslu & Bumen, 2012). Though teachers want professional development opportunities, they also want them when they need them, on their skill level, and for the topics applicable to their teaching assignments or curriculum (Anthony, 2012; Buabeng-Andoh, 2012; Kurt, 2013; Winslow, Smith, & Dickerson, 2014).

Table 20

Reasons for NOT Attending Onsite Technology Training

Responses	*n*	%
Training topics are not what I need training for	9	24
Other school commitments (after school sports, department responsibilities, committees, etc.)	7	18
Times training is offered during the school day conflicts with my teaching schedule	6	17
Other (with fill in the blank responses)	6	17
I prefer more one-to-one support for my specific needs	4	10
Family or day care issues with after school options	3	8
Personal reasons	3	8

Another reason that teachers may not be attending onsite technology training may be because they already feel prepared to integrate technology. Of the 62 participants, 84% reported feeling *well* to *very well prepared* to use computers and the Internet for classroom instructions (based on data collected using survey Item 13). Furthermore, 95% (n = 59) of the participants attributed their readiness to *independent learning*. Although 65% (n = 40) did credit professional development activities at the research site as being responsible for their readiness to a *moderate* or *large extent,* nearly just as many, 66% (n = 41), reported offsite professional development as being responsible for their readiness to a *moderate* or *large extent*. Similarly, 76% (n = 47) credited their preparedness to use computers and the Internet to their *colleagues*. Students' support was recognized by 45% (n = 28) of the respondents as a *moderate* or *large extent* of their preparedness, while *college or graduate studies* received the least amount of recognition, with only 26%

(*n* = 16) of respondents reporting it as a *moderate* or *large extent* for their readiness. (Preparedness data were collected using survey Item 14.) Based on these data, it is likely that teachers consider themselves prepared to integrate technology and therefore do not participate in technology integration training. This condition would be evident irrespective of whether or not teachers actually do integrate technology.

Participants' perception of support from administration. Additional data were collected under the section Technology Training and Professional Development focused on the respondents' perception of their administration's expectation, and encouragement of technology integration training as well as support through the means of incentives. The type of support evaluated was susceptible to the respondents' interpretation of the term incentive, as the instrument did not clarify the meaning nor provide examples. The general interpretation would most likely have been related to a tangible incentive such as release time for planning, approval of school funded professional development opportunities, stipends for participation in training program, and other physical incentives. It could also mean to some participants a more interpersonal incentive such as recognition by their administration of career growth and skills for advancement.

Frequency data for the respondents' perception of administrative expectations and offering of incentives are presented in Table 21. Although 55% of the respondents (n = 34) reported that they perceived their administration required technology training of its teachers, nearly a quarter more of respondents (n = 44, 71%) reported that their school's administration left the responsibility to initiate participation with the teachers. In addition, few teachers (n = 6, 10%) perceived that they were offered incentives to participate in training.

Table 21

Administration Expectations and Acknowledgement of Incentives for Technology Training

	Yes		No	
	n	%	*n*	%
Administration requires tech training	34	55	28	45
Encouragement without incentives	52	84	10	16
Encouragement with incentives	6	10	56	90
Left up to teachers to initiate	44	71	18	29

No data in literature specifically clarifies the specifics of types, effect, or value of incentives to boast technology training attendance specifically; however, data in the literature do support the value and importance of direction and support from one's administration. Researchers consistently have reported that teachers need and seek clarity and support from their administrators as well as covet the recognition and a sense of value from their administrators (see An & Reigeluth, 2011; Berrett et al., 2012; Gumbo et al., 2012; Ritzhaupt et al., 2012; Steinke & Putman, 2011). A lack of support and sense of value from administrators are well-recognized barriers to successful participation of educators in technology integration training (An & Reigeluth, 2011; Keengwe et al., 2008; Pan & Franklin, 2011; Potter & Rockinson-Szapkiw, 2012).

Research Question 4

Research Question 4 was, "What is the educator's ideal support system in relation to their desired educational technology integration outcomes?" Four open-ended survey items were used to collect data to answer this research question. The topics of these items were (a) available resources and uses of those resources, (b) the ideal use of computer technology in the classroom, (c) the ideal instructional technology support system, and (d) how that instructional support system would impact teachers' use of technology in the classroom. Tables of teachers' responses for each of these topics are presented in this section. The rich substance of these qualitative-like antidotes add value and credibility to the quantitative data findings from this project study.

Table 22 shows participant responses related to resources available to teachers at CAA and uses of those resources. Of the responses, 71% (n = 39) could be grouped into three themes; more training opportunities (33%), release time to prepare to use technology (20%), and technology specialists as coaches or mentors (18%). Other responses provided by a notable amount of the teachers (9% for each) were increased training staff and support with iPads.

Data from literature support these findings regarding the top three themes. Researchers consistently report teachers wanting or requesting additional training opportunities (Gumbo et al., 2012; Ritzhaupt et al., 2012), additional time for preparation of technology-enriched lessons (Anthony, 2012; Ritzhaupt et al., 2012; Uslu & Bumen, 2012), and coaching or mentoring from grade level and content area qualified technology specialists (Smith 2012; Wang, 2013).

Table 22

Open-Ended Responses Related to Needed Resources and Their Uses

Participant comment	*n*	%
More training opportunities onsite	18	33
Release time to work on technology related topics	11	20
Technology specialists as trainers, coaches, or mentors	10	18
Increased training staff	5	9
Support with iPads – both classroom sets and teacher issued iPads	5	9
Certified technology training - Very specific training areas for certification (e.g. Microsoft Office Certified)	2	4
Hands-on practical ways to improve instruction through technology	1	2
Provide certification for training hours as incentives.	1	2
We need to be a Google school...it could be a huge resource for collaboration with both students and colleagues.	1	2
I also think that providing teachers with a list of websites the school has accounts for at the beginning of the year would be helpful and less overwhelming than receiving each one in a random email.	1	2
Total	55	100

Note. $N = 41$: elementary ($n = 11$), middle school ($n = 14$), high school ($n = 16$). The number of total responses does not equal the number of participants because some participants provided multiple responses.

It is through technology-focused training that educators acquire technology competencies (Gumbo et al., 2012; Kopcha, 2012; Ritzhaupt et al., 2012; Uslu & Bumen, 2012), gain confidence using technology (Anthony, 2012; Buabeng-Andoh, 2012), and become empowered to transform their teaching practices from teacher delivered to student driven (Lee & Spires, 2009; Sadaf, Newby, & Ertmer, 2012). In addition, through the practice of technology coaching and mentoring in nonsupervisory collaborative relationships, teachers' may experience an exponential increase in their confidence and efficacy with regard to using technology, the frequency they use technology, and the level of technology they integrate into their learning practices (Cornett & Knight, 2008; Smith, 2012; Wang, 2013).

Participants' ideal use of computer technology. Table 23 shows participant responses related to the ideal use of computer technology in the classroom. Of the responses, 53% (*n* = 28) were organized into three themes: student driven work (34%), student centered collaboration (13%), and flipped classrooms (6%). Like flipped classrooms, the idea of seamless integration also was identified by 6% of the teachers.

Data from literature support these findings regarding the top three themes. Researches consistently have reported that teachers want or request additional training opportunities (Ritzhaupt et al., 2012; Tournaki et al., 2011), additional time for preparing technology-enriched lessons (Gumbo et al., 2012; Wachira & Keengwe, 2011), and coaching or mentoring from grade-level and content-area qualified technology specialists (Smith, 2012; Stevens, 2011). It is likely that teachers request additional time for training and preparing as well as help from specialists because they realize that technology has the power to transform the learning environment into one of collaboration and student driven learning (Chell & Dowling, 2013; DeSantis, 2012). Data from literature also support the findings on the instruction practice of flipping the classroom through technology. Specifically, Levin and Schrum (2013) suggested that flipped classrooms are possible with technology facilitating the process and supporting the structure.

Table 23

Open-Ended Responses Related to Ideal Use of Computer Technology in the Classroom

Participant comment	*n*	%
Student driven work	18	34
Collaboration student centered	7	13
Flipped classrooms	3	6
Seamless integration	3	6
SmartBoard integration	2	4
One that allows students to be engaged and learning	2	4
Enrichment to learning and increase students' lifelong skills	2	4
Student access: Students have access information and software, all students having access to computers at all times.	2	4
Other individual comments	14	26
Total	53	100

Note. *N* = 34: elementary (*n* = 9), middle school (*n* = 13), high school (*n* = 12). The number of total responses does not equal the number of participants because some participants provided multiple responses.

Participants' ideal instructional technology support system. Table 24 shows participant responses related to the ideal instructional technology support system. Of the responses, 64% (*n* = 25) could be grouped into three themes: technology coaching specialists (36%), customized technology support (15%), and relevant training (13%). Other responses provided by a notable amount of participants (10% for each) were technology rights/privileges on school issues devices and reliable and expanded WiFi.

Table 24

Open-Ended Responses Related to Ideal Instructional Technology Support System

Participant comment	*n*	%
Technology coaching specialists	14	36
Customized technology support	6	15
Relevant training	5	13
Technology rights/privileges on school issues devices	4	10
Reliable and expanded WiFi	4	10
Subject specific knowledge and understanding-- knowing how to integrate technology into the class.	2	5
Classroom cart with 5 laptops, 5 ipads, and one digital camera	1	2
Educational programs for each course.	1	2
One in which teachers are not afraid of using technology because they know exactly where to find answers for every tech issue.	1	2
Database of instructional tools available; resource library of instructional methodology of subject-specific teaching; peer discussion groups across schools/continent; access to multiple assessment practices and techniques	1	2
Total	39	100

Note. N = 34: elementary (n =10), middle school (n = 11), high school (n = 13). The number of total responses does not equal the number of participants because some participants provided multiple responses.

The data from literature support these findings. Researchers have reported that teachers, through the use of instructional coaches, are able to improve their technology integration practices and confidence with integrating technology (Knight, 2011; Lowther et al., 2008; Smith, 2012). Customizable technology support, typically provided through mentoring and coaching, has been identified by researchers as a beneficial means of providing teachers with the individual, grade-level focused, curriculum-specific, and skill leveled support that produce positive outcomes: increased use of technology, diversity in technology use, increased student engagement, and deeper content learning (Al-Khatib, 2011; Anthony, 2012; Tournaki et al., 2011). Additional data from the literature support the reduction of barriers to technology integration (e.g., unreliable WiFi access and restrictions of administrator rights on devices) as a means of improving a teacher's technology integration practices (Gu et al., 2013; Hammonds et al., 2013; Kopcha, 2012; Lei, 2009).

Impact of participants' recommendations on teaching practices. Table 25 shows participant responses related to the impact of an instructional technology support system on teachers' integration of technology in the classroom. The 47 responses could be grouped into nine themes. The majority of responses (54%, n = 25) were from three themes: improve my integration of technology (22%), increase student use of technology (17%), and improve my efficiency with technology (time saving; 15%). Other responses provided by a notable number of participants (13% and 11%, respectively) were increase my use of technology and improve quality of teaching.

Overall, data from literature support these findings. Researchers have reported that when teachers have support systems that help decrease barriers to technology integration, the use of technology in teaching practices and technological confidence increases (Gu et al., 2013; Hammonds et al., 2013; Kopcha, 2012; Lei, 2009; Ritzhaupt et al., 2012). Similarly, researchers have shown that when teachers receive support in the form of professional development, they become more competent with regard to integrating technology into their teaching practices (Gumbo et al, 2012; Knight, 2011;

Lowther et al., 2008; Ritzhaupt et al., 2012). Also, when teachers have customized technology support, they are able to obtain the skills they need to (a) become more efficient with regard to using technology, (b) use more diverse technology, (c) increase student engagement, and (d) promote deeper content learning (Al-Khatib, 2011; Anthony, 2012; Tournaki et al., 2011).

Table 25

Open-Ended Responses Related to Technology Integration Outcomes of Implementing an Ideal Instructional Technology Support System

Participant comment	*n*	%
Improve my integration of technology	10	22
Increase student use of technology	8	17
Improve my efficiency with technology (time saving)	7	15
Increase my use of technology	6	13
Improve quality of teaching	5	11
Student engagement in lessons.	3	6
Help develop better lesson plans	3	6
Increased knowledge of technology uses in education	3	6
Improve confidence or comfort with technology	2	4
Total	47	100

Note. N = 26: elementary (n = 7), middle school (n = 8), high school (n =11) The number of total responses does not equal the number of participants because some participants provided multiple responses.

Research Question 5

Research Question 5 was, "Is there a significant relationship between technology integration (access of programs and use of devices) and (a) self-perceived barriers to technology integration, (b) self-perceived level of technology confidence, and (c) participation in technology focused professional development?" The four variables used in Research Question 5 are: (1) technology integration use levels, (2) barriers to technology integration levels, (3) confidence using technology in education levels, and (4) participation or non-participation in onsite technology related professional development. Table 26 displays the descriptive statistics of these four variables. The cumulative sum of scores used for analysis in this research question are based on the same calculations and scales as reported for the earlier in this project study pertaining to Research Question 1, Research Question 2, and Research Question 3.

Table 26

Descriptive Statistics: Variables of Research Question 5

Variables	Mean	SD	Minimum	Maximum
Technology integration use levels	145.08	14.43	50	200
Barriers to technology integration levels	34.77	9.77	17	55
Confidence using technology levels	48.18	7.10	11	55
Participation in onsite technology PD	21.82	6.33	9	36

Levels of technology integration. Levels of technology integration were calculated using data based a combination of different scales; yes/no, two different 4-

point scales, and a 5-point scale. The yes/no scale was assigned a 2-point numerical scale of 1 (yes) and 2 (no). This allowed the data collected to be calculated into one cumulative sum per respondent for technology integration use levels. As reported earlier in this project study in the discussion of establishing reliability, Cronbach's alpha was calculated for this variable and its related sub-scales. The overall variable Cronbach's alpha of .83 and sub-scale Cronbach's alpha coefficients range of .07 to .89 were determined to be reliable for the population in this study. The cumulative sum of scores was determined for each participant based on responses to the 50 survey items. Because the 50 items were based on different scales, the range of potential scores was 50-200. These data were used to address the three variables/hypotheses associated with Research Question 5. The mean for technology integration level on the 50-200 range was 145.08 (see Table 26).

No data in literature specifically support these findings, because literature focuses on factors or variables that affect (negative or positive) integration rather than determining levels of low versus high. However, because of the extensive amount of technology available at the school, the promotion of its use by the education technology department, the school requirement that technology be used for teacher related tasks (e.g., grading, communication, attendance, etc.), the use of electronic books in specific subject areas, and the virtual classrooms in middle and high school divisions, it is not surprising that teachers reported high levels of technology integration.

Relationship between self-perceived barriers to technology integration and technology integration levels. The barrier levels were calculated using survey Item 12, including all sub-items based on a 4-point scale; 1 (*not a barrier*), 2 (*small barrier*), 3 (*moderate barrier*), and 4 (*great barrier*). Because there were 17 items, the range of potential scores was 17-68. Of the data collected, the lowest cumulative sum of scores calculated for a respondent was 17, and the highest cumulative sum of scores was 52, indicating some respondents claimed zero barriers and no respondents claimed all examples to be great barriers. The mean for barriers to integrating technology in education level on the 17-68 range was 34.77 (see Table 26).

The scatterplot illustrates (Figure 5) the summarized results of two variables: barriers to integrating technology (y-axis) and technology integration use levels (x-axis). For a correlation between the variables to be identified the data on the scatterplot needs to create a linear or curvilinear pattern. The shotgun clustering of the data from this study is neither a linear nor curvilinear path. Thus indicating there is a low correlation between these barriers to technology integration and technology integration variables. Meaning data from this project study indicated that increases in technology integration use in the classroom were not correlated with decreased levels of barriers to technology integration in education.

According to researchers, teachers' barriers with integrating technology are commonly related to low confidence, lack of competency, lack of support, and limited experience with technology devices or program (Anthony, 2012; Gumbo et al., 2012; Ritzhaupt et al., 2012). No researchers have identified specific barriers associated with specific levels of technology integration. Despite the lack of support in the literature, the findings from this study are not surprising considering the high level of technology integration with a mean of 145.08 with a maximum score of 200 reported by teachers and the small barrier level with a mean of 34.77 with a maximum score of 68 (see Table 26). Likely, if there were many barriers to technology integration at the school, fewer teachers would have reported high levels of technology integration. In addition, it is likely that the education technology department has been working to decrease the number of barriers to technology integration, which may have contributed to the high levels reported by the teachers.

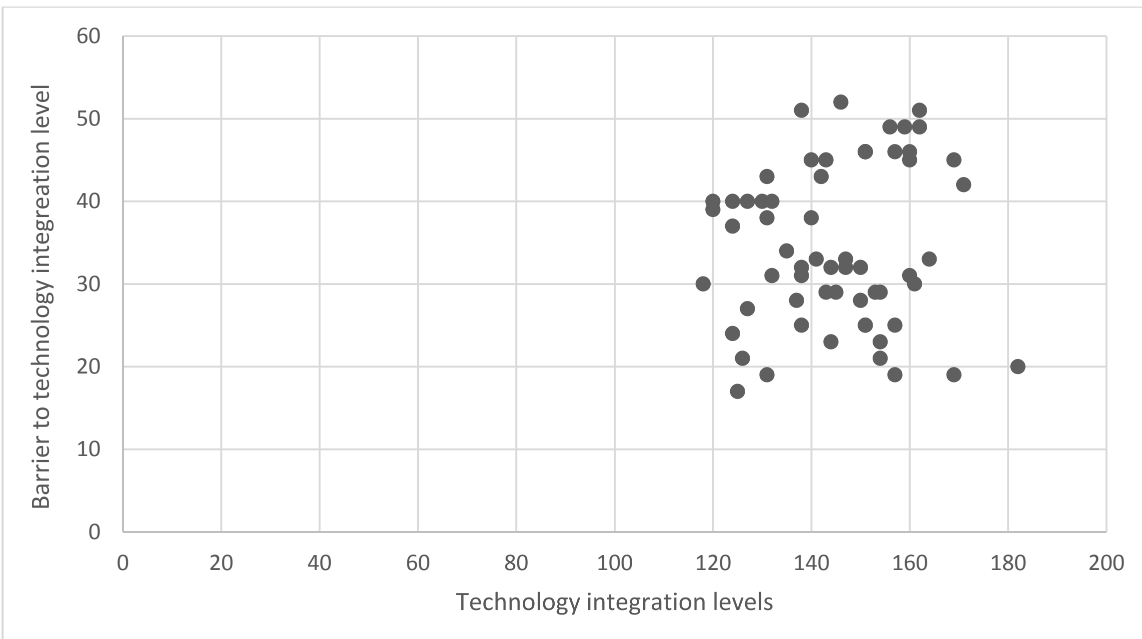

Figure 5. Scatterplot of relationship between technology integration levels and barriers to technology integration.

A Pearson product-moment correlation coefficient was calculated using SPSS software to evaluate the relationship between the technology integration level of a teacher and barriers to technology integration in educational practices. The Pearson statistical test determined there was no significant correlation between the two variables, *r* = 0.084, n = 62, p = 0.517. The data collected from this project study indicated that increases in technology integration in the classroom were not correlated with increased levels of confidence using technology in educational practices. Based on the results of the Pearson product-moment correlation analysis and data illustrated in Figure 5, the null hypothesis ($H_0$1) was accepted and the alternate hypothesis was rejected.

No literature supports these specific findings. However, it is likely that there was no significant difference in levels of technology integration between those who rate barriers high and those who rate barriers low because of the school's required use of technology for teacher tasks pertaining to student records and communication in addition to the requirement the middle and high school teachers use the virtual classroom portal. Regardless of teacher perceived barriers, the teachers must use the programs and technology.

Relationship between self-perceived level of technology confidence and technology integration levels. The confidence data were calculated based on a 5-point scale; 1 (*strongly disagree*), 2 (*disagree*), 3 (*mildly disagree*), 4 (*mildly agree*), 5 (*agree*), and (*strongly agree*. Because there were 11 items, the range of potential scores was 11-55. Of the data collected, the lowest cumulative sum of scores calculated for any respondent was 20, and the highest cumulative sum of scores was 55, which indicated no respondent had zero confidence yet some reported maximum confidence. The mean for confidence using technology in education level on the 11-55 range was 48.18 (see Table 26).

The scatterplot illustrates (Figure 6) the summarized results of two variables: confidence using technology in education (y-axis) and technology integration levels (x-axis). For a strong positive or negative correlation between the variables to be identified, the data on the scatterplot needs to create a linear or curvilinear pattern. The shotgun clustering of the data from this study is neither linear nor a curvilinear path. This pattern indicates there is low correlation between the confidence and technology integration variables.

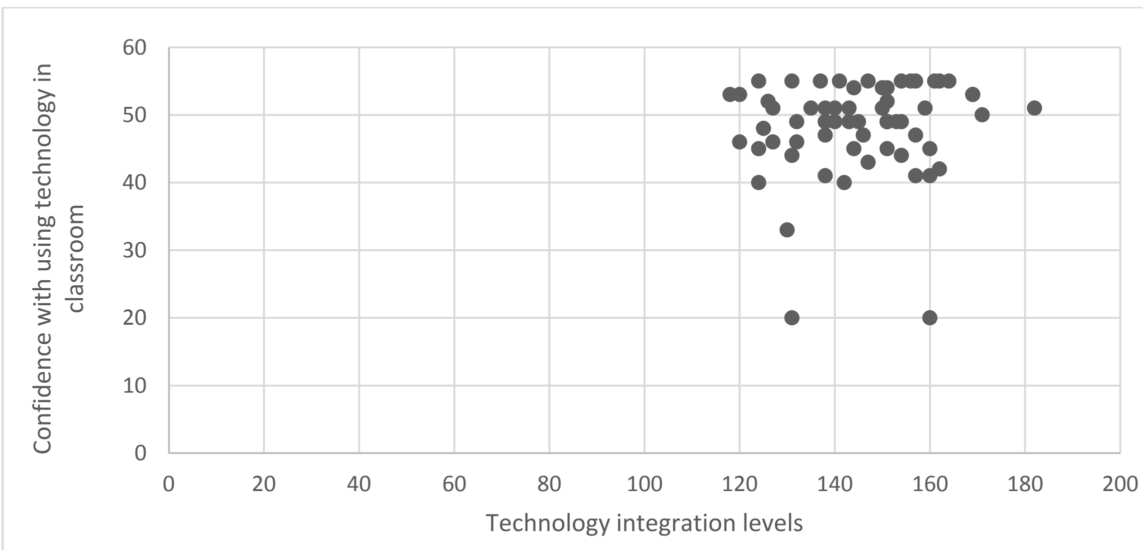

Figure 6. Scatterplot of relationship between technology integration levels and confidence using technology in teacher practices.

When compared with technology integration levels, 18% of respondents (n = 11) reporting an extremely high confidence level for using technology in education (i.e., cumulative sum of 55 or maximum confidence score) were reporting technology integration levels both below and above the technology integration level mean of 145. Of the 11 extremely high confident respondents, 45% reported technology levels between 124 and 145 (i.e. below the mean), while 54% reported levels between 146 and 164 (i.e. above the mean). Meanwhile, of the 35% of respondents (n = 22) reporting low cumulative scores (i.e. below the mean) for confidence with using technology in education, 36% (n = 8) also reported high technology integration levels.

A Pearson product-moment correlation coefficient was calculate using SPSS software to evaluate the relationship between the technology integration level of a teacher and their confidence using technology in educational practices. The Pearson statistical test determined there was no significant correlation between the two variables, $r = 0.100$, n = 62, p = 0.437. The data collected from this project study indicated that increases in technology integration in the classroom were not correlated with increased levels of confidence using technology in educational practices. Based on the results of the Pearson product-moment correlation analysis and data illustrated in Figure 6, the null hypothesis (H_02) was accepted and the alternate hypothesis was rejected.

No data in literature support these specific findings with regard to differences between technology integration among those with low levels of confidence and those with high levels of confidence. However, these findings were not surprising because no matter what level of confidence the teachers may have, they are required by the school to use the technology provided for specific mandatory tasks pertaining to communication, student records, electronic textbooks, and virtual classroom portals (for specific grade levels). This condition is irrespective of the technology integration training the school provides.

Relationship between participation in technology focused professional development and technology integration levels. The professional development attendance data were calculated based on a 4-point scale; 1 (*I don't know if it is available*), 2 (*No, not available*), 3 (*Yes, but I do not participate*), and 4 (*Yes, and I participate*). Because there were nine items, the range of potential scores was 9-36. Of the data collected, the lowest cumulative sum of scores calculated for any respondent was 11, and the highest cumulative sum of scores was 36. These scores indicated some respondents reported not knowing of any onsite training offered, while some reported knowing of and attending all training topics offered. A cumulative sum of 12 was needed to indicate knowledge of at least one training topic offered despite lack of attendance, while it required a cumulative sum of 13 to have attended a minimum of one training topic offered.

The scatterplot illustrates (Figure 7) the summarized results of two variables: participation in onsite professional development (y-axis) and technology integration use levels (x-axis). The data on a scatterplot needs to create a linear or curvilinear pattern in order to identify a strong positive or negative correlations between the variables. The shotgun clustering of the data from this study is neither linear nor a curvilinear path. This pattern indicates there is low correlation between the professional development attendance and technology integration variables.

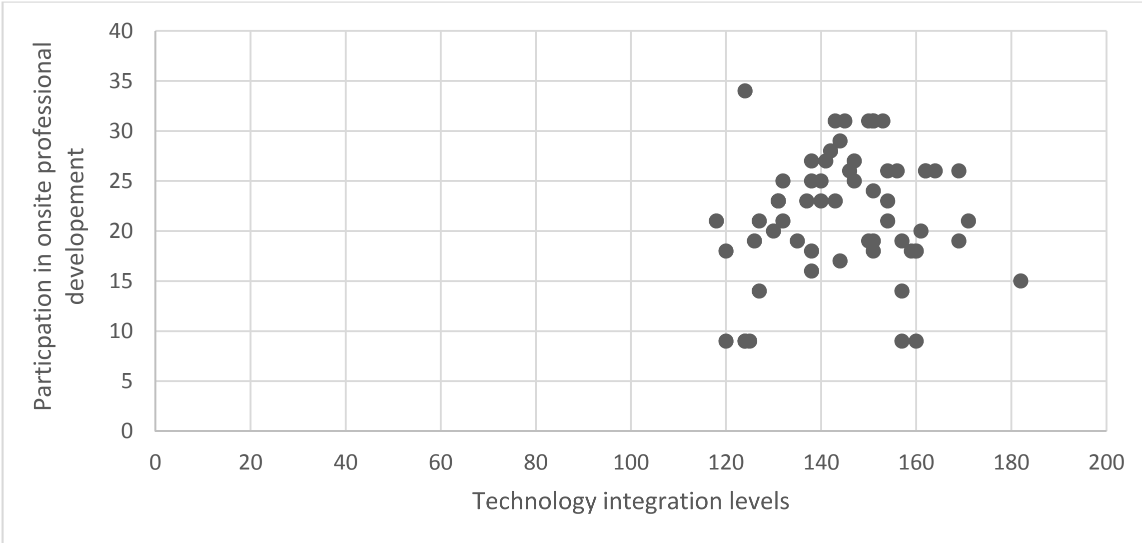

Figure 7. Scatterplot of relationship between technology integration levels and participation in onsite technology related training.

A Pearson product-moment correlation coefficient was calculate using SPSS software to evaluate the relationship between the technology integration use of a teacher and their participation in onsite technology related professional development. The Pearson statistical test determined there was no significant correlation between the two variables, $r = 0.132$, n = 62, p = 0.305. The data collected from this project study indicates that increases of technology integration in the classroom were not correlated with increased participation in onsite technology related professional development. Based on the results of the Pearson product-moment correlation analysis and data illustrated in Figure 7 the null hypothesis ($H_0 3$) was accepted and the alternate hypothesis was rejected.

The acceptance of the null hypothesis and rejection of the alternative hypothesis is the opposite of the expected outcome. Although, the data collected in this study indicates technology integration levels are not correlated to participating in onsite technology related professional development, there may be other factors impacting these results. First, the survey item (ETIQ 17 including sub-items) used to collect the data to evaluate participation in onsite technology related professional development included two concepts: knowledge of training and actual attendance. It is likely that by combining these two concepts into one item, true levels of participation in training were not attained. For example, a cumulative sum of 27 (i.e., a rating of 3 for all 9 subitems = 27) would have meant that the participant knew about the training opportunities but did not attend any of them yet the high cumulative sum could be interpreted as high attendance. If the participant also was viewed as a teacher with a low level of technology integration, it would appear that the training was ineffective with regard to promoting the integration of technology. Secondly, according to the data collected from ETIQ Item 14, 61% (n =38) and 34% (n = 21) of respondents reported independent learning to a large extent and to a moderate extent, respectively, as their source of preparedness to use technology in educational practices. Additionally, 21% (n = 15) and 42% (n = 26) credited professional development outside of school to a large extent and to a moderate extent, respectively, as their source of preparedness to use technology in education.

Additionally identified correlations in data. Upon further analysis of the data collected from ETIQ three other correlations were identified during analysis for Research Question 5. While creating a correlation matrix and calculating the Pearson product-moment correlation coefficients for the four variables of Research Question 5, it was discovered that there is significant correlation between the confidence in using technology and levels of barriers to technology integration, r = -0.335, n = 62, p = 0.008. The linear correlation can be seen organization of the data on the scatterplot (Figure 8)

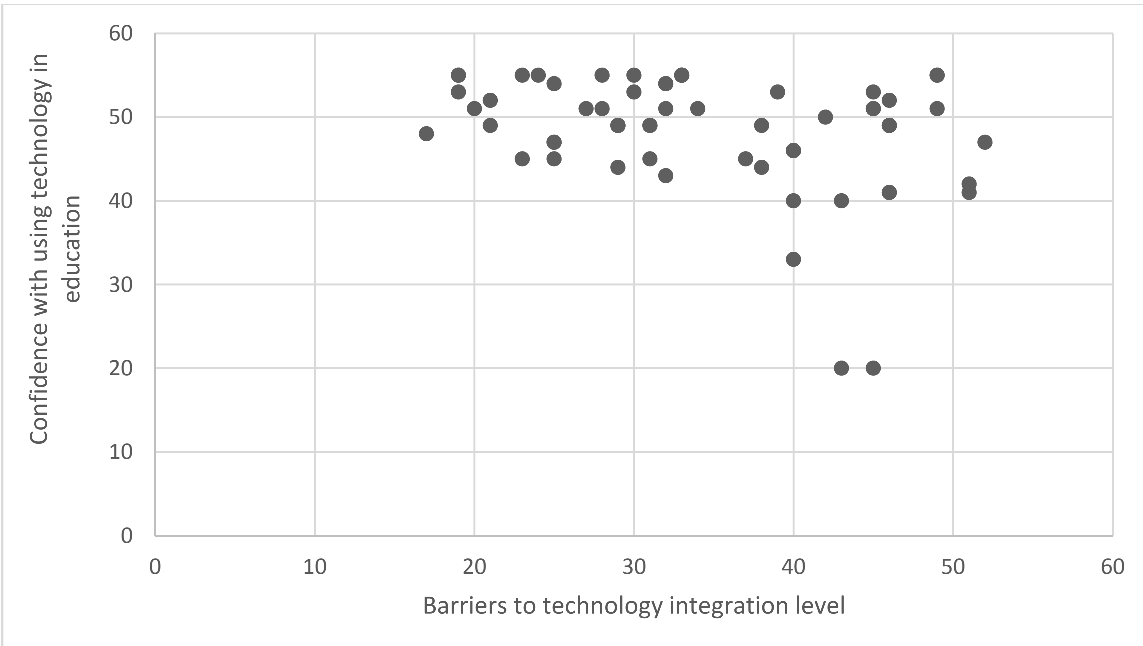

Figure 8. Scatterplot of relationship between confidence using technology in education levels and barriers to technology integration levels.

While analyzing the rejection of the alternative hypothesis of Research Question 5c, the data collected for Item 14 (preparedness to use technology in education) was examined for possible explanation of why teachers at the research school were reporting high technology integration levels yet low attendance of onsite technology related professional development. Two sub-items, professional development activities outside of school and independent learning, indicated a strong correlation to technology integration levels. Two additional Pearson product-moment correlation coefficients were calculate using SPSS software to evaluate if there was a relationship between the technology integration use of a teacher and their sense of preparedness to use computers from outside of school professional development and independent learning. Both Pearson correlations yielded a significant relationship. There was a strong correlation between technology integration levels and a sense of preparedness from technology related professional development outside of the research site, $r = 0.286$, $n = 62$, $p = 0.025$. There was also a strong correlation between technology integration levels and a sense of preparedness from technology related independent learning, $r = 0.402$, $n = 62$, $p = 0.001$.

The correlation of these two variables in relationship to technology integration levels is also evident on the related scatterplot displaying the summarized data. Figure 9 illustrates the data from the strong correlation of technology integration levels and preparedness from professional development outside of school. Figure 10 illustrates the strong correlation between technology integration levels and technology related independent learning.

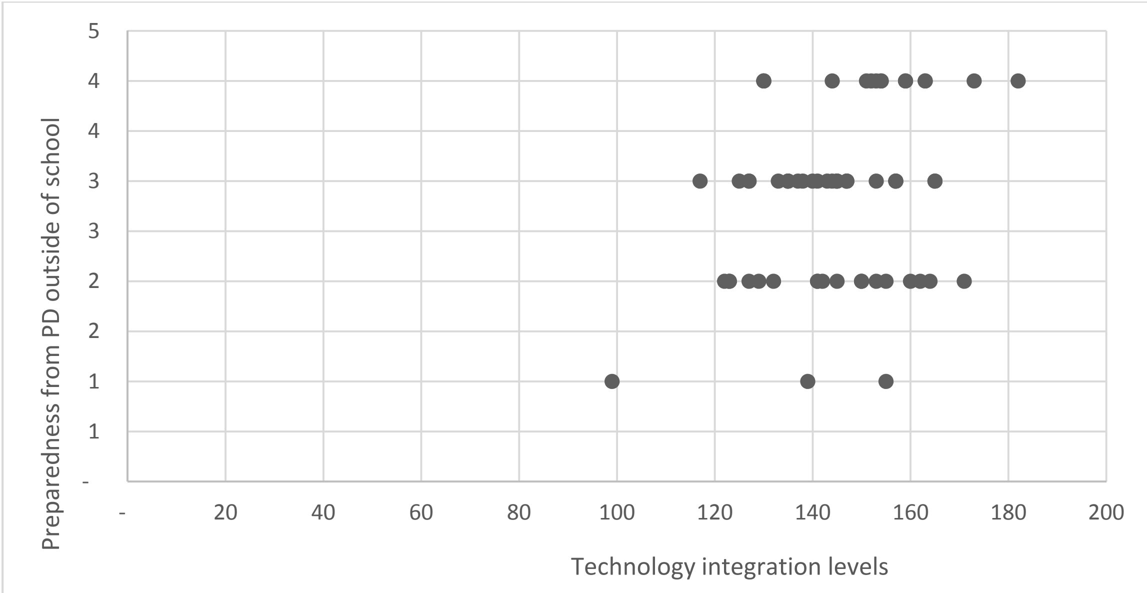

Figure 9. Scatterplot of relationship between technology integration levels and preparedness from professional development outside of school.

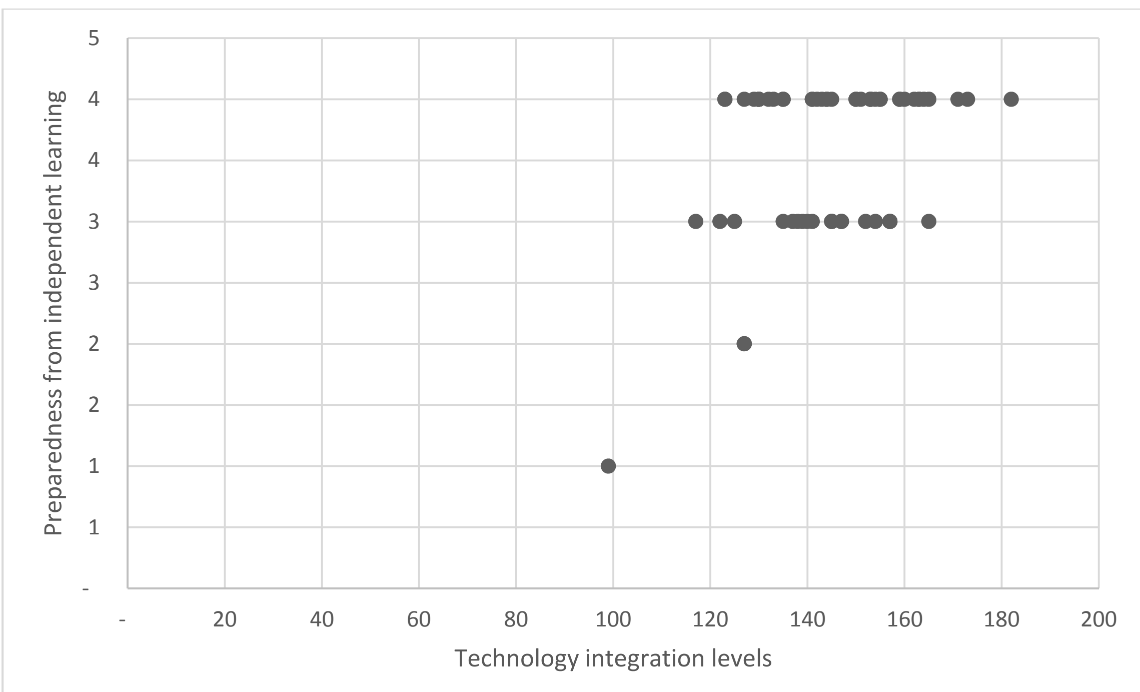

Figure 10. Scatterplot of relationship between technology integration levels and preparedness from independent learning.

Although these specific correlations were not part of the original research questions or hypothesis, the data indicated significance that supports the general concept that professional development and technology related learning positively correlates to technology integration levels in classrooms. Lastly these additional findings provide information that supports the concern regarding the possibility of ETIQ Item 17 being flawed due to its two prong inquiry.

Conclusion

A quantitative cross-sectional survey research study was implemented to identify the technology integration needs of the teaching staff of CAA. The voluntary participants were obtained from the certified teachers of CAA educational staff. The 127-question Likert-style survey link was provided electronically through e-mail and administered through the SurveyMonkey encrypted survey program to ensure confidentiality and anonymity. The survey submission window was 14 calendar days from November 17th to 30th, 2014. Additional reliability and validity measures were taken to ensure survey content, construct, and empirical validity. The data was collected, stored, and analyzed via Microsoft Excel and SPSS software. Utilizing the information collected from the quantitative research, a program proposal was made to participants and administration of CAA. However, no data was collected until after IRB approval had been obtained. Section 3 provides the details of the project study including its goals, rationale, literature review, and implication for social change, which has been based on the survey data collected and explained in Section 2.

Section 3: The Project

The results of this study indicated that teachers of the research site need and want four things: (a) clarity and direction regarding expectations for technology integration across the curriculum, (b) improvement to the onsite technology training opportunities to include focus on school-provided devices and better promotion of the training that is offered, (c) onsite coaching or mentoring as a means of continuous customizable technology integration support, and (d) effective leadership and administrative support. Based on these results and insight, I determined that a three-stage action plan, the Technology Integration Improvement Plan (TIIP), was an appropriate project for this study. The TIIP will be used to improve technology integration through (a) the development of standards for technology use and training (by grade level), (b) the provision of level-specific technology integration training for specific devices provided by the study site, and (c) the provision of ITCs for teachers. Because the improvement of effective leadership is beyond my capacity as an educator at the study site, I did not include this aspect in my project. However, because I will share the TIIP with school administrators at the study site, its implementation may indirectly and positively affect the leadership in the school.

A model of the TIIP is presented in Figure 11. The model includes a general description of the phases of the TIIP as well as the outcomes associated with the implementation of those phases, in particular, the effect on teacher-reported barriers to technology integration, the fulfillment of teacher identified support needs, and ultimately, student outcomes.

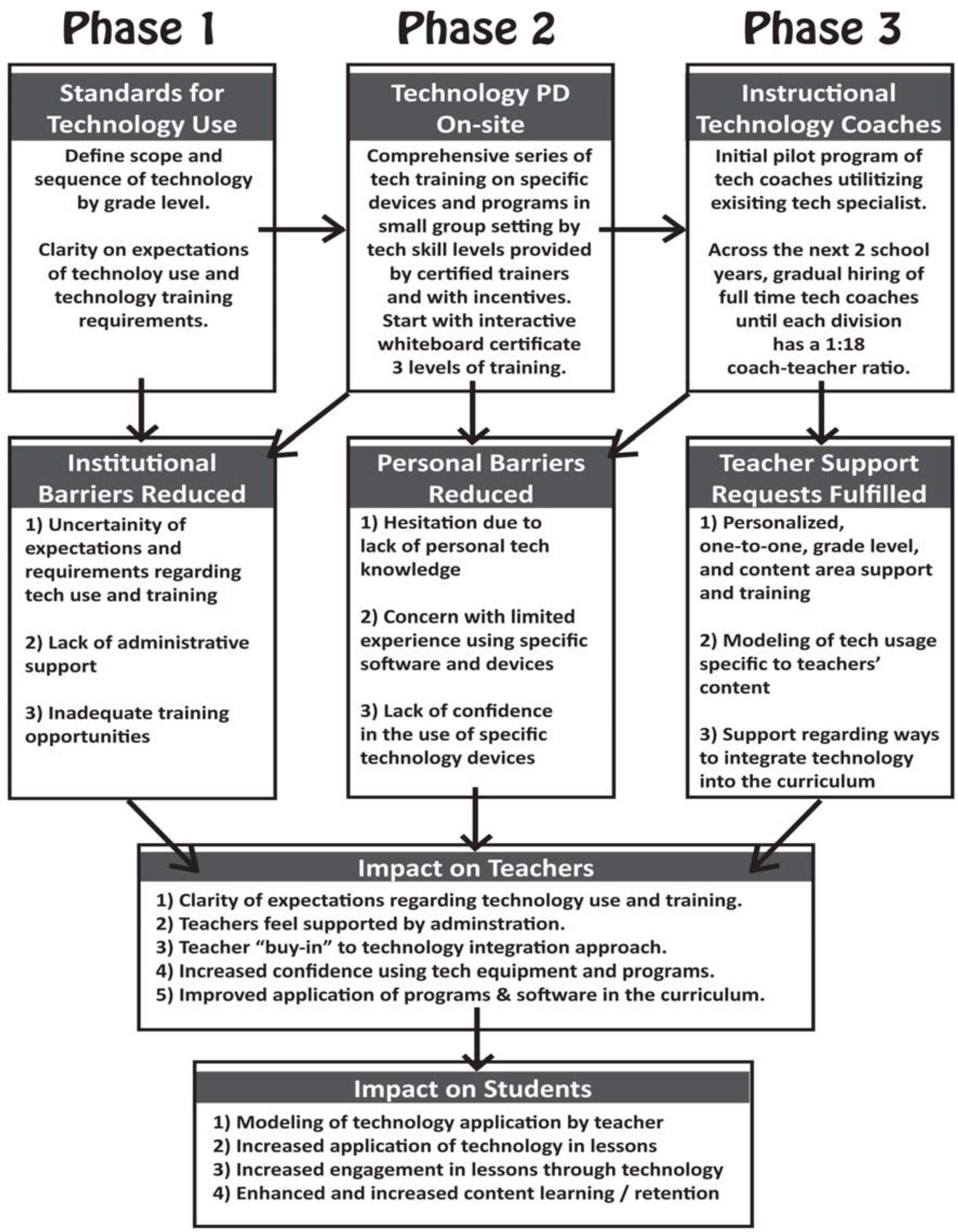

Figure 11. The Technology Integration Improvement Plan (TIIP).

I designed this action plan broadly to focus on the school as a learning community and for long-term technology sustainability. In general, the comprehensive action plan addresses the all-encompassing problem of the research school presented in Section 1: a lack of efficient and effective technology integration across the curriculum. Specifically, each of the three phases of the TIIP (the development of standards for technology use and training [by grade level], the provision of level-specific technology integration training for specific devices provided by the study site, and the provision of ITCs for teachers) aligns with the three major findings in this study: the need for (a) clarity and direction regarding expectations for technology integration across the curriculum, (b) improvement to the onsite technology training opportunities to include focus on school-provided devices and better promotion of the training that is offered, and (c) onsite coaching or mentoring as a means of continuous customizable technology integration support.

The remainder of this section is made up of five subsections. The first two sections are the rationale for choosing the project and the related literature. The last three sections pertain to the project itself: a thorough description of the project, the plan for evaluating the project, and the implications of implementing the project.

Project Goals

The three goals of this project are (a) to establish a school wide integration plan with clear expectations, identified guidelines, and support from administration that sustains high quality technology integration practices across the curriculum, (b) to provide teachers at the study site with effective and relevant technology-related integration training, and (c) to provide onsite customized technology integration support.

Specific outcomes resulting from the achievement of three goals include (a) transparency for educators and staff with regard to expectations for teachers including standards for the application of technology for their curriculums, (b) improved teacher technological confidence and skills, (c) improved empowerment of teachers as learners and as leaders, and (d) increased levels of technology integration at the classroom level. The long-term goal for this study is the improvement of student outcomes at the study site.

Rationale

Educators are routinely encouraged to use technology in their classrooms to enhance learning and engage students (Liu, 2013). It is believed that meaningful technology integration begins with technologically competent and confident educators (Buabeng-Andoh, 2012; Peterson & Palmer, 2011; Schrum, Shelley, & Miller, 2008). For educators to become tech-savvy and confident, they must have access to technology related training opportunities that are focused on recognized needs and that foster teacher participation and growth (Schlechty, 2011).

With regard to teacher training, Berrett et al. (2012) identified two major challenges to successful technology integration as the lack of understanding of what the technology can do and the inability to make effective use of the technology tools in one's own teaching environment. These two areas of concern indicate a need for teacher training. Buabeng-Andoh (2012) explained that it is from frequent and effective technology-related training opportunities that educators acquire new technological skills and competencies as well as a conceptual grasp of the power of technology in education. It is through these technology-infused training opportunities that teachers are empowered to transcend from passive learners to active learners who share their newly acquired resources, strategies, and skills with their peers (Linton & Geddes, 2013). Additionally, Smolin and Lawless (2011) advocated that it is through technology-infused training that teachers are exposed to methods and best practices of how to better use their technology tools.

Researcher also have suggested that the more time educators participate in technology integration training, the more educators will implement different types of technology in their teaching practices (Tondeur et al., 2012). Linton and Geddes (2013) stated that it is important to equip teachers with technological knowledge and skill for effective technology integration, yet Winslow et al. (2014) explained the equal importance of designing the technology training to minimize the teachers' investment of additional time and energy while maximizing the benefits to their instructional practices. By creating a flexible professional development platform based on variety, multi skill level technology training, and specialized technology instructional coaches, technology integration practices should be improved at the classroom level and across curriculums at CAA.

Student engagement and achievement are related to their teachers' leadership, competency, and confidence with using, modeling, and teaching 21st century skills (Schrum & Levin, 2013). Specifically, the effective execution of technology integration at the classroom level results in an increased level of student engagement with classmates and content, subsequently enhancing students' academic outcomes (Gikandi, 2013; Sadaf et al., 2012; Schrum & Levin, 2013). Based on this understanding, increasing levels of effective and efficient technology integration into CAA learning environments will facilitate increased student engagement and content learning, ultimately improving student outcomes.

The choice to include a school technology plan and ongoing support in the TIIP also is supported in the literature. With regard to a school technology plan in particular, Stevens (2011) explained that a lack of clarity of expectations was a well-identified barrier to teachers' ability to integrate technology into their curriculum. Results from the literature also support the need for teacher support. In particular, Reed and Bowser (2012) reported the implementation of instructional coaches creates collaborative professional learning communities and provides modeling and nonsupervisory mentoring opportunities, which in turn provides significant levels of support for educators.

Review of the Literature

Technology is a critical component in 21st century education (Schrum & Levin, 2013); however, it is ineffective when it is viewed as an isolated component of education (Kurt, 2013; Teo, 2011). Technology is more than just a vehicle "for delivering the traditional curriculum" (Richardson, 2013, p. 11). It is a vehicle that can increase student engagement and achievement through technology-infused lessons facilitated by technology-confident and knowledgeable teachers (DeSantis, 2012; Project Tomorrow, 2012; Sabzian, Gilakjani, & Sodouri, 2013). Typically, those tech-savvy teachers are ones who have been provided technology-related professional development and support from their administrators (Moore-Hayes, 2011; Potter & Rockinson-Szapkiw, 2012), support that provides teachers a clear plan and guide for technology integration, appropriately leveled training, and coaching for implementation of best practices. According to Schrum and Levin (2013), student engagement and achievement are related to teachers' leadership, efficacy, and commitment to teaching 21st century skills. For the sustainability and success of technology initiatives, administrators need to provide teachers with clear direction through a technology integration plan (Schrum & Levin, 2013), a shared vision through teacher buy-in (Berrett, et al., 2012), relevant professional development (Smolin & Lawless, 2011), and ongoing nonsupervisory mentoring by trained technology specialists (Harris & Hofer, 2011).

In this section, I review literature pertinent to the development of my project. Because the first phase of my project is the development of standards for technology use and training (by grade level), I first discuss literature that demonstrates the importance of having a technology integration vision and plan. Then, because the second phase of my project is onsite training and because a large portion of the successful integration of technology at the study site will depend on appropriate and effective technology training, I discuss effective technology-related professional development, including the need for teacher buy-in to the technology integration philosophy. Finally, because the third phase of my project is the placement of ITCs at the study site, I discuss an appropriate instructional coaching model (ICM) as well as the role of instructional technology coaches in the successful integration of technology in schools.

To execute the search for literature for this review, I used electronic databases: EBSCOhost, Education Research Complete, the Education Resources Information Center (ERIC), ProQuest Central, Computers & Applied Science Complete, and Safari Tech

Books. Sources included scholarly journal articles (print and online only versions), conference presentations, white papers, government reports, and papers from national and private organizations as well as educational books and dissertations.

While the majority of the research I used in this literature review was conducted in the Unites States, approximately a dozen international studies were included. The research applied to this project study was published between 2010 and 2015. The inclusion of international studies and literature published before 2010 was done because the research either represented a significant contribution to the field of study or because the research provided vital evidence in support of educational technology developments or advancements. Search terms included *educational technology, instructional coaches, technology coaches, technology integration professional development, technology vision,* and *technology integration models.*

Technology Integration Vision and Plan

As the data collected from the ETIQ indicated, teachers at the research site are in need of clarity and direction from their administration with regards to technology integration expectation and alignment with their curriculum. Researchers Berrett et al. (2012) explained that for the benefit of their teachers and students, leaders within schools need to define clearly and articulate what technology integration is as well as what function it will play in the school community. Without a clear vision and well-articulated set of goals, technology integration initiatives can become lost and confusing among educators (Davies, 2011; Margolis & Huggins, 2012; Norton, 2013; Schrum & Levin, 2013).

Clear vision provides the school community with direction and focus (Levin & Schrum, 2013; Margolis & Huggins, 2012; Norton, 2013), while a set of well-articulated goals establishes structure and guidelines for the stakeholders (Norton, 2013; Sabzian et al., 2013). The development of a scope and sequence for technology integration by grade level provides educators with clarity as to expectations and appropriate application for their classroom (Buabeng-Andoh, 2012; Levin & Schrum, 2013). Sharing the strategic technology plan within the school's community provides a perspective of what technology integration should be occurring as well as how it is expected to unfold in the coming years (Johnson, 2013; Lim & Pannen, 2012; Norton 2013). The establishment of a technological pedagogical framework provides a pathway to understanding how technology can impact teaching and learning (Abbitt, 2011b; Liu, 2013; Sabzian et al., 2013). In addition, the framework provides educators with scaffolding to follow in the development of the technology-enriched learning practices and lessons (Hughes, 2013; Liu, 2013). Once the direction, the goals, and the expectations of all parties involved have been made clear, the school as a whole can move forward towards executing the technology integration strategic plan under effective leadership.

Teacher buy-in. Teachers, who by many are regarded as "the heart of the education process" (Ghamrawi, 2013, p. 181), are the powerhouse behind any new technology initiative (Berrett et al., 2012; Ghamrawi, 2013; Moore-Hayes, 2011). According to Davis (2008), it is important not to underestimate the significance of teachers' willingness and readiness to partake in professional development. Schrum and Levin (2013) believed the energy and efforts of teachers are vital in bringing about any real educational change, development, or progress. Ramirez (2011) stated educators must be acknowledged as essential components in establishing the successful execution of technology-infused lessons. Based on these researchers' claims and as Berrett et al. (2012) suggested, it is paramount to listen to the requests of teachers and use their knowledge in order to achieve technology integration success. As the "frontline stakeholders," teachers as the facilitators of technology integration initiatives cannot be disregarded (Smolin & Lawless, 2011, p. 93). Administrators and educational leaders need to recognize the important agent of change role filled by teachers as well as their ability to identify the value of infusing technology tools into their curriculum (Ertmer & Ottenbreit-Leftwich, 2010).

The same leadership also needs to acknowledge teachers as professionals (Knight, 2011; Schrum & Levin, 2013) and afford them the same educational support of ongoing training (Polly, 2012; Tondeur et al., 2012) as they provide the students of their schools. Educational training that is valued by teachers as an opportunity to engage in collegial collaboration and professional growth (Ghamrawi, 2013). Additionally, teachers view this educational training as an opportunity to gain proficiency and know-how of new-found skills and enhancement of existing skills (Ghamrawi, 2013). Researchers suggested that meaningful technology integration begins with a focus on professional development that recognizes the teachers' needs and fosters their participation and buy-in of the initiative (Schlechty, 2011). Educators need to subscribe to the philosophy of how the technology initiatives will benefit their students' engagement and learning outcomes without substantially increasing the teachers' workload (Kurt, 2013; Winslow et al., 2014). As teachers face a substantial number of challenges and high expectations in creating technology-enriched learning environments that guarantee student success (Capo & Orellana, 2011), relevant and applicable professional development plays a significant role in building a teacher's confidence and capabilities with infusing technology as well as their subscribing to the technology integration philosophy (Buabeng-Andoh, 2012; Smith, 2012; Winslow et al., 2014). Moving forward, schools need to invest in their teachers' professional development and growth if their technology-based initiatives are to unfold successfully.

Effective Technology Related Professional Development

Educational technology integration literature consistently identified educators to be the most valuable asset and pertinent factor in achieving meaningful technology-based educational reform. Likewise when technology integration is ineffective in education and learning practices, educators are most often blamed (Hixon & Buckenmeyer, 2009). Buckenmeyer (2012) further contended a substantial number of teachers fail to utilize the technologies available to them accurately due to their lack of ability and confidence. Many educators continue to struggle and hesitate with integrating technology into classroom practices, daily routines, and lessons (Funkhouser & Mouza, 2013; People for Education, 2014; Tondeur et al., 2012). Odden (2012) advocated that to create meaningful technology integration, schools must tap into the "power of technology" (p. 15). The tapping of technology's power requires an investment by the schools in their teachers' professional development and growth (Odden, 2012).

Holmes, Singer, and MacLeod (2011) explained that in delivering effective professional development there was opportunity to provide teachers with new skills, resources, experiences, and knowledge that can be implemented in their field of teaching. Singer, Lotter, Feller, and Gates (2011) reiterated the importance of how workshops and relevant trainings provided assistance and facilitation of innovative practices in teachers' classrooms. To best create conditions that result in effective instructional practices using technology, Guzman and Nussbaum (2009) advocated teachers must be trained to use technology beyond the basic alignment of their curriculum. Essentially, in order for educational technology to be effectively integrated into today's classrooms, teachers must be conscious of its function and application (Davies, 2011).

Teachers also need to be equipped with the knowledge and skills to integrate technology meaningfully into their curriculum (Linton & Geddes, 2013); however, the design of the professional development needs to minimize the teachers' investment of additional time and energy while maximizing the benefits to their instructional practices (Winslow et al., 2014). Based on established research, it remains imperative for 21st century teachers to be provided more than simply access to technology tools and devices (Richardson, 2013). Educators need the necessary training and technology skills to create effective technology-integrated learning opportunities for their students.

Past researchers (Ertmer, 2005; Lawless & Pellegrino, 2007; Sugar, 2005) have long contended that professional development regarding technology use and application needed to contain specific essential components: curriculum-specific applications, hands-on technology use, a variety of learning experiences, active participation of teachers, connections to student learning, sufficient time, technical assistance and support, administrative support, adequate resources, continuous funding, and built-in evaluation. More recently, researchers (Buckenmeyer, 2012; Keengwe et al., 2010; Schrum & Levin, 2013; Smolin & Lawless, 2011) have continued to support this earlier research-established set of essential components with the addition of a few more necessary components: professional development be an ongoing process, job embedded support, training the trainer, and continuous program modifications for improvements aligning to the ever-changing world of advancing technology. From these two combined set of essential components, it can be inferred as Tsai and Chai (2012) explained, technology integration in education is not simply a state of *technology*, but rather it is a state of *art*. Establishing a teacher's design capacity is, therefore, a crucial task in order to support the integration of technology (Tsai & Chai, 2012).

Expecting educators to function in this "state of art" and create learning environments infused with technology means that educators must possess a "professional tool-kit" (Keengwe, Georgina, & Wachira, 2010, p. 2; Winslow et al., 2014, p. 45) with techniques and skills on how to effectively use technology. However, the mere use of the technology should not be the primary focus of technology integration (Davies, 2011; McLeod, 2015; Schrum & Levin, 2013). The focus should be on the learning outcomes and how technology aids the improvement of these outcomes (Boud & Hager, 2011; Ghamrawi, 2013). In order for this to happen, availability and access to technology related professional development are essential.

Wachira and Keengwe (2011) asserted that technology will consistently fall short of leveraging the educational landscape as long as training and support remain unreliable, limited, and inaccessible by educators. If these training opportunities are available to educators, who are accountable for increasing the effective use of technology in educational practices (Buckenmeyer, 2012), they are able to obtain the skills and knowledge needed for their professional technology tool-kit. Smolin and Lawless (2011) reinforced this concept in their suggestion that technology focused professional development was an essential factor for educators to integrate technology effectively into the classroom. Moore-Hayes (2011) explained there is a connection between educators' perceptions of their abilities to provide meaningful technology-enriched lessons for all learners and their self-efficacy combined with their willingness to explore new and innovative instructional strategies. It is through professional development that educators' self-efficacy, confidence, competence, and willingness to try technology integration best practices are developed, strengthen, and reinforced (Aldunate & Nussbaum, 2013; Buabeng-Andoh, 2012; Iscioglu, 2011; Levin & Schrum, 2013; Peterson & Palmer, 2011).

Instructional Coaching

The concept of instructional coaches and mentors is an established practice in education for content-specific areas such as math, literacy, and languages (Hammonds et al., 2013; Gallucci, Van Lare, Yoon, & Boatright, 2010; Steven, 2011; Wang, 2013). Therefore, it would be reasonable to believe the application of the same practices could be applied to technology integration mentoring or coaching with similar successful outcomes. More recently, the use of coaching in the field of educational technology has come into practice (Green 2013; Lim & Pannen, 2012; Sugar & van Tryon, 2014). Successful coaching programs have been recognized as a confusion reducer between administration and educators as well as having great potential for pedagogical significance in education (Stevens, 2011; Wang, 2013).

Approaches to instructional coaching. There are four educational coaching approaches most frequently discussed in scholarly literature: Peer Coaching, Cognitive Coaching, Literacy Coaching, and Instructional Coaching (Cornett & Knight, 2008; ISTE, 2012; Knight, 2011). Cognitive coaching refers to a set of strategies that invites oneself reshape their thinking and problem solving based on four propositions: thought and perceptions produce all behavior, teaching is a constant decision making process, learning requires new engagement, and humans cognitively continue to grow (ISTE, 2012). When applied to coaching in educational technology, the cognitive coaching model concentrates on practices such as train-the-trainer and professional development for technology specialists. Literacy coaching is the most commonly used coaching model in education, particularly because its focus is, in general, to support teachers in their daily teaching responsibilities (Cornett & Knight, 2008). As literacy coaching is broadly focused on the general academic support of teachers’ needs and skills, it often appears different from school to school. The peer coaching approach, as it relates to educational technology, concentrates on training teachers to assistance fellow educators integrate technology in a collaborative team concept (ISTE, 2012). Instructional coaching refers to the practice of a technology specialist and teacher working as partners to identify, plan, model, observe, and refine technology-infused educational practices (Knight, 2011). While cognitive coaching and peer coaching can be applied to educational technology integration methods, the ICM is being used for the purpose of this project study.

The Kansas Coaching Project (KCP), a division of the University of Kansas Center for Research Learning, focuses on research in support of the ICM (2015). The KCP (2015) characterized instructional coaching as a philosophical bearings or theory that underlies the foundation of coaching. From its 10 years of research, Kansas Coaching Project identified a seven step process instructional coaches (IC) use to empower educators to acquire and incorporate proven teaching practices into their instructional repertoire is illustrated in Figure 12. This strategic model under the KCP philosophy for instructional coaches focuses on the *how to* for delivering effective learning. An IC's goal is to help educators focus on their strengths and skills that can positively affect their teaching methods and how their student learn rather than focus on the teacher's shortfalls in the areas of practice.

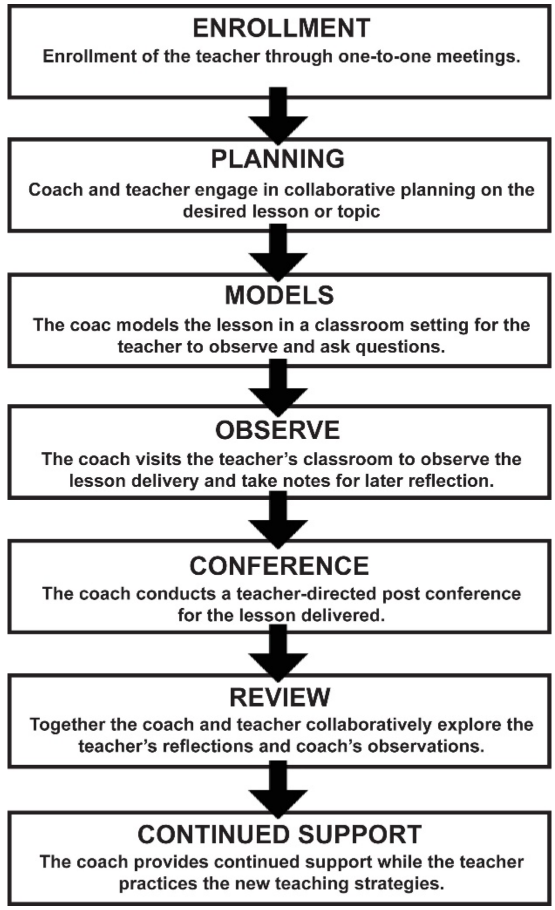

Figure 12. Kansas Coaching Project 7-Step Instructional Coaching Process.

Knight (2011), one of the founders of the ICM and founder the Kansas Coaching Project, explained the ICM framework was designed to (a) remove any barrier that might stand in the way of implementation (b) be a powerful means of modeling best practices in classroom settings, and (c) foster a mutual collaborative respectful learning community between educators and coaches. In order to achieve these framework goals, Knight (2011) identified seven principals for instructional coaching. The seven principals of equality, choice, voice, dialogue, reflection, praxis, and reciprocity strengthen Kansas

Coaching Project's seven step process (Knight, 2011). In his research Knight explained the seven principals of instructional coaching to be:

- Equality: Instructional coaches and teachers are equal partners.
- Choice: Teachers should have choice regarding what and how they learn.
- Voice: Professional learning should empower and respect the voices of teachers.
- Dialogue: Professional learning should enable authentic dialogue.
- Reflection: Reflection is an integral part of professional learning.
- Praxis: Teachers should apply their learning to their real-life practice as they are learning.
- Reciprocity: Instructional coaches should expect to get as much as they give.

The Annenberg Institute for School Reform (2011) at Brown University reported that the principles of instructional coaching are grounded in current research on effective professional learning communities and professional development and the clinical knowledge of effective educational leadership and community practices of schools. /the institute's educational research on coaching practices referenced recent empirical evidence identifying ICM as a means for educators to transition their learning from professional trainings to classroom applications (King et al., 2014). It was also through the practice of instructional coaching that Annenberg Institute for School Reform identified greater collaboration and reflection among teachers.

In opposition of blankly accepting instructional coaching as the cure-all solution to technology integration, Annenberg Institute for School Reform's research cautioned educational leaders and administrators to be aware that (King et al., 2014):

- Instructional coaches need to be grounded in both school and classroom level and not solely focused the classroom practices.
- Coaching is only one aspect of the necessary professional development, it is not the sole solution or quick fix.
- One instructional coach's practices do not necessarily fit all grade levels, meaning the successful practices of an elementary level coach do not translate into guaranteed success in middle or high school classroom.
- Instructional coaching goes beyond building knowledge and awareness to help support changes in practice, it involves reaching out to all educators including the teachers resistant to the new initiatives.

More recent research by the International Society of Technology Education [ISTE; (2012)] reported that instructional coaching is a professional development model known to improve the skill, knowledge, and practice of teachers, and therefore effectively affected student achievement and engagement. Additionally, research by ISTE (2012) identified instructional coaching as a more effective model for 21st century teachers, as it establishes a level of trust and mutual respect between the coach and educator. The collaborative trustworthy relationship translates into a more effective learning environment.

The role of technology coaches. Based on the ETIQ participants' response to support related questions and their open-ended responses to ideal needs for effective technology integration, it was concluded that teachers at the research schooled needed a job-embedded mentoring or coaching support system for technology integration practices. As discussed earlier in Section 1 Review of Literature (Tech Coaches Fulfill Training Support Roles), the use of technology specialists as coaches to support training has been an emerging practice in education. More recently through research—more specifically the Kansas Coaching Project and the Annenberg Institute work with instructional coaching has started to become a norm in technology rich schools. Different from a technology specialist filling a support role, the practice of instructional technology coaches disrupts the traditional training focus on the use of device itself and concentrates its focus on infusion of the technology tool into the existing curriculum in a personalized learning environment (McLeod, Bathon, & Richardson, 2011; Skoretz & Childress, 2013).

The concept of a technology coach breaks the contemporary mold of professional development by removing the lecture method and the practice of one-size-fits-all, single-session, large-group workshops that are often disconnected from the classroom environment (DeSantis, 2012; Koch, Heo, & Kush, 2012; Uslu & Bumen, 2012). Replacing the traditional model with ITCs; a contemporary prototype designed to provide a mentor, a non-judgmental educationalist, a non-supervisory evaluator of technology integration practices, and source of on-going training and support all focused on the individual educator's needs and curriculum (Berrett et al., 2012; Cifuentes, Maxwell, &

Bulu, 2011; Cheok & Wong, 2015; Green, 2013; Lim & Pannen, 2012). Application of the technology coaching practice also supports the educational philosophy that effective integration of technology is a developmental process that occurs over time at an individual educator's pace (Kereluik, Mishra, Fahnoe, & Terry, 2013).

Instructional coaching also establishes a practice of unending professional development (Tyron & Schwartz, 2012). This continuous approach creates a system of ongoing learning opportunities for teachers. The availability of multiple ongoing training options, often tiered on different skill levels, leads to the improvement of technology-related professional development (Berrett et al., 2012). Researchers have established that continuous professional development provides teachers with the training and support needed to master technology skills and acquire tech-related competency, meanwhile allowed time for adjustment of the individual teachers' beliefs regarding pedagogy and technology (Ryan & Bagley, 2015; Tryon & Schwartz, 2012; Sugar & van Tryon, 2014). Compared to onetime workshops, continual professional development has been judged more effective in supporting a teacher's ability to learn new teaching strategies and effect change in his or her teaching environment (Cifuentes et al., 2011). Additionally, as researchers have established (Cheok & Wong, 2015), to become comfortable in a new system or learning environment, it takes a significant amount of time and support. Instructional coaches are in the position and practice of providing that time and creating the customized support needed.

The role of a technology coach provides the one-to-one or small group custom support system with training tailored to educators' technology abilities and proficiencies

(An & Reigeluth, 2011; Chapman, 2012; Ertmer et al., 2012). A technology coach establishes a nonconfrontational, face-to-face environment where teachers can share their ideas and instructional best practices and learn from other professionals (Chapman, 2012; Tryon & Schwartz, 2012). A coach is an encourager who assists a teacher in becoming more confident, comfortable, and motivated to attempt new instructional technology strategies (Vanderburg & Stephens, 2010). Wang (2013) explained that in an academic setting, instructional coaches develop a teacher's abilities, skills, and talents in the specific topic of the coaching. A technology coach fosters a cooperative, non-threatening, professional learning community of educators and nurtures its development and growth through collaboration, modeling, practice, and reflection (Sugar & van Tryon, 2014). A technology coach models best practices of technology integration through demonstrations and co-teaching in the classroom (Gann, 2012; Knight, 2011; Sugar & van Tryon, 2014). A technology coach is a role model and leads by example through collaboration, teaching practices, and mutual respect.

Teachers who have worked with coaches in educational settings exhibited more confidence and a sense of empowerment with respect to their technology integration skills, decisions, and use in the classroom (Sugar & van Tyron, 2014). Harris and Hofer (2011) explained that through modeling of technology integration in content-specific areas, coaches have helped to shift the teacher's focus from *how to teach* to *what to teach with technology*. Through research, Cifuentes et al. (2011) revealed that teachers were deploying a wider menu of new technology in their classroom as a result of their technology related learning communities established through instructional coaching models.

Summary

It is well recognized that technology is the method and atmosphere necessary to engage learners across the curriculum (Sabzian et al., 2013). Researchers of technology integration have identified the use of technology needs to be connected to student learning, include hands-on use of technology in a variety of learning experiences, directly apply to the curriculum, and have support along with adequate resources (Schrum & Levin, 2013). Researchers Sadaf et al. (2012) determined that the use of technology in education has the potential to increase students' engagement with classmates as well as the content and subsequently enhance learning. But before the student engagement can be created, technology infusion into the curriculum must occur. For this to happen, educators must first (a) have clear direction and understanding of their school's technology plan, (b) subscribe to their school's technology initiatives and technology infusion philosophy, (c) be afforded opportunity for professional growth and development, and (d) be provided ongoing support in their infusion of technology in their teaching practices. Researchers have found successful technology coaching programs to provide both the specialized professional development and the continuous technology integration support system necessary for effective and sustainable technology learning environments (An & Reigeluth, 2011; Chapman, 2012; Gann, 2012; Knight, 2011; Smith, 2012; Sugar & van Tryon, 2014).

Project Description

Based on the results of the ETIQ survey, I concluded that, in general, CAA teachers wanted clarity, training, and support relating to the use of and strategies for integrating technology effectively and efficiently into their teaching practices. Based on educational research and published literature, through the implementation of an organized and realistic technology integration improvement plan, teachers' use of technology for educational purposes (i.e., planning, lesson creation, curriculum development, designing presentations, project based learning, flipped classrooms, cross-curriculum collaboration) should be improved; thus impacting student engagement and content learning. In addition, the findings indicated that a majority of CAA teachers wanted more technology-related professional development opportunities and preferred to have access to a qualified technology specialist as a means to create a collaborative professional partnership for personalized technology integration support.

Based on this insight, I developed a strategic technology integration improvement plan (TIPP). The three phases of the TIPP are (a) the development of a K12 Technology Standards Guide, (b) providing onsite professional development on school-provided devices, and (c) the introduction of instructional technology coaches. Appendix A of this report contains a fully deliverable presentation of the TIIP for the Director of CAA. The TIIP comprehensive presentation begins with an overview of the three-phase plan and its effect on the CAA learning community; (a) reduction of barriers (personal and institutional), (b) fulfilling of teachers' technology support requests, (c) expected impact on teachers' teaching practices with technology, and (d) expected impact on students with regards to technology use, engagement, and content learning. Next, the presentation presents each phase in order of implementation with clear details and supporting documentation. The support documents include professional development curriculum (31-hours of leveled interactive whiteboard training), schedule of courses (14-week semester cycle), technology standards (ISTE and grade level samples), and ITC program documents (role of ITC, job description, and ITC work schedule). The TIIP was designed to be implemented in three phases. For the remainder of this section, I will provide specific details on each phase including design, reasoning, target audience, and expected learning outcomes. Following the description of each phase I will address the implementation of the TIIP including the expected timetable, existing resources, potential barriers, and roles and responsibilities. In closing, I will address the evaluation scheme of this TIIP.

Phase 1 of the TIIP

Phase 1 focuses on the research site as a community with its organized approach to creating a framework for developing a set of expectations, directions for technology application, and identification of administrative support. Through the development and distribution of a comprehensive K12 Technology Standards Guide organized by grade level (TSG), the administration of the research school will be able to provide their educators with clear guidelines of what technology should be integrated at which grade level. The sharing of the TSG with the school community will not only provide clarity of the school's technology direction but also establish the administration's expectations of technology integration across the curriculum. Furthermore, by providing a TSG, it demonstrates the school leaderships' support for the integration of technology in their learning community. Kitchenham (2009) explained it is important that technology integration is a common goal that even school's administration shared.

Creation of content for K12 TSG. Based on identified elements of strategic planning and transparency in education, as depicted in the literature, I concluded content for the K12 TSG was best if created by a group of key stakeholders from the research school, with consideration of their school's curriculum, technology resources, and organizational structure. In addition, the stakeholders should align the TSG with the research recognized Student Technology Use Standards (formerly referred to as NETs) from the International Society of Technology Education (See Appendix A). While the adoption of an already established K12 TSG (also known in education as a technology scope and sequence) is an option, it is best practice for the school's technology leadership to create their school's TSG. As researchers explained involvement in development, sense of ownership, and self-identity are key factors to the success of programs and initiatives (Green & Cooper, 2012; McLeod, 2015; Newhouse, 2012; Smith; 2012). Examples of a first-grade and fifth-grade technology standard guide are included in Appendix A. I chose to provide a sample of two grade levels on different ends of the elementary division to demonstrate the structure of the guide as well as the variance in technology standards in relationship to the grade level. Each Technology Standards Guide is organized by technology concepts. Under each technology concept, specific actions or abilities relating to the technology concept are detailed. For each action or ability, a skill expectation is included on a 4-point scale; IS (introduce skills), DS (develop skills), MS (master skills), and IU (independent user). To ensure understanding of the coding and reduce confusion, a legend is included at the top of each page.

Target audience and purpose of Phase 1. The target audience of Phase 1 is the educational staff of the research site: classroom teachers, classroom aides, learning support educators, curriculum coordinators, librarians, and technology specialists. The general purpose of Phase 1 is to provide the learning community of the research school with clarity, direction, and expectations of the technology standards by grade level. The learning outcomes would be (a) an understanding of the scope and sequence of technology by grade level, (b) ideas of what integrated technology looks like in their current curriculum, and (c) what applications or programs can be used to achieve technology integration in their lessons. Additionally the teachers would have a document that clarifies what prior technology skill knowledge their students should have on a grade level basis.

Phase 2 of the TIIP

Phase 2 concentrates on the teacher-reported need for consistent and applicable onsite technology related professional development. Substantiated by identified elements of effective professional development and quality training as discussed in the literature, I determined content for the onsite technology training to be best focused on the technology tools, devices, and programs currently available at the research school. According to Berrett et al. (2012), training needs to focus on the effective and efficient use of the technology tools in one’s own teaching environment.

At the time of this project study, the research school had two large relatively new technology platforms: (a) interactive whiteboards and (b) virtual classroom portals from all courses offered in grades 6 to 12. Based on these two initiatives and their need for improvement (personal correspondences, CAA Director, September 2014; personal correspondences, Division Principal 1, CAA Division Principal 2, & CAA Division Principal 3, August 26, 2014) it would be reasonable to focus the training portion of TIIP (i.e., Phase 2) on one of these two topics. At the time of this study, the option of a local, qualified trainer for the virtual classroom program used by the research school did not exist. However, there was a local provider (EduPan) with bilingual certified instructors for certified training on the interactive whiteboards.

Providing certified training on interactive whiteboards. Implementation of Phase 2 would involve the hiring of EduPan's certified bilingual trainer to provide a series of leveled certificate training for educators at the research school on the integration practices and lesson development using the related software. The three levels of interactive whiteboard training being recommend and available from EduPan are basic, intermediate, and advanced levels. Included in Appendix A is a detailed breakdown of the 31 cumulative hours of interactive white board curriculum by 90-minute sessions across the three certification levels. The Saturday course curriculum covers 2.5 weekday sessions with extended application and practice due to the volume of topics covered in the longer sessions. The seven weekday session series and three Saturday session series each cumulate to 10.5 hours per level. The completion of 2 or 3 certificate levels would cumulate to 21 or 31 hours of professional development, respectively. For this 3-level curriculum, the lower level course would be a prerequisite for the course level above it. Under this curricular plan, teachers with previous interactive whiteboard skills may elect to enroll in the intermediate level without taking the basic course; however, they would be required to pass a basic skill proficiency practical exercise evaluated by the certified instructor.

Appendix A also contains the recommended 14-week interactive whiteboard training semester courses schedule. This 14-week schedule would provide opportunity for nine courses in interactive whiteboards; three courses at each level. This 14-week schedule aligns with CAA semester schedule and accounts for the restrictions on teacher's time at the start and end of the semesters. The course schedule is designed to provide flexibility for teacher schedules and other commitments, allow time between classes for practice of the skills learned, and offer options for different skill levels. The schedule is also designed to provide the opportunity for course graduates to proceed to the next level of training shortly after completion or take a break for application and practice, yet have the opportunity of the next level training during the same semester. According to Winslow et al., (2014) it is important to respect teachers' schedules and workload.

Twenty one hours of professional development. By the end of the 14-week window, there is a potential for about 33 teachers to have at minimum completed the Basic certification level. In addition, this 14-week schedule provides the opportunity for upward of 33 teachers to complete intermediate level and/or advanced level. For teachers who start at the intermediate level, completion of the advanced level course would ensure they were still able to obtain 21 hours of leveled interactive whiteboard professional development. The intent or aim of the leveled training would be to certify over half ($n > 55$) of classroom teachers with 21 hours of interactive whiteboard training by the end of the school year.

Based on literature and ETIQ findings of this study, additional recommendations under consideration in offering onsite, topic-specific training program include (a) factoring in barriers to attending, (b) issues of training participants' readiness for level of training, (c) frequency and repetition of training offered versus one or two times a school year, and (d) management of training class size, all of which were strongly reported in the ETIQ data as significant issues. The solutions to these data indicated issues are (a) school provided support such daycare, incentives to participate, and release time for technology studies, (b) establishment of pre-requisites for nonbasic level courses or completion of a skill competency exercise, (c) rotation of courses designed similar to the proposed schedule in Appendix A in an effort to ensure courses are offered more than once in a semester, and (d) enrollment limitations set to ensure smaller class sizes of 5 to 10 teachers, respectively.

Respecting teacher workload and schedules. It is important to note that although teachers desire and appreciate professional development and growth (Anthony, 2012), it is vital that the training being offered maximizes the benefits for educators while limiting the amount of inconvenience and workload (Winslow et al., 2014). In this respect, the 14-week proposal (See Appendix A) is designed to offer training:

- On different days of the week, including Saturday options for flexibility and convenience of the educator.
- If a session is missed for some reason (i.e. illness), the teacher has other session they can attend for makeup.
- Outside of the regular school day in order to not compete with teaching schedules or other school hour obligations.
- That does not use a teacher's valuable and limited planning time.
- That can be offered during the second semester to allow teacher's whose first semester schedules limited or prohibited their participation to be able

Classic professional development courses are typically offered by means of a one, two, or even three day workshop series often comprising of six to seven hour of training daily (i.e., 21 hours across three days), research relating to technology related professional development has indicated this is not best practice (Uslu & Bumen, 2012). Additionally, the large group, one-size-fits-all, lecture style training for technology integration practices does not accommodate for differentiated skill level, does not provide opportunity for practice and reflection, and can be mentally overloading and draining on the learner thus limiting the information learned (Hoffman, 2013; Uslu & Bumen, 2012; West, 2011). Therefore, it is my recommendation that the proposed interactive whiteboard courses be broken into shorter sessions (i.e. 90 minutes), offered in small group settings (i.e. minimum five maximum 12) in a classroom environment as detailed in the TIIP (see Appendix A).

Constructivist approach to teacher training. Furthermore, the course should be delivered using a constructivist approach for which the trainer models an exercise followed by the teachers, as students, mimicking the instructor and practicing what was modeled. This design allows for teachers, as students, to create practical and applicable work for their grade level and curriculum through the learning process. The shorter sessions allow for focus and concentration on fewer topics, rather than overwhelming participants with too much new information. The time between sessions allows for application and practice in the teachers' classrooms and time for reflection or questions before returning to class (Banoglu, 2011; Ryan & Bagley, 2015). The time learning in the shorter (i.e., 90 min on weekdays and 3.5 hours on Saturdays) session adds up to 10.5 hours per course. Completion of two or three leveled courses would calculate to 21 to 31.5 hours, respectively. In comparison to traditional two- or three-day workshops, completing two of the three interactive whiteboard courses would fulfill the same time requirement, yet yield more beneficial learning for long-term sustainability across the longer calendar period or number of session (Teo, 2013; Uslu & Bumen, 2012; West, 2011).

Target audience and purpose of Phase 2. The target audience of Phase 2 is the teacher population of the research site and could be extended to include the teaching assistants from elementary classrooms and technology specialists from all three divisions. The general purpose of Phase 2 is to provide technology-focused training that CAA educators are requesting on an essential technology device and associated program provided by the school. The learning outcomes would be (a) boosted confidence in using the interactive whiteboard, (b) enhancement of ideas and practical application for their curriculum to engage learners through use of the interactive whiteboard, and (c) an increased interest and ability to use their interactive whiteboard. Additionally the teachers would receive 10 clock hours of professional development and a skill leveled certificate for each class completed; indicating a total of 21 to 31 hours with completion of two or three courses, respectively.

Phase 3 of the TIIP

Phase 3 focuses on the necessity of continuous individualized technology mentoring, coaching, and support for teachers in their learning environments. As identified in literature, I believe the best solution for answering this request from their educators is through the implementation of instructional technology coaches (ITC) across the curriculum and in each of the different divisions. Researchers have identified ITCs as key factors in building technology related professional learning communities (Beglau et al., 2011; Frankenberg, Siegel-Hawley, & Wang, 2011) and providing continuous job-embedded technology integration support for educators through nonsupervisory mentoring, modeling, and coaching (Fitzpatrick, 2012; Sugar & van Tryon, 2014; Wang, 2013). It is my recommendation that the ITCs follow the instructional coaching model (ICM) designed by Knight and the Kansas Coaching Project as detailed in Figure S3-1 and explained in the review of professional literature specifically related to the project.

ITC program concept documents. Appendix A includes an introduction to ITC at CAA, an ITC program document, a job description for hiring ITC, and a weekly ITC workload schedule. The ITC program document not only explains the ITC concept but also both the responsibilities of and services offered by an ITC specific to CAA's technology philosophy, devices, and programs. The ITC program document also includes statements addressing the impact ITC expect to have on teachers and students. The job description is designed to provide the CAA administration with a ready-to-use recruiting document as well as clarification on the responsibilities and expectations of an ITC. The job description was custom designed for CAA based on existing ITC job descriptions available freely online from various large public school districts. Lastly, in Appendix A is a workload schedule to illustrate the ability of one ITC to engage with upward of 18 teachers individually for 30 to 45 min weekly. In addition the week's schedule allocates time for the ITC to support teachers through four – 45-minute Ed Tech Helpdesk shifts and support the interactive all whiteboard professional development sessions from Phase 2 scheduled, when applicable. Lastly the design of the week long schedules provides time for the ITC 4-hours weekly for research, 2 – 30 minute daily preparation window, and 2–30 minute long check-in meetings with the Technology Integration Coordinator.

For the research school, it is recommended that initially one or two current K12 technology specialists fill the role of ITCs for their appropriate division for the pilot of ITCs. Then, based on the success and feedback from this ITC pilot, the research site would recruit and hire one to two ITCs per division; elementary, middle, and high school, over two school years. The hiring of three ITCs in the first full year would yield approximately 1:48, 1:26, and 1:36 coach-teacher ratio by division, respectively. The hiring of three additional ITCs, the following school year would improve the ratio to approximately 1:24, 1:13, and 1:18 coach-teacher ratio by division, respectively. It is important to note that the ITCs work under an agreement of a nonsupervisory, collaborative relationship and should be specially trained for technology integration and coaching as well as possess the appropriate grade-level teaching background or experience (Harris & Hofer, 2011; Sugar & van Tyron, 2014; Wang, 2013). By the end of the third full school year, the ITC program ideal would have six fulltime instructional technology coaches working under the direction of the Educational Technology Department and supervised by Technology Integration Coordinator.

Target audience and purpose of Phase 3. The target audience of Phase 3 is the classroom teacher population of the research site. The general purpose of Phase 3 is to provide the teachers with the customizable individual onsite mentoring and coaching they are reporting a need and desire for in their ETIQ responses. The learning outcomes would be (a) progressive integration of technology related activities in their curriculum, (b) empowerment as technology-savvy teachers with skills and forward-thinking for building lesson designed to engage student learning, and (c) confidence in themselves to use and apply technology in their teaching practices. Additionally, the teachers would have access to a nonsupervisory technology specialist for encouragement, support, collaboration, and feedback.

Implementation

The technology integration improvement plan (TIIP) is designed for implementation at the school at which the project study occurred. There are five levels of potential resources and existing support: (a) existing technology equipment, (b) IT and Ed Tech teams, (c) K12 technology specialists, (d) fiscal resources, and (e) administrative team and school calendar. There are three potential barriers to the implementation of the recommend TIIP: (a) availability of funds due to budgetary restraints, (b) international location challenges, and (c) international school budgetary and educator hiring cycles. The recommended timeline for the implementation of the TIPP would be a staggered roll out over the coming school year (SY 2015-16) with the expectation of using the following two school years (SY 2016-17 & SY 2017-18) to expand Stage 2's technology course offerings and strength Stage 3 with the hiring of fulltime ITCs. The roles and responsibilities for the implementation of the TIIP would involve the school's teachers and key staff positions as well as the project study's researcher.

Potential Resources and Existing Supports

There are five layers of potential resources and existing support for the implementation of the TIIP: (a) technology equipment available at CAA, (b) the Educational Technology Department and Informational Technology team, (c) K12 Technology Specialists team, (d) financial resources of CAA for educational technology, and (e) CAA administrative leadership and annual school calendar. In this subsection I will discuss each layer in detail. I also explain how each layer impacts the success of the TIIP implementation.

The primary layer of existing support and potential resources for the proposed TIIP is the extensive collection of technology devices and equipment already installed in classrooms and distributed to teachers at the research site. The devices installed include document cameras in 50% of the classroom, interactive whiteboard installed in nearly 80% of all classrooms, and ceiling mounted projectors in 100% of classrooms from Pre-

Kinder to 12th Grade. Every teacher and educational support position are issued a laptop for academic and personal use for the duration of their employment at the research school. The school also distributes more than 265 iPads to educators individually, on mobile carts within each division, and classroom sets of 4 throughout the elementary division. The Internet, high-speed bandwidth, and numerous access points ensure the campus is 100% Wi-Fi accessible and that all classrooms, workstations, and offices have at least one Ethernet cable junction box. In addition, teachers have access to checkout other technology devices such as digital and video cameras, nooks, GPS devices, robotics, and assorted adapters through their respective library or the Educational Technology (Ed Tech) Department. Access to this collection of equipment and the Internet support the implementation of technology integration campus wide.

The second layer of existing support comes from the existence of the established Ed Tech department and the Informational Technology (IT) team. The IT team manages the school's email system, Internet along with their access points, the firewall, and schoolwide server. Meanwhile, the Ed Tech department manages all school software programs, educational subscriptions, and electronic textbook programs in addition to being the systems administrator for both the student database program and the school's virtual classroom portal. Ed Tech also organizes, facilitates, and implements all onsite technology related training courses, offsite technology related professional development, and technology guest instructors. Both departments work collaboratively to support the ability of teachers, staff members, and students at the research school to use and integrate technology daily.

The third layer of existing support comes from the K12 technology specialist team under the leadership of the Technology Integration Coordinator. The five technology teachers assigned to elementary, middle school, and high school divisions are trained and skilled to be technology teachers, mentors, and coaches. The two media specialists assigned to the two divisional libraries are capable of helping to support technology initiatives and integration practices. The Technology Integration Coordinator is a highly qualified experienced technology integration teacher and experienced professional development instructor for multiple technology devices and programs. The primary focus of the K12 technology specialist team is to facilitate the best practice of technology integration and support fellow educators with technology proficiencies.

The fiscal resources are the fourth layer of existing resources. The research school's board of directors annually approves a technology budget (capital and operational) in excess of $500K USD including funds for technology-related training and professional development. In addition to the technology-allocated professional development funds, there are professional development funds available through the school's curriculum director that can be requested for new platform initiatives on a case-by-case basis. These funds, particularly the portion allocated for training and professional development, are beneficial resources of support for the improvements of technology integration at the research school.

The fifth and final layer of existing resources and support comes from the leadership team and annual school calendar combined. The 15-person administrative leadership team includes two curriculum coordinators, professional development coordinator, and a student services coordinator that are all in the position of leadership to support the rollout of this proposed technology integration improvement platform. The annual school calendar has time allocated at the start of each semester for teacher in-service training. There is additional in-service time also reserved for technology training of all newly hired staff each July before the start of the new school year. Lastly, every Wednesday students are dismissed at noon to provide administrators, teachers, support staff, and time for meetings, guest speakers, professional learning communities, department meetings, and training windows without requiring them to stay past normal school work hours.

Potential Barriers

There are three potential barriers to the implementation of the TIIP: (a) budgetary restrictions, (b) availability of replacement equipment and maintenance, and (c) typical international hiring and school's budgetary approval cycle. In this subsection I will address each potential barrier and the relating issues or causes. I also discuss possible solutions for each of the potential barriers.

First there is the potential, due to budgetary restrictions, that funds may not be available as needed. The research school is a self-supporting, private, international school that relies on annual tuition and students' one-time capital contribution to maintain operation and purchase supplies annually. While the annual technology portion of the school's budget is substantial and flexible to an extent in its application, there are guidelines or restrictions regarding budgetary categories: operational versus capital, memberships versus software, divisional assignment. Therefore there is the potential the money needed for certain aspects of the proposed platform may not be available.

Secondly, although funds are allocated for replacement and maintenance of technology equipment, the location of the research school could potentially be a barrier to continued technology implementation. The study site's international location can create issues with access to devices locally, import issues, and qualified technology-skilled labor. Although there are technology stores and suppliers available, selection can be limited, prices are 25% to 50% higher than in the United States, and equipment is often labeled in Spanish (i.e., Spanish keyboards). One cannot easily run out to a Best Buy, Costco, Office Depot, or Super Store to purchase an emergency replacement device or product in bulk volume. There are no overnight or two-day shipping options from online suppliers either. Equipment can be imported, but incurs a shipping cost and often an import fee as well as up to a month delay for customs. Additionally, finding skilled, qualified maintenance for technology equipment can also be challenging in the research site's country. There have been incidents in which maintenance has done more damage to a device, cost was more than replacing the equipment, or repairs took in excess of 2 months (discussions with CAA IT Manager, 2013). Knowing of these issues, the research site makes the effort to order extra of essential devices, strives to keep replacement stock on hand, and utilizes travels to the United States by administrators to bring back emergency supplies when possible and appropriate. The limitations of the international location can be a potential to smooth implementation of the proposed plan.

Third and lastly, the research school's budgetary cycle and the international school educator hiring cycle create a potential barrier to implementation of the recommended plan. The budget cycle (preparation, evaluation, and approval) for the coming school year is from November to February of the prior school year, meaning the approval for hiring 2015-16 staff is awarded by February of 2015. The cycle for hiring international educators for the coming academic school year is generally from December to April of the prior academic year; meaning teachers hired for the 2015-16 academic school year are typically hired between December 2014 and April 2015. This practice of early hiring would mean the study site would need to hire ITCs for the 2015-16 school year, the budget approval would have needed to be done by January 2015 and ITCs hired by April 2015. A solution to this potential barrier would be to adjust the roles of two or three of the currently employed technology specialists, for a portion of the 2015-16 school year, to be instructional coaches under the guidance of the Technology Integration Coordinator.

Proposal for Implementation and Timetable

Overall, the TIIP was designed to be implemented in three phases across one to three academic school years for full implementation of all three phases. Although unique in design and technically able to be implemented individually, each phase has the potential to impact the subsequent phase as to its outcomes and timetables. The implementation design of the TIIP was focused on a staggered role out with gradually increasing levels of complexity and size. The implementation timetable also allows CAA to experience smaller more immediate impacts of the initial phases, while the full implementation timetable requires a longer timeframe to feel the more substantial and long-term impacts. In the remainder of this section, I address the proposed timetable of implementing each of the three phases of the TIIP in detail.

Phase 1 would be best implemented with the start of the new academic year during the annual In-Service days (i.e., first week of August). This execution would include the introduction of the K12 Technology Standards Guide by grade level along with a clear directive from each divisional principal as to their specific expectations with regards to the implementation of technology. Phase 2 would be best implemented shortly after Phase 1 but after the first month of school has concluded. The first month at the research site is full of back to school activities, parent nights, and establishing classroom practices. Teachers tend to not have time or energy in the first 4 weeks to attend training. To best support the new technology standards guide as well as directives from principals, training should start by September 2015 and conclude for the first semester by the start of December. The first two weeks of December at the research site is used for summative assessments in elementary grades, semester final exams in middle and high school, and preparing report cards schoolwide. Additional technology training courses should also be offered in a similar fashion during the second semester. Phase 3 would best be implemented in the second semester of the school year in conjunction with additional technology training courses from Phase 2 and in support of teachers who completed training during the first semester. Simultaneously, from November 2015 to April 2016, the budget approval, recruitment, and hiring of additional instructional technology coaches for the SY 2016-17 would need to happen. Evaluation of the TIIP, including specific aspects of the process and training courses offered, would be conducted at appropriate times during and at the conclusion of each phase.

Roles and Responsibilities of Student and Others

Complete implementation of the TIIP would involve numerous members of the research school to include, but not be limited to, administrators, cost center managers, teachers, technology specialists, and members of both the IT team and Ed Tech department. Initially the TIPP would need to be presented to the Educational Administration Team of the research site during one of their "readiness plan" meetings regarding the coming school year for their general consensus and overall support. The primary administrative lead for the TIIP would be the school's Technology Integration Coordinator (TIC). The TIC oversees the overall integration of technology and all technology related training as well as curriculum alignment in cooperation with Curriculum Director at the research school.

The K12 Technology Specialist team would be instrumental in the creation and implementation of K12 Technology Standards Guide of Phase 1. The division principals would also be involved in Phase 1 with the responsibility for leadership and guidance with clarity as to the expectation of teachers to integrate technology into their curriculum. Phase 2 would be mainly handled by the TIC and the Ed Tech department. The IT Team would be involved with supporting the implementation of both Phase 2 and Phase 3. Phase 3 would be divided into two substages and require two groups of people. The first substage would relate to the budget approval, recruitment, and hiring of qualified ICTs. The people responsible for accomplishing Substage 1 would include Cost Center

Managers; human resources director, financial controller, and purchasing manager, along with the TIC and Curriculum Director. The second substage would relate to the introduction and implementation of instructional technology coaches working directly with educators. The individuals responsible for accomplishing Substage 2 of Phase 3 would include teachers, educational support staff, TIC, and ICTs. Additionally, division principals and current K12 technology specialists might be involved with Substage 2 of Phase 3 regarding the assignment of coaching responsibilities to a few of the technology specialists if ICTs were not able to be hired for the initial implementation year. The teachers and educational staff of the research school would be involved in all three phases and instrumental in the successful implementation of the TIIP.

Project Evaluation

It is well acknowledged that an evaluation process is used as a means for understanding how something is going or went (Creswell, 2012; Mertens, 2014). As Lodico et al. (2010) explained the value in completing a project evaluation is to identify and understand the project's successes, failures, and areas of improvement. According to Kuo et al. (2012), "based on the evaluation goal, criteria should be identified before evaluation would be conducted" (p. 250). For these reasons, I will use pre- and postsurveys to first establish-participants' starting points and secondly to collect outcome details from the training programs offered and work time with ITCs. Kuo et al. (2012) further explained that there is a need to create a system to "pin point effects of integrating emerging technology" (p. 250) into educational curriculum so that they may expose the impact and other vital information. I believe through the use of pre- and postsurveys a system of evaluation can be established to “pin point” the effects of my TIIP. If needed follow up interviews will be held with educators, administrators, and ITCs.

For this study, I identified three short-term goals and one long-term goal. I concluded for the project evaluation using a goal-based approach was fitting. Gathered from multiple sources, English, Cummings, and Straton (2002) defined goal-based evaluation as assessment concentrated “on obtaining information on the extent to which the objectives of the program have been attained. It assumes that program goals represent the most important criteria in judging the worth of the program” (p. 127). The three immediate goals of my project are to a) establish a school wide integration plan with clear expectations, identify guidelines, and support from administration that sustains high quality technology integration practices across the curriculum, (b) to provide teachers at the study site with effective and relevant technology-related integration training, and (c) to provide onsite customized technology integration support. Specific outcomes resulting from improved technology related training efforts, ongoing customized support, and the establishment of an organized technology integration plan would include evidence of (a) enhanced understanding by teachers, staff, and administrators of the expectations and direction of technology integration at the research school (b) increased teacher confidence with and integration of technology, and (c) empowered teachers as technology competent leaders.

As my primary short-term goal of the TIIP is to ensure the school’s teachers receive the best technology related integration training and onsite customized support they are requesting, my primary evaluation plan will address whether or not the school’s educators found the training and ITCs informative, useful, and supportive of their integrating technology in their curriculum and classroom practices. The information and data collected before and after training will help identify reduction of barriers, technological skill growth, and increased technology integration through self-reporting. The data will aid in decision making and planning for future training options. This evaluation process will be best achieved through the use of pre- and postevaluation surveys per training course attended by teachers.

As my secondary short-term goal of the TIIP is to institute a schoolwide integration plan with clear expectations, identified guidelines, and effective leadership that sustains high quality technology integration practices across the curriculum, my secondary evaluation plan will focus on the overall climate and use of technology by the school's teachers, educational staff, and administration. The data collected will help identify users' understanding of guidelines and expectations, their feeling of support from their administrators and school's technology departments, and their change in their use of technology. The data will aid in decision making and planning for possible technology adjustments and future technology initiatives. This evaluation process will be best achieved through the use of a technology climate survey completed three times across the school year: start of the school year (August), mid-school year (January), and end of the school year (June). Achieving the short-term goals will have an immediate positive impact on the stakeholders (i.e., the current teachers and students of the research school) as evident through student engagement in lessons and content learning as a result of the improved application of technology on teach practices and the increased levels of integration in the learning environments.

My one long-term goal of my TIIP is to establish a team of ITCs at the research school in an effort to create a culture and community of onsite long term technology related support, modeling, and mentorship. To evaluate this long-term goal, the use of self-reflection and journaling will be most beneficial in recoding the impact, viewpoints, and effects of instructional coaches on the integration of technology and continuous support the school educators. However, the uses of pre- and postsurveys along with reflection interviews would be used initially to gauge immediate and palpable impact from work time with ITCs. Yet, the actual long term or sustainable impact of ITCs on technology integration practices will require a longer evaluation process across two to three school years depending on the timelines for the successful implementation of ITCs across the curriculum. Achievement of the long-term goal will also have a beneficial impact on the stakeholder with the longevity and sustainability of quality technology integration practices.

Implications Including Social Change

Local Community

This project addresses the needs of the research school's educators by addressing deficiencies in clarity, direction, and expectations regarding technology integration practices. Additionally, this project helps to improve technology integration skills of the educators at the research site and provide continuous technology integration support. The first stage of the TIIP should help address the problem of the teachers' uncertainty of expectations for integrating technology and a feeling of lack of support from their administration. The second stage through the structured onsite technology-training program should help reduce or remove the barriers identified by the respondents and increase the teachers’ technology confidence, skills, and integration practices. The third stage of providing ITCs should help provide teachers’ with onsite continuous support, modeling, and mentoring for best practices of technology integration. Through the education of technology integration practices, training with different programs and devices, mentoring and coaching, and learning about technological advancements in education, teachers should become more effective and efficient in their abilities to apply technology to their teaching practices and integration in their curriculum (Gumbo et al., 2012; Ritzhaupt et al., 2012; Wang, 2013).

According to Hechanova and Cementina-Olpoc (2013), teachers are at the forefront of change on the educational horizon; only through defined goals and individual efforts will the changes be achieved. Yet in order for change to occur in a local community, change must first occur at the root of the problem: education of technology integration best practices. The results from this project should motivate the majority of the school’s educators to participate in technology related training and increase their level of integrating technology in their teaching environments. From the initial year of implementation of the TIIP, the administration of the research school will have established the importance of and their support for integration of technology in classroom instruction. Thus, social change will occur in the following ways: (a) the school community will possess a clearer understanding of the expectations and application of technology integration practices for their school, (b) teachers' technological skills and confidence should improve, (c) teachers' level of integrating technology in their curriculum should increase, (d) students' engagement in their learning environment should increase from teachers' increased use of technology, and (e) students' content learning should increase from their increased engagement in their learning environment.

Far-Reaching

The technology integration improvement plan (TIIP) that I have designed is straightforward and not complicated to implement. Any team of capable and willing educational leaders could follow the TIIP and apply it to their school's technology integration deficiencies. The impact of teachers on their students is most important aspect of their job, and administrators need to realize that in order for their teachers to be successful at implementing technology for the benefit of their students, they need clear direction, unrelenting support, and continuous training. This TIIP is one way to ensure teachers are provided these critical necessities for the benefit of their students.

In the larger scheme, the findings of this study indicated what numerous researchers have already discovered: educators need less barriers to integration, administrative guidance and support, leveled technology integration training, and continuous specialized support with integrating technology practices for the classroom. As researchers have also established, schools and educators must keep current with technological advancements and build collaborative supportive learning environments for their educational community (Franciosi, 2012; Jenkin, 2009; Project Tomorrow, 2012; Ritzhaupt et al., 2012).

Finally, the TIIP provides the local international educational community of the research school's host country, as well as any other large international school, recommendations on how to develop a logical plan that will increase their schools technology integration practices and become more technologically integrated through training and use of instructional coaches. Although my project is small and focused on one specific international school community, the data and conclusions categorically show that teachers need to constantly be learning and practicing new technology skills, improving in technology proficiency, and participating in collaborative technologically-rich learning environments. It is my expectation that this project will encourage other researchers to investigate these recommendations, ultimately adding to the research base with more data, results, and conclusions about technology integration plans, onsite training, instruction technology coaches, and their impact technology integration practices in K12 classrooms.

Conclusion

The research school from this project study has invested a large amount of financial capital and operational expenses as well as provided their teachers with extensive technology resources in an effort to establish/create a quality of level of technology integration across the curriculum. Yet the level of integration is not to a satisfactory level and the teachers are reporting a collection of barriers impacting their success and progress. By providing the focus school with my technology integration improvement plan (TIIP) from my project study, I will be providing them with an effective and efficient plan aimed at improving their teachers' technological skills and confidence, providing clarity and direction of the school technology scope, developing a collaborative structured support system, and creating sustainable and increasing technology integration at the classroom level. In particular, the school's administration and Technology Integration Coordinator may use the feedback and information they collect from the evaluation process of the TIIP stages to improve upon the plan and guide future technology implementations or initiatives.

The TIIP presented in this section was based on the conclusions drawn from the ETIQ data collected in Section 2 and relevant current research as discussed. The intent of the TIIP is to improve teacher use of technology in their instructional practices to engage learners as well as promote social change through the use of best practices for integration of educational technology. The literature review I conducted and presented provided me with a deeper comprehensive and solid understanding of the elements of effective technology integration practices, relevant educational models, the value of professional development, and technology related professional learning communities—information which I used in conjunction with the results from the ETIQ to develop my technology integration improvement plan. The implementation of the TIIP is expected to take one to three years for full implementation depending on the extent of the development of the ITC program at the research site. I have identified two primary goals and one long-term goal for the project. I have established plans to evaluate the three stages of the TIIP using pre- and postsurveys to gauge acquisition of skills and increased levels of technology integration as well as goal-based evaluation for the overall impact of the TIIP. Next in Section 4, I will reflect and discuss the overall project and conclusions relating to strengths, limitations, and analysis. Lastly in Section 4, I will address directions for future research on technology integration, training, support, and ITCs.

Section 4: Reflections and Conclusions

Newbill and Baum (2013) expressed the significance of how technology is revolutionizing the world and our daily interactions. They further discussed the value and importance of students being capable of using technology. Franciosi (2012) explained how today's schools are in a technology cultured society and need to be flexible and adaptable to the ever changing technology-enriched world. However, in order to facilitate 21st century technology integration practices, educators need to grow professionally and learn about current technology related pedagogy (McLeod et al., 2011; Sadaf et al., 2012; Yeung, Lin, Tay, Hui, & Low, 2014). Through technology-related professional development, teachers have been able to acquire technology skills (Castle & McGuire, 2010; Ertmer et al. 2012), build their technological confidence (Peterson & Palmer, 2011), and increase their use of technology in their curriculum and teaching practices (Glazer et al, 2009; Gumbo et al., 2012; Ritzhaupt et al., 2012; Uslu & Bumen, 2012).

With this knowledge and understanding of how learning technology skills and an improvement in confidence affects teachers' in their ability to use technology effectively to impact their students' engagement in learning and content acquisition, I explored a logical and reasonable approach to the improvement of technology integration practices through effective leadership with administrative support, structured leveled training, and job-embedded continuous customized support. Results of my study indicated that teachers sincerely wanted to integrate technology in their teaching practices but lacked clear directions, expectations, and support from their administration, had insufficient leveled training opportunities, and needed continuous technology support onsite for their specific needs. Based on these conclusions, I determined that an improvement plan that tackled decreasing or eliminating reported barriers and provided solutions to the teachers' requests for training and support was a logical route to improve technology-infused instructional practices, and ultimately influence student engagement and content learning.

In this section, I examine strengths and limitations of my capstone project, thus addressing the local problem of this study and potential social change alignment with Walden University's mission. I also discuss alternative solutions for addressing the problem outside the scope of the project I presented. Next I provide a comprehensive analysis of what I learned from conducting this study pertaining to the scholarly process including project development and evaluation, leadership and change, and myself as a scholar and researcher. I also present my overall reflection on the significance of my research as well as a review of implications, applications, and directions for future research. I concluded this section with a summary of the key points of my study and render my conclusions.

Project Strengths

The overall strength of my project is found in the alignment of my project's design with components described in the literature for establishing effective and efficient technology integration practices in education. I used these components as the theoretical framework and for the pedagogical development of the TIIP's three stages. The key topics in literature were (a) technology integration needs and influences, (b) the power of professional development, and (c) the impact of instructional coaching. The other primary strength of my project is its development in response to the results of my survey conducted at the research school. In particular, I used the data collected, their analysis, and the conclusions drawn to identify the specific deficiencies, strengths, and needs of the educators at the research school, in conjunction with elements identified in literature, as a guide to creating a logical, comprehensive, and applicable improvement plan.

Application of the Technology Integration Literature in the TIIP

Harris and Sass (2011), Hsu (2010), and Iscioglu (2011) all suggested that teachers are a key factor in the success or failure of technology initiatives. Overbay et al. (2011) and Lin, Wang, and Lin (2012) supported fellow researchers regarding valuing teachers' mindsets and cooperation with their reports of the importance of obtaining teacher's buy-in to the technology plan, initiatives, and practices. Sipilä (2011) and DeSantis (2012) reiterated the importance of recognizing teachers' willingness to support and subscribe to a school's technology integration philosophy. Teclehaimanot, Mentzer, and Hickman (2011) reported that a teacher's lack of confidence and limited knowledge negatively affected a teacher's integration and support technology practices. Thus, I discussed the value of obtaining teacher's interests, buy-in, and willingness to participating in and support technology initiatives.

Ramirez (2011) indicated that continuous support and King et al. (2014) explained that job-embedded support were essential components of integrating technology into learning practices. Ritzhaupt et al. (2012) as well as Boud and Hager (2011) explained the value and necessity of application and practice for educations with their acquisition of new technology skills and competencies, respectively. Uslu and Bumen's (2012) claim that technology integration did not occur overnight added weight to fellow researchers' statements regarding the importance of time, repetition, and unlimited support. I discussed the value of significant support and ample time during training for educators to apply, practice, and reflect on what they have learned as well as return to the next class with questions, comments, and requests for support.

Dawson (2012) indicated that students' use of technology in education is associated with the level of use by their teachers. The more students see their teachers model and employ technology, the more students use technology in the educational program (Darling-Hammond, 2010). Through the application of technology in the classroom practices, Latham and Carr (2012) suggested that student engagement is increased and thus content learning is also increased. Aldunate and Nussbaum (2013) explained that educators' use of technology is dependent on their confidence and competencies with regards to that technology. It was also reported in literature that providing access to or simply providing the physical devices did not constitute a cure-all to technology barriers as much as training and support (Hsu, 2013; Kusano et al. 2013; Richardson, 2013). Consequently, I reviewed the importance of training and support for educators in order to acquire the technological skills and confidence in order to use technology effective and efficiently in their curriculum, which would lead to increased student use of technology and increased engagement in learning and ultimately content knowledge.

Application of the Professional Development Literature in the TIIP

Professional development is a key component in the successful integration of technology in learning environments because it provides opportunity for teachers to acquire technological skills (Ertmer et al. 2012), builds teachers' confidence using technology (Peterson & Palmer, 2011), and promotes using technology as a tool to improve student engagement (Kusano et al., 2013). Facilitators of professional development can provide educators with technology integration competency by providing knowledge and application of technology devices and programs (An & Reigeluth, 2011; Harris & Sass, 2011) and by providing ideas and suggestions for integrating these devices as tools into their existing curriculum (Potter & Rockinson-Szapkiw, 2012). Additionally, technology integration professional development is a primary means of assisting teachers in understanding and acquiring methods of using technology to improve their curriculum and student engagement (Anthony, 2012; Hsu, 2013). I addressed the importance of training and support for educators in an effort to acquire the technology skills and confidence to use technology effectively and efficiently in their curriculum. The acquisitions and application of these skills have to the potential to lead to increased student use of technology and amplification of engagement in learning, ultimately facilitating content knowledge.

Application of the Instructional Coaching Literature in the TIIP

Instructional coaching is an essential component in-providing both mentoring and modeling for successful integration of technology as well as onsite continuous support of educators using technology in learning environments because it provides opportunity for teachers to collaborate with technology knowledgably professionals (Wang, 2013), observe and practice technology integrations lessons (Knight, 2011; Sugar & van Tryon, 2014), and promotes using technology in a nonsupervisory, nonjudgmental supportive environment (Chapman, 2012; Slagter van Tryon & Schwartz, 2012). An and Reigeluth (2011) claimed that general training, workshops, and professional development currently in practice is too general and generic as well as basic skill leveled, which in turn does not provide quality training for educators. King et al. (2014) suggested that through instructional coaching, teachers are provided continuous improvement opportunities that in turn improve teaching practices. Instructional coaching is a preferred and popular form of job-embedded training and support of educators (Tryon & Schwartz, 2012). The practice and philosophy of instructional coaching is common practice in literacy and mathematics (Kruse & Zimmerman, 2012; Obara, 2010) and would be applicable to technology integration practices in similar fashion (Plair, 2008). Thus, I discussed the value of instructional coaching for technology as a means of support for educators' learning and use of technology in their teaching practices and learning communities.

Limitations

The improvement plan I developed for my study project has limitations. For example, I assumed that participants would provide honest responses on the survey. However, it is possible that survey respondents' fears of appearing incompetent or incapable with using technology or reflecting poorly on the school they represent may have led to inflated responses that could generate inaccurate data. It is also possible that participants felt obligated to report more favorable use of technology because they knew I was a colleague responsible for coordinating technology at the research site. To limit the potential of these conditions, during participant recruitment and data collection, I recommended to the respondents that honest responses were the best means of providing accurate data to help identify real/accurate issues for improvement. Additionally, I attempted to make clear to all potential respondents that this study was outside the scope of my job at the research site and had no impact on my employment or theirs. Lastly, I strongly reminded the invited participants that the survey was completely anonymous and submissions were untraceable.

My project's improvement plan was also limited by the size of the available sample (N = 62) and the international location of my research site. Although small sample sizes can be helpful when a researcher aims to collect detailed information about a phenomenon, a researcher's ability to generalize data can be limited by the smallness of the sample size. The unique international setting of my research site with its ethnic diversity, language variances, hiring practices and restrictions, and excessive financial resource are factors that limit the generalizability of my findings and conclusions. Therefore, school administrators of other schools will not be able to generalize the results from this specific school's findings to other populations if, for instance, the board of directors or school's direct chose to share the survey results with the international schools, regionally or worldwide. However, results from this project study can provide insight that may work as a launching platform for other schools in implementing their own investigation of technology integration barriers and educator technology needs for their particular learning communities.

Alternative Solutions

The research school has invested a considerable amount of money on technology devices and programming in an attempt to support their teachers' efforts to integrate technology into their curriculum. As an alternative solution to the teacher-reported barriers and support requests, I focused my recommendation for improving technology integration on the original problem of this study (low levels of integrating technology across the curriculum) on determining how to best use the existing technology staff and existing teachers' technology skills to create an alternative plan to potentially improve teachers' skills and confidence with applying technology to their lessons. The first alternative solution would be to seek an online professional development program platform focused on creating long-term sustainable technology integration skills and/or a virtual coaching program provided by the research school that teachers could self-select to participate for training or support. The second alternative solution I would suggest would be to determine if there are any current staff members who are capable of becoming technology mentors or members of a collegial technology support team that could provide ideas, techniques, and examples of ways teachers can improve their technology skills.

Scholarship

Throughout the journey of completing my capstone project, I have grown as a scholar in multiple areas. By conducting my research, I not only learned that in general the research process is challenging and time consuming but also rewarding and fulfilling in the acquisition of new ideas and approaches, hearing/learning different points-of-view, and an enhancement of prior knowledge. I also learned that the research process is fluid by nature. As I read different articles and sought additional information-from each new source, my understanding was affected by the new information of different viewpoints, more current studies, conflicting approaches, and the constantly advancing world of technology. The newness of technology in education also posed some challenges as there were at times gaps in the research and limits to generalizability of results due to research limitations and individual research sites and populations.

I also learned that the concept of correlation and interdependence applies to the data analysis process and drawing of conclusions. In the data analysis process, there were times it was challenging to identify which factors potentially impacted another factors or which factor occurred first in different scenarios. The drawing of conclusions required a nonbiased approach and nonsubjective viewpoint to identify the appropriate trends and accurate inference to the reported data. I also learned the value of using scholarly works and peer-reviewed articles to support my findings and conclusions. The experience overall was a complex and challenging yet rewarding journey, in which I have gained increased respect for educational researchers and an appreciation for their contribution to improving the understanding and knowledge base of integrated educational technology. I believe through the completion on my research, the collection of my survey, and creation of my technology integration improvement plan, I have made a small, but genuine, contribution to furthering the integration of technology in education.

Project Development and Evaluation

I have determined from my experience that planning and designing a project, in my case, a goal-based technology improvement plan, is a complex process. I learned that planning and developing a three-stage improvement plan requires a substantial amount of time to research, organize, plan, develop, evaluate, and adjust. Although time-consuming, a goal-based improvement plan can provide valuable information regarding the effectiveness and success of the plan's implementation. In addition, I learned that developing an action plan to improve a problem in school-required the collection of evidence in support of the suspected problem. In order to collect that evidence, a reliable and credible instrument was needed. Finding or developing the instrument required tremendous attention to details such as validity and reliability, ethical practices, protection of research participants, and certainty that the instruments would collect the information sought. Furthermore, each phase in the development of the project required a comprehensive review of previous research and consideration before determining the next step in the process. In the end, I determined the development of my project was not solely about the completion of the scholarly exercise or even the development of the project itself as much as it was about the contribution to the ongoing discussion of the integration of educational technology and potential of impacting social change for the a learning community.

Leadership and Change

If I were presented with the opportunity to plan a technology integration project study again, I would plan a mixed-method study. I would first complete a quantitative study to identify a specific need or deficiency in the research school's technology integration practices, followed by a qualitative study to further explore one specific facet identified by the quantitative data. While the quantitative data is helpful in identifying a significant problem or trend, the open responses of a qualitative style study provide richer and deeper information to understanding the issue. I would talk to teachers about their planning process, lesson development, technology strengths and areas of improvement, and the integration practices for their specific curriculum. The addition of a qualitative study to the quantitative data collected might uncover nuances and circumstances in teaching practices, barriers, or support factors that could not be identified through quantitative data or improved by implementing a plan based on quantitative data alone.

I would also like to perform a series of annual pre- and postsurveys with teachers of the research school over the course of multiple school years, if the research school actually put a technology improvement plan into practice, in whole or part. I believe the collection of data from two annual technology integration surveys (start of the school year vs. end of the school year) could provide valuable data on the impact of any improvement plan specific to that school's integration practices and training provided as well as educational technology research in general. Understanding specific issues identified by teachers as relevant to the integration of technology would provide school leadership with critical information for the development of concentrated and effective training. This future training would provide educators with the skills and confidence to improve their technology integration, which researchers have suggested leads to student engagement and increased content learning (Kopcha, 2012; Schrum and Levin, 2013).

Analysis of Self as Scholar

As a practitioner of educational research, I have experienced the necessity to deliver valid and reliable results through a methodical research design and logical approach to the implementation process. Through this scholarly experience, I have gained satisfaction and been intrinsically rewarded by making a contribution to the research discussion of educational technology and its integration practices as well as its potential to promote positive social change within the educational community. This completion of this scholarly project study and the sense of contributing to education has provided me additional motivation to persevere in my research efforts and attempt to implement my recommended technology integration improvement plan at the research school with the permission of the administration.

In addition, completing, developing, and executing this study required that I work with numerous individuals who simultaneously judged, disparaged, and supported my work and dedication to completing this educational journey. I learned that as a scholar, I was more guarded in sharing my work with nonscholars and sensitive about the feedback from all parties, than I would have imagined I actually was at the start of this journey. As my journey progressed and I continued to work with educational professionals and rely on my support network, I learned to accept the constructive criticism of my work as feedback and evaluation of my work and not of me as an educator. I also learned to adjust my focus to be on the content of the study as its own entity rather than a part of myself as an individual. This adjustment in perspective allowed me the ability and mindset to openly explore ideas and openly admit the need for help and guidance from educational leaders. Through this journey and the overall experience, I have grown as a scholar.

Analysis of Self as Practitioner

I have become a better practitioner as a result of my participation in the process necessary to complete my research, development, execution, and evaluation of my project study. For example, I (a) have come to understand the value of prior research and scholarly practices both in support and disagreement of my viewpoint and experience, (b) have learned the importance of commitment and follow through with efforts focused on improving technology integration practices and working to achieve expected outcomes and (c) have reflected on my own strengths and challenges in these respects. I have reconsidered the best practices for technology integration in education and how I may better apply these practices to training and support of my fellow educators with their own teaching practices with integrating technology. As a coordinator of technology integration, a facilitator of technology related training, and integration mentor of teachers, I have learned the value and importance of sharing my scholarly research and work as a strategy to engaging my colleagues and administrators in relevant and applicable discussions of technology integration barriers, needs, and practices that directly affect the school community where I work. These discussions have (a) afforded me a deeper understanding of the issues my colleagues face in effective and efficient technology integration, (b) aided in keep abreast of relevant technology research in education and innovation, (c) promoted collaboration amongst our learning communities which has provided me alternatives to my current technology training practices, and (d) created a route for facilitating change in the educational practices of integrating technology at my school and promoting reform for how my school's administration supports technology integration. Most importantly, I have learned that as a practitioner, I am a life-long learner, and there is always room for growth.

Analysis of Self as Project Developer

Despite my previous experience with development, execution, and leadership of educational projects and initiatives in the past, I was not fully prepared for the all-encompassing and time-consuming role of project developer on such an extensive scale without a team to delegate responsibilities to or share the workload. This entire experience, including barriers I encountered, challenges I overcame, and the successes I enjoyed, throughout different parts of the process, has helped me become a more independent and self-assured project developer. My perspective as a project developer also changed due to this experience. In particular, I have always considered myself well organized, able to manage multiple issues at one time, determined, and open to feedback, but I now realize that these skills alone were not enough.

To successfully navigate this process, I needed to rely on not only my knowledge and diverse skill set but also be willing to step forward into unfamiliar territory, extensively revise work, adjust my thinking, seek additional knowledge, and recognize when I needed help and obtain it. In developing past training programs and projects, I had not always considered the barriers or challenges of my participants face with such importance as much as I should have, yet while developing this project, I became more attentive to my teachers' needs and technology challenges as well as conscious of the effect my audience might have on the outcome of my results. The process of conducting a literature review on technology integration pedagogy, key factors of professional development implementation, and importance of instructional coaching identified areas of weakness which I welcomed and improved on to become an better-qualified project developer.

The Project's Potential Impact on Social Change

When I reflect on the overall importance of my work, I am proud of myself and how much I have learned, grown professionally and scholarly, and the potential positive effect my technology integration improvement plan might make on my school's teachers and learning community. However I am also slightly frustrated and disappointed that my survey findings did not identically reflect the finding reported in educational technology related literature. As a result, I came to recognize the individuality and uniqueness of each schools' learning community and resources greatly affects the findings, even with the use of the same reliable and valid instrument. As researchers of technology integration practices repetitively reported, one-size, whole-group, cookie-cutter approaches to the integration of technology and training does not fit all (An & Reigeluth, 2011; Boud & Hager, 2011; Hoffman, 2013; Levin & Schrum, 2013; Uslu & Bumen, 2012; West, 2011). As I developed the improvement plan I eventually recommended, I began to see the value of data collect and importance of my conclusions drawn as they applied directly to the learning community I was focused on developing the plan for. Even more importantly, as I reflected on my completely developed project, I was able to appreciate the importance and value of the project on a larger scale and my potential as an agent of change with the possible implementation of my project.

When I reflect on what I learned overall through the completion of my doctoral studies, I realize that I have learned more than simply the concrete concepts about the research process, quantitative studies, data collection and analysis, literature reviews, and project development, but more importantly I have learned to critically think, question, analyze, and write as a scholarly researcher. To me this means I not only must consider the research itself and my role as a researcher, but also the effect of my research, my knowledge, my findings, and recommendations on my learning community to effect positive change positive and to do no harm. I have become a more capable scholar, a more mindful project developer, and an improved practitioner. I have learned to consider how effective leadership and instructional coaches contribute to positive social change of educational technology and how I can both provide such technology teacher leadership and promote such change in my learning community. I have learned that I have the knowledge and capability to be a vehicle for change by helping to cultivate effective technology integration teaching practices that can affect student engagement and increase content learning.

Implications and Applications

One aspect of Walden University's mission statement establishes its commitment to improving social conditions the around the world. This study and project I developed have the potential to contribute to positive social change in education by initiating a shift in the school's approach to technology integration practices, which can result in increased levels of teacher confidence, competency, and use relating to technology in their classrooms and curriculum. These improvements may help the focus school efficiently and effectively create sustainable technology integration practices that in response may stimulate student engagement and therefore lead to improved content learning.

This study's project can also contribute to a shift in the focus school's general technology culture by providing a framework for proven technology integration models, transparency in the school's philosophy of technology and direction, and providing teachers with clarity of expectation in applying technology at their respective grade levels. When educators are provided the opportunity to grow professionally and receive training on new skills, they are likely to feel respected, valued, and invested in their school's community and achieving outcomes. They are also more likely to be willing to participate in training, accept leadership responsibilities, and support new initiatives, from being respected, values, and treated like professions. By (a) providing effective leadership and transparency of the plan, (b) administration demonstrating their support of their teachers' efforts to integrate technology with guidelines, resources, and training, (c) establishing an applicable and effective technology-related professional development program, and (d) creating a culture of continuous individualize technology integration support, a community of educators focused on best practices of technology integration as a tool for engaging student learners will develop and a school's culture can become one that recognizes the value of and embraces the harnessing 21st century technology skills rather than fearing them or allowing the ever advancing world of technology restrict their students.

Knowledge gained through this study and the recommended project has applications for other schools also experiencing challenges and low levels of technology integration. Other schools may use this study as a platform for launching their own investigation of their school's technology culture and teachers' practices of technology integration. Other schools may also (a) gain insight from this study about ideas for developing their own scope and sequence for technology aligned to their school's curriculum and structure, (b) creating their own onsite technology related professional development training program, (c) adapt the instructional coaching concept of the TIIP, onsite or virtually, for their educators, or (d) use parts or all of the technology integration improvement plan (TIIP) I developed for this study to meet the particular needs of their school's community.

Directions for Future Research

Directions for future research at the research school include (a) the continuation of this study to examine the impact of onsite multi-leveled professional development programing on the teachers at the research school and (b) the evaluation of the changes in integration confidence and application of technology integration methods of teachers enrolled in an instructional technology coaching program, onsite or virtual, as recommended in the TIIP. Such research might help identify further needs of educators of the research school or improvements resulting from the actions taken by the leadership of the research school in support of their educators. The directions of future research beyond the scope of the research school of this study, is the extension (or repetition) of this same research study on an affluent international schools of similar size and resources in the Central and South American region. Such research might shed light on needs and challenges unique to culturally diverse teaching communities of large, affluent, international schools.

Because the literature has suggested that the technology-related professional development and training can improve teacher confidence and competency relating to technology integration (Peterson & Palmer, 2011), which in turn leads to increased student engagement (Sadaf et al., 2012), future research could be conducted to explore the relations between the amount of training need to effectively increase the level of technology used in the classroom and it impact on increasing student engagement. Such research might provide insight into how much training and time is needed for teacher to realistically impact student engagement through technology. Because technology integration is not an all-or-none philosophy and there are varying levels of integration practices, future research could focus on collecting data to aid in the creation of a scale correlating the use or application of technology integration and the resulting levels of increased student engagement. Lastly, because teachers of this study and in literature reported needing job-embedded individualized or customizable technology support, mentoring, and nonsupervisory coaching for improving their technology integration skills, confidence, and strategies, research could be conducted to explore the various types of instructional technology coaching occurring in other international schools and the results of those instructional technology coaching efforts. Such research might yield data that could be used to identify improvements to teachers' use of technology and the benefits of job-embedded coaching on students' engagement and content learning resulting from their teachers improved technology infused teaching practices.

Conclusion

The project I developed based on the results of my quantitative correlated survey was strong in many ways because I incorporated many research identified elements of effective training, best practice for technology integration at the classroom level, and quality professional development as well as took into consideration means to reduce teacher reported barriers to successful technology integration methods. In general, the project is limited in the ability to generalize the results to the greater educational community because of the studies limitations. Alternative solutions for addressing the local problem include the option of involving the existing tech-savvy educators employed at the research school as mentors and the option of employing a virtual instructional coaching system to provide more individualized support of the research school educators with improving technology integration skills and confidence.

Through self-reflection of what I learned about scholarship, project development and evaluation, and leadership and change, as well as reflection of myself as a scholar, a practitioner, and a project developer, prompted me to consider my viewpoints on the research process, my role as a researcher, and the outcomes resulting from my participating in the research process. I have grown both professionally and personally through this self-reflection and experience. This self-awareness as scholarly, practitioner, and project developer will influence the way I approach, evaluate, develop, and conduct future research projects. Implications of this study include an increased understanding of technology integration barriers and best practices in educational communities and how efforts can be made to foster a shift in a school's technology culture, improve teacher effectiveness with integration of technology, improved teacher confidence applying technology in their curriculum, and ultimately increasing student engagement and content learning.

At the local level, the research school has invested time, money, and resources in an attempt to improve teachers' technological confidence, increase their technology integration skills and uses across the curriculum, and provide support, with an ultimate goal of stimulating student engagement. Through this research study, I have performed two literature reviews, followed ethical protocols and practices in my collection of data, identified the barriers and needs of the school's educators, and developed a scholarly plan under rigorous guidelines in an effort to provide a solution for the school's learning community and promote social change. Technology is constantly evolving and advancing while simultaneously affecting how we live our lives and enrich education (Newbill & Baum, 2013) and schools are tasked with the responsibility of preparing students for their technology infused future (Berrett et al., 2012; Hohlfeld, Ritzhaupt, Barron, & Kemker, 2008; Mouza, 2011). The workload on are teachers is heavy, while the demands and expectations on teachers is great (Green & Cooper, 2012; Kurt, 2013; Langran, 2010; Mathew, 2012). Yet, educators are asking for and welcome the opportunity for professional development and training for professional growth and acquisition of new skills and confidence (Kim et al., 2013; Kopcha, 2010). The potential for creating a shift in the school's technology culture, improvement of teachers' technological abilities, increase in student engagement, and effects of positive and sustainable technology integration practice cannot be ignored.

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Appendix A: The Project

Technology Integration Improvement Plan (TTIP) for [redacted]

Target Audience: Classroom level teachers and educational support staff on varying levels of involvement

Administrative Lead: Technology Integration Coordinator

Dept. of Support: Educational Technology Dept. and Informational Technology

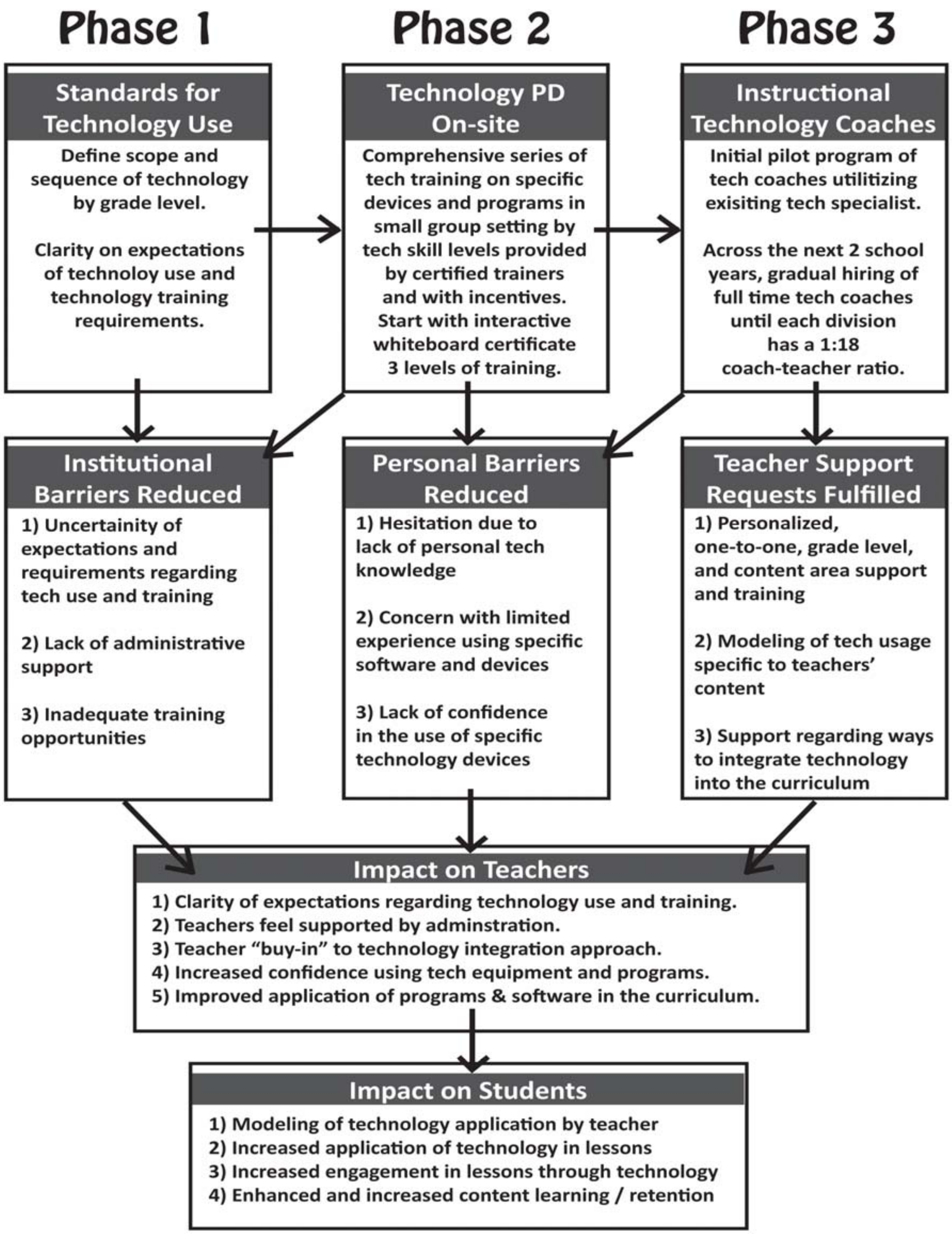
Ultimate Goal: Increased student engagement and content learning

TIIP Impact: Improved technology integration,
Reduction of barriers to integration technology
Establish continuous technology support program

Timeline: Phase 1 – 6 months; 2 months planning: 4 months execution
Phase 2 – 16 weeks: 2 planning/recruitment, 14 training
Phase 3 – (pilot) 1 academic year, (full scale) 2 academic years

Synopsis of TIIP
The TIIP is a complete and realistic improvement plan designed to be implemented in three phases schoolwide that focuses on providing research proven strategies to improve the overall use of technology at the classroom level, establish clarity and direction for the teachers on the technology standards by grade level, and create a technology related professional learning community with nonsupervisory collaborative instructional coaches as technology trainers and mentors for individualized teacher support.

TIIP Overview & Flowchart



Technology Integration Improvement Plan (TIIP) Outline

I. Phase 1

A. Focus Area

1. Clarity in technology standards, school technology direction, and administration's expectation of technology use in classrooms by grades.

B. Tangible

1. Creations of a K12 Technology Standards Guide by grade level aligned

C. Resources

1. ISTE Student Technology Standards K12
2. [redacted] K12 Technology Specialist Team
3. [redacted] Educational Technology Department Team

D. Barriers

1. Teacher buy-in: willingness to follow plan, willingness to apply to teaching / curriculum
2. Teacher workload overload curriculum time with current focus on cur support from administration

E. Goal

1. Provide teachers with a specific information as to "what" technology and "how to" integrate the technology into their specific curriculum, subject area, and/or grade level.

F. Timetable

1. 6 months: 2 months development; 1 month delivery, 3 months implementation and evaluations

G. Key Stakeholders

1. All classroom teachers and classroom instructional assistants,
2. Curriculum coordinators and curriculum directors

3. Media specialists, technology specialist, and technology integration coordinator

H. Evaluations

1. Pre- and post-surveys, teacher feedback, goal-based evaluation of integration improvements by grade level, teachers, and subject areas

I. Learning Outcomes

1. Improvement of teachers understanding and clarity on what technology is applicable to their grade level and subject area, clarity in support from administrators

II. Phase 2

A. Focus Area

1. Development of technology focused professional development on specific equipment provided by ISP and programs used (i.e., Canvas, SmartNotebook, e-books, iXL Math, Spelling City, etc).

B. Tangible

1. 3 – 10.5 hour interactive whiteboard certified training courses (levels of basic, intermediate, and advance)

C. Resources

1. Local SmartTechnology Certified Provider of interactive whiteboards
2. Local Company (EduPan) with bilingual certified IWB trainer
3. 75% of [redacted] Classrooms with Interactive Whiteboards already installed
4. [redacted] Educational Technology Department Team

D. Barriers

1. Teacher schedules, outside commitments, and workload.
2. Personal conflicts – i.e., daycare, tutoring, anxiety, confidence
3. Funding for paid certified instructor

E. Goals

1. Provide teachers with device and software focused differentiated leveled training with professional development clock-hours and certificates.

F. *Timetable*

1. 6 months: 2 months development; 1 month delivery, 3 months implementation and evaluations

G. *Key Stakeholders*

1. All classroom teachers and classroom instructional assistants

H. *Evaluations*

1. Pre- and post-surveys, teacher feedback,
2. goal-based evaluation of integration improvements by grade level, teachers, and subject areas

I. *Learning Outcomes*

1. Improvement of teacher technology competency and efficiency
2. Improvement of teachers confidence in using technology
3. Increased use of technology and integration of technology by teachers
4. Increased use of technology and engagement in learning by students

III. Phase 3

A. *Focus Area*

1. Providing teachers with customized, individual, grade level, content area specific, continuous job-embedded technology support from

trained and experience technology specialist from a coaching approach.

B. Tangible

1. Creations of an Instructional Technology Coaching program

C. Resources

1. [redacted] K12 Technology Specialist Team
2. [redacted] Educational Technology Department Team

D. Barriers

1. Teacher buy-in: willingness to participate, interest in coaching support
2. Budget: funding for international-hire teacher(s)
3. Staffing: International hiring cycle, limitation of local hire options

E. Goal

1. Provide teachers with a collaborative technology focused professional learning community with support, mentoring, and coaching for qualified technology specialist.
2. Ideal – 1:18 coach - teacher ratio

F. Timetable

1. 1 to 3 academic school years: 6 months to 1 academic year for pilot ITC program, 1 full academic year for implementation of 3 full time

ITCs, 1 additional full academic year for improvements to ITC program with addition of 3 more ITCs.

G. *Key Stakeholders*

1. All classroom teachers
2. Media specialists, technology specialist, and technology integration coordinator

H. *Evaluations*

1. Pre- and post-surveys, teacher feedback, goal-based evaluation of integration improvements by grade level, teachers, and subject areas

I. *Learning Outcomes*

1. Improvement of teachers confidence in using technology
2. Improvement of teachers attitude about and comfort with technology
3. Increased use of technology and integration of technology by teachers
4. Increased use of technology and engagement in learning by students

PHASE 1 of TIIP

Development of a K12 Technology Standards by Grade Level

SAMPLE

K-5 Integrated Technology Scope & Sequence

Elementary (K-5)

by Grade Level

April 2015

PHASE 1 - Continued

International Society for Technology in Education

Technology Standards for Students

1. Basic operations and concepts

- Students demonstrate a sound understanding of the nature and operation of technology systems.
- Students are proficient in the use of technology.

2. Social, ethical, and human issues

- Students understand the ethical, cultural, and societal issues related to technology.
- Students practice responsible use of technology systems, information, and software.
- Students develop positive attitudes toward technology uses that support lifelong learning, collaboration, personal pursuits, and productivity.

3. Technology productivity tools

- Students use technology tools to enhance learning, increase productivity, and promote creativity.
- Students use productivity tools to collaborate in constructing technology-enhanced models, prepare publications, and produce other creative works.

4. Technology communications tools

- Students use telecommunications to collaborate, publish, and interact with peers, experts, and other audiences.
- Students use a variety of media and formats to communicate information and ideas effectively to multiple audiences.

5. Technology research tools

- Students use technology to locate, evaluate, and collect information from a variety of sources.
- Students use technology tools to process data and report results.
- Students evaluate and select new information resources and technological innovations based on the appropriateness for specific tasks.

6. Technology problem-solving and decision-making tools

- Students use technology resources for solving problems and making informed decisions.
- Students employ technology in the development of strategies for solving problems in the real world.

PHASE 1 - Continued

1st Grade

K12 Technology Scope & Sequence Sample

IS	Introduce Skills	DS	Develop Skill	MS	Master Skill	IU	Independent User

Skill / Proficiency: Basic Computer & Technology Usage

Starts and shuts down computer including storing and recharging laptops	DS
Opens and quits applications	DS
Works with windows, icons, and menus	IS
Communicates about technology using developmentally appropriate and accurate terminology	IS
Uses keyboard, mouse, and other common input and output devices	IS
Discusses advantages and disadvantages of using technology in daily life	IS

Keyboarding

Uses proper posture and ergonomics	IS
Locates and uses letter and number keys with correct left and right hand placement	IS
Uses the correct finger of the correct hand for all keys	IS

Word Processing (i.e. MS Word) – Starts at Grade 2

Presentations (i.e. MS PowerPoint) – Starts at Grade 3

Spreadsheets (i.e. MS Excel) – Starts at Grade 4

Publications (i.e. MS Publisher)

creates a picture with paint program	IS
uses draw tools to create objects	IS
inserts graphics within an application	IS

File Management

Logs into network	IS
Saves and finds files and folders	IS

PHASE 1 - Continued

K12 Technology Scope & Sequence – Grade 1

IS	Introduce Skills	**DS**	Develop Skill	**MS**	Master Skill	**IU**	Independent User

Digital Citizenship

Demonstrates positive social and ethical behaviors when using technology systems and software	IS
Recognizes signals of cyber bullying	IS
Recognizes and practices healthy behaviors relating to screen time	IS
Protect private information for themselves and others	IS

Internet Use

Uses teacher selected web sites	IS
Launches a browser and uses the tool bar	IS
Navigates by clicking on links on web pages	IS
Returns to site using back buttons or bookmark/favorites	IS

Integrating Technology Skills into the Curriculum

- **MS Publisher** – Creating banners for events and celebrations.
- **Keyboarding** – LyricsTraining.com – students typing popular song lyrics as an engaging activity to promote keyboarding skills
- **Internet Use** –
  - Using programs (ie: PebbleGo) as an online resource to gather information to create a project or complete an assignment.
  - Creating “word clouds” or “word salads” (ie: wordle.com) using vocabulary or spelling words.
- **Digital Citizenship** – Use of programs (ie: Spelling City, TumbleBooks, RazKids, iXL Math, etc) with individual user ids password combinations and students maintaining information as private from other students.

PHASE 1 - Continued

5th Grade

K12 Technology Scope & Sequence - Sample

IS	Introduce Skills	DS	Develop Skill	MS	Master Skill	IU	Independent User

Skill / Proficiency: Basic Computer & Technology Usage

Starts and shuts down computer including storing and recharging laptops	IU
Opens and quits applications	IU
Works with windows, icons, and menus	IU
Communicates about technology using developmentally appropriate and accurate terminology	IU
Uses keyboard, mouse, and other common input and output devices	MS
Discusses advantages and disadvantages of using technology in daily life	MS
Applies strategies for identifying and solving routine hardware and software problems	DS

Keyboarding

Uses proper posture and ergonomics	IU
Locates and uses letter and number keys with correct left and right hand placement	IU
Uses the correct finger of the correct hand for all keys	IU
Touch types 20 words per minute	DS

Word Processing (i.e. MS Word)

Inserts, edits, and formats text	DS
Formats a basic document (e.g. title, paragraphs, alignment)	DS
Creates bullet and number lists	DS
Uses spell checker and thesaurus	DS
Uses word processor from first to final draft	DS
Uses ruler, margins, and tabs	DS
Creates and formats tables	DS

PHASE 1 - Continued

K12 Technology Scope & Sequence – Grade 5

IS	Introduce Skills	**DS**	Develop Skill	**MS**	Master Skill	**IU**	Independent User

Presentations (i.e. MS PowerPoint)

Determines target audience, goal, and purpose of presentation	DS
Uses outlines, storyboards, and mind-mapping software to brainstorm and plan presentation	DS
Adds transitions and sounds to presentations	DS
Imports animations, video, images, and hyperlink	IS
Applies good design principals	IS
Includes graphs and charts in presentation	IS

Spreadsheets (i.e. MS Excel)

Explains what the data represents in an existing spreadsheet	DS
Collects data and creates new spreadsheet	IS
Uses simple formulas	IS
Recognize parts of a spreadsheet	DS
Print and area of a spreadsheet	DS
Create a simple chart	DS

Publications (i.e. MS Publisher)

Creates a picture with paint program	IU
Uses draw tools to create objects	MS
Inserts graphics within an application	DS
Uses digital camera	DS
Rotates, duplicates, groups, aligns, and resizes objects	DS
Saves images in different formats	DS
Applies good design principals	DS

PHASE 1 - Continued

K12 Technology Scope & Sequence – Grade 5

IS	Introduce Skills	**DS**	Develop Skill	**MS**	Master Skill	**IU**	Independent User

File Management

Logs into network	IU
Saves and finds files and folders	MS
Creates folders to store work and saves work in current folder	DS
Shares files over network and email	IS
Moves, copies, deletes, renames a file	DS

Digital Citizenship

Creating and managing online account	DS
Makes informed decisions in choosing the most appropriate	DS
Demonstrates positive social and ethical behaviors when using technology systems and software	IU
Exhibits legal and ethical behaviors when using information and technology, and discusses consequences of misuse	DS
Follows proper use of copyrighted material and cites resources properly	DS
Demonstrates and advocates for legal and ethical behavior among peers, family, and community regarding the use of technology and information	IS
Captures images from the internet and follows co	DS
Evaluates site and information for validity and accuracy	DS
Copies and pastes text or images and cites source correctly	DS
Recognizes signals of cyber bullying	MS
Recognizes and practices healthy behaviors relating to screen time	MS
Recognizes potential online threats	DS
Protect private information for themselves and others	MS

Internet Use

Uses teacher selected web sites	IU
Launches a browser and uses the tool bar	IU
Navigates by clicking on links on web pages	IU
Returns to site using back buttons or bookmark/favorites	IU
Adds bookmarks/favorites	IU
Knows the parts of a URL	DS
Uses keyword and natural language searches	DS
Evaluates site and information for validity and accuracy	DS
Copies and pastes text of images and cites sources correctly	DS
Knows difference between search engines and subject directories	IS

PHASE 1 - Continued

K12 Technology Scope & Sequence – Grade 5

Advanced Technology Skills (optional)

Coding and programing	DS
Sound Management (audacity)	IS
Robotics – creation, programing, and competitions	DS

Integrating Technology Skills into the Curriculum

- **MS Publisher** – Creating banners for events and celebrations.
- **Presentations** – using MS Excel program to create presentations with multiple slides including appropriate fonts, colors, and images.
  - Advanced user could embed links, video, and / or sound.
- **Word Processing** – using MS Office program to create multiple page reports with formatting, tables, inserting images, and title pages for social studies or science lab reports
- **Spreadsheets** – using MS Excel program to create multi-column bar graphs and/or pie charts from spreadsheets
- **File Management** – use of Google Drive or Drop Box to organize and store documents, images, and
- **Keyboarding** – use of Learn to Type program to demonstrate touch typing and
- **Internet Use** –
  - Using programs (i.e.: Scholastics Growler) as an online resource to gather information to create a project or complete an assignment.
  - Creating “word clouds” or “word salads” (i.e.: wordle.com) using vocabulary or spelling words.
- **Digital Citizenship** –
  - Use of programs (i.e.: Spelling City, TumbleBooks, RazKids, iXL Math, etc) with individual user ids password combinations and students maintaining information as private from other students.
  - Participation in the Digital Citizenship Poster competition including the use of PosterMyWall program.

PHASE 2 of TIIP

Technology Related Onsite Professional Development

Interactive Whiteboard Professional Development
3-Level Curriculum Certification Program

Target Audience:	Classroom level teachers (grade level and subject area)
Local Provider:	EduPan certified SmartTechnology trainers
Administrative Lead:	Technology Integration Coordinator
Dept. of Support:	Educational Technology Department
Course Levels:	Basic Level, Intermediate Level, Advanced Level
Prerequisites:	Basic Level for Intermediate or successful completion of skill proficiency exercise; Intermediate for Advanced Level
Time Commitment:	Ed Tech: 16-weeks; 1-wk planning, 2-wk recruiting, 14-wk management
	Teachers (Course Participants): 6 to 9 weeks for training
Cost:	$80/per participant
Number Courses:	Per Semester - 4 Basic, 3 Intermediate, 3 Advance
Class size:	Per session - Minimum 5 and Maximum 12
Incentives:	10 hrs professional development clock hours per course
	Interactive Whiteboard Skill Certificate per course
Expectation:	60% of [redacted] Teachers complete 2 course levels

PHASE 2 – Continued

EduPan

BASIC Level Interactive Whiteboard Training - 7 sessions - 10.5 hours

Session 1	Introduction, Agenda, Objectives
	Getting Started - Review Hardware Basics
	    Hand in Mouse
	    Keyboard & Right Click
	    Orientation
	Floating Tools
	    Maximize / Minimize & Move
	    SMART System Menu Show/Hide Tools
	    Using PEN tools & configuring tools
	    Customizing Floating Tools
	    Using Recorder
	    Using Screen Shade
	    Using Spotlight
		Session 2	Brief Review from Session 1
			Opening SMART Notebook
			    New Page & Delete Page
			SMART Notebook Interface
			Saving a Notebook File
			Using Pens, Manipulating Objects, Erasing
			
			Using Text Tools & Deleting Objects
			Special Pens
			    Shape Recognition Pen
			    Magic Pen
			Recap Session 2 Topics

Session 3	Brief Review from Session 2
	Using Lines, Shapes, & Fill Tools
	    Changing Fill and Line Color
	    Changing Line Style
	    Changing Transparency
	Exploring different object properties
	Object Animation
	Exploring Measurement Tools
	Using Screen Capture
	Recap Session 3 Topics
		Session 4	Brief Review from Session 3
			Inserting Images from Internet & Computer
			    Copy / Paste
			    Drag & Drop
			    Menu Bar Insert optios
			Explorig the Gallary
			    Navigating Gallery Tabs
			    Performing Searches
			Using an object's drop-down menu options
			Recap Session 4 Topics

Session 5	Brief Review from Session 4 Techniques for creating interactive content and activities (Part 1) Infinite Cloner application Locking application Order application Pull Tabs & Group applications Extended application & practice time Recap Session 5 Topics	**Session 6**	Brief Review from Session 5 Techniques for creating interactive content and activities (Part 2) Erase to Reveal technique Order to Reveal technique Move to Reveal technique Object Animation technique Using Links to websites, page in file Current attachements or shortcuts Recap Session 6 Topics

Session 7	Brief Review from Session 6
	SMART Exchange
	    Registering
	    Exploring and performing a search
	    Downloading
	    How to share, upload, and exchange
	    Modifying downloaded lessons
	Extended application & practice time
	Wrap Up, Certificates, & Photos
			Curriculum adopted with permission from SMART Technologies Course Curriculum Outline for BASIC Level Training

PHASE 2 – Continued

INTERMEDIATE Level Interactive Whiteboard Training - 7 sessions - 10.5 hours

Session 1	Introduction, Agenda, Objectives
	Reviewing the Basics
	Best Practices for Designing a Presentation
	    Choosing
	    Font Choice
	    Contrasting Colors
	    Using Alignment Guides
	Changing & Saving Tool Properties
	    Setting Defaulys
	    Standard Pen Fading Ink
	    Magi Pen Setting Fading Time
	    Creative Pen - New Patters
	Review Session1 Topics
		Session 2	Review from Session 2
			Tables
			    Properties
			    Cell Shades
			    Object Inserts
			Screen Recording
			    How to setup
			Inserting Internet Browswer
			    Pinning Page
			    Obtaining Images
			Extended application & practice time
			Recap Session 2 Topics

Session 3	Review from Session 3
	Using the Page Sorter
	    Moving Pages
	    Cloning Pages
	    Other Page Options
	Gallery
	    Multimedia Sections
	    My Content & Saving Pages
	    Sharing Content
	Recap Session 3 Topics
		Session 4	Review from Session 4
			Activity Builder
			    Setup Activity
			    Adding Sounds
			Extended application & practice time
			    Build an activity
			Recap Session 4 Topics

Session 5	Review from Session 5
	Lesson Activity ToolKit (Part 1)
	    Games folder
	    Graphics folder
	    Tools folder
	Extended application & practice time
	    Build a lesson with activity toolkit
	Recap Session 5 Topics
		Session 6	Review from Session 6
			Lesson Activity ToolKit (Part 2)
			    Tools folder
			SMART Ink
			    SMART Ink vs Microsoft Ink
			    Internet Explorer vs Other Browsers
			Extended application & practice time
			    Build a lesson with activity toolkit
			Recap Session 6 Topics

Session 7	Review from Session 6
	XC Collaboration Basics
	    Setup
	Extended application & practice time
	    Build a multiple page lesson
	Wrap Up, Certificates, & Photos
			Curriculum adopted with permission from SMART Technologies Course Curriculum Outline for Intermediate Level Training

PHASE 2 – Continued

ADVANCED Level Interactive Whiteboard Training - 7 sessions - 10.5 hours

Session 1	Introduction, Agenda, Objectives
	Reviewing of Basic & Intermediate Skills
	Using Key Shortcuts
	New SMART Notebook 14 Features
	    New Pens
	    Object's drop-down menu options
	    SMART Bocks
	    Lesson Recorder
	    3D Objects
	Customizing the SMART Notebook Toolbar
	Attachement Tab
	Recap Session 1 Topics
		Session 2	Review from Session 1
			Creating a "theme" for SMART Noteobook Presentations
			Using the Page Groups screen to organize content
			Inserting FLASH & Video into SMART Notebook lessons & activities.
			Recap Session 2 Topics

Session 3	Review from Session 3
	Introduction to SMART Response VE
	    Setup Tool
	    Teacher Tools
	    Title Page & Inserting Questions
	SMART Response Widgets
	Recap Session 3 Topics
		Session 4	Review from Session 4
			Lesson Activity ToolKit 2.0 (Part 1)
			    Pages Folder
			    Activity Folders
			    Application & Practice Time
			Recap Session 4 Topics

Session 5	Review from Session 5
	Lesson Activity ToolKit 2.0 (Part 2)
	    Activity Folders
	Widgets
	    Application & Practice Time
	Recap Session 5 Topics
		Session 6	Review from Session 6
			Importing/Exporting content from SMART Notebook
			    Importing
			    Exporting
			    SMART Notebook Document Writer
			    SMART Express
			SMART Ink Document Viewer
			Recap Session 6 Topics

Session 7	Review from Session 6
	Practical Application
	    Complete creating lessons
	    Present / Share your lesson creation with the class
	Wrap Up, Certificates, & Photos		

Curriculum adopted with permission from SMART Technologies Course Curriculum Outline for Advanced Level Training

14-Week (Semester Long) 3 Level Training Course Rotation Schedule

Weekday Sessions from 3:00 - 4:30pm (90 min) Saturday Sessions from 8am to Noon (3.5 hrs)

Classsize: Minimum 5 and Maximum 12 / Location: Ed Tech Training Center

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Week 1	Basic 101-1 (1)	Inter 201-1 (1)	Basic 101-1 (2)	Inter 201-1 (2)		Basic 101-3 (1)
Week 2	Basic 101-1 (3)	Inter 201-1 (3)	Basic 101-1 (4)	Inter 201-1 (4)		Basic 101-3 (2)
Week 3	Basic 101-1 (5)	Inter 201-1 (5)	Basic 101-1 (6)	Inter 201-1 (6)		Basic 101-3 (3)
Week 4	Basic 101-1 (7)	Inter 201-1 (7)				
Week 5						Inter 201-3 (1)
Week 6	Inter 201-2 (1)	Basic 101-2 (1)	Inter 201-2 (2)	Adv 301-1 (1)		Inter 201-3 (2)
Week 7	Inter 201-2 (3)	Basic 101-2 (2)	Inter 201-2 (4)	Adv 301-1 (2)		Inter 201-3 (3)
Week 8	Inter 201-2 (5)	Basic 101-2 (3)	Inter 201-2 (6)	Adv 301-1 (3)		
Week 9	Inter 201-2 (7)	Basic 101-2 (4)		Adv 301-1 (4)		Adv 301-3 (1)
Week 10		Basic 101-2 (5)		Adv 301-1 (5)		Adv 301-3 (2)
Week 11	Adv 301-2 (1)	Basic 101-2 (6)	Adv 301-2 (2)	Adv 301-1 (6)		Adv 301-3 (3)
Week 12	Adv 301-2 (3)	Basic 101-2 (7)	Adv 301-2 (4)	Adv 301-1 (7)		
Week 13	Adv 301-2 (5)		Adv 301-2 (6)			
Week 14	Adv 301-2 (7)					

PHASE 3 of TIIP

Implementation of Instructional Technology Coaching Program

Instructional Technology Coach (ITC) Program

Target Audience:	Classroom level teachers (grade level and subject area)
Provider:	(Pilot) Technology Specialist on Special Assignment (Regular) Full Time International or Local Hire Tech Specialist
Administrative Lead:	Technology Integration Coordinator
Dept. of Support:	Educational Technology Department
Time Commitment:	3 to 4 collaboration session per month; 30-45 minutes sessions
Workload Ratio:	1 : 18 (Coach : Teacher)
Expectation:	60% of [redacted] Teachers complete 2 course levels

PHASE 3 – Continued

Instructional Technology Coaching at [redacted]

The position of Instructional Technology Coach (ITC) is a relatively new teaching position in schools. Commonly filled by TOSA – Teacher Special on Assignment in public schools, these positions function in a non-supervisory mentor role for teachers at an assigned school.

The restructuring of the K12 technology standards and curriculum sequence in conjunction with the introduction of the Instructional Technology Coach (ITC) represents a tangible affirmation of the school's focus of Instructional Technology within the [redacted] *to provide effective support for teaching and learning through technology integration*. The expected outcome of this new role is an empowering of teachers with confidence and technological competencies, increased student engagement in learning, and the maximization of the school's investment in technology devices and resources.

A major challenge with technology integration in schools is to provide sufficient training and support to bring teachers, who are at every point of the technology knowledge continuum, to an adequate level of technical expertise to meet teaching and learning goals. [redacted] ITCs will serve as resources to classroom teachers with the primary purpose to train teachers in technology use. In this role, they are also agents of change and actively engaged in curriculum development and lesson planning infused with technology. ITCs are available during the school day to meet and plan with teachers as well as model or co-teach integration activities.

PHASE 3 – Continued

As part of their coaching responsibilities, an ITC will:

- Collaborate with teachers to align academic achievement and technology initiatives in one-to-one or small group settings.
- Identify staff development needs related to instructional technology
- Manage small group technology related staff development activities
- Direct the development and sharing of model technology enriched instructional lessons/units with teachers in support of District teaching and learning models
- Collaborate with library/media staff to determine, and facilitate the acquisition of, information literacy and research skills

Instructional Technology Coaches are available to assist teachers with the following resources:

- RenWeb LMS
- CANVAS portal
- SmartBoards and related programs
    - SmartNotebook 14.1
    - SmartSlates (advance cert. level required)
    - SmartResponse Remotes (advance cert. level required)
- MS Office Suite – Word, Excel, PowerPoint,
- Media Production – Adobe Suite, Podcasting and Vodcasting
- e-textbooks (if applicable)
- iPads, Nooks, and Tablets
- The CLOUD - Google Drive, Google APPS, DropBox
- Educational Subscription Programs
    - (e.g., SpellingCity, iXL Math, BrainPOP, Globster, Prezi, etc.)
- Using tech tools to enhance learning and lessons/activities
- Using tech tools to engage students in learning and content

PHASE 3 – Continued

ITC Impact on Teachers

Through this targeted training on the use of the school's physical and virtual resources along with strategies for integrating them into the curriculum, teachers will be have to access a variety of programs, subscriptions, materials, and devices to more effectively differentiate instruction in order to accommodate the needs of the diverse student population of [redacted], increase student motivation through the use of multimedia resources and instructional tools, and improve effectiveness and efficiency of instruction through technology programs and electronic learning resources.

ICT Impact on Students

[redacted] students are expected to benefit from the use of 21st Century technology tools and skills in their learning environments and through technology-infused practices. Student interest, engagement in learning, and content learning should increase from being able to develop innovative and creative assignments, create or performance through use of high quality multimedia technologies, to apply higher order thinking skills and problem solving skills that are essential in and across the curriculum. Students are also expected to experience practical application through real world learning and work; resulting in a potential of personal growth, career experience, and possibility of impacting social change.

PHASE 3 – Continued

Job Description

Job Title: Instructional Technology Coach **Job Classification:** Teacher
Department: Educational Technology
Supervisor: Technology Integration Coordinator **Contract:** Academic School Year

Job Summary
Position is primarily responsible for coaching and mentoring instructional staff to integrate technology effectively and efficiently. This involves the knowledge and exercise of observation, training, the pedagogy of integration, and content delivery for adult learners. Creation and management of a technology focused professional learning community and facilitation of technology-related professional development programs.

Essential Duties

1. Collaborates with classroom and subject area instructional staff for instructional planning, co-teaching, and modeling strategies for effectively integrating technology into teaching and learning.
2. Collaborates with educational technology department members, student services coordinators, and curriculum coordinators on technology curriculum development
3. Identifies technology integration competencies and shortfall among instructional staff, in collaboration with technology integration coordinator, and delivers appropriate coaching, training, and resources to support professional growth of adult learners.
4. Researches new technology integration techniques and resources and disseminates to instructional staff.
5. Maintains a current knowledge of effective instructional and coaching pedagogies.

<u>Job Specifications</u>
Master of Education or higher; preference of degree concentration focused on Technology Integration, Technology Curriculum, or Teacher Leadership
Post Graduate teacher's certification or equivalent teaching license.
Minimum of five years K12 teaching experience; preference of international experience
Experience coaching, mentoring, or training adult learners; preference technology related

<u>Minimum Qualifications - Knowledge, Skills, and/or Abilities Required</u>
An in-depth knowledge of instructional technologies, instructional delivery, curriculum development, and data analysis. Ability to communicate effectively verbally and in writing. Must possess the ability to establish and maintain effective working relationships with students, staff, and leadership. Able to work as a leader, member of a team, and independently. Able to manage schedules, prioritize tasks, follow-up with others, and balance multiple mentee. Preference for Spanish communication abilities.

PHASE 3 – Continued

Weekly ICT Schedule for Meetings with Teachers

Length: 30 Min Session   Frequency: 2 to 4 times monthly

	Monday	Tuesday	Wednesday	Thursday	Friday
7:30	*Start of Work Day (Contract Time)*				
7:45	ICT Planning Window	ICT Planning Window	ICT Planning Window	ICT Planning Window	ICT Planning Window
8:00					
8:15	Host Country FLAG Ceremony Requirement. NO Teachers Available at this time.		Meet with Teacher 7		Ed Tech Help Desk Shift
8:30		Meet with Teacher 3		Meet with Teacher 11	
8:45			ITC Worktime		
9:00		ITC Worktime		ITC Worktime	
9:15		Ed Tech Help Desk Shift	Meet with Teacher 8		Meet with Teacher 15
9:30					
9:45			ITC Worktime	Meet with Teacher 12	ITC Worktime
10:00	Start of Wk Mtg with Tech Coor	Window for research and project development			
10:15			Meet with Teacher 9	ITC Worktime	Meet with Teacher 16
10:30	Follow Notes				
10:45			ITC Worktime		ITC Worktime
11:00	Meet with Teacher 1	Meet with Teacher 4		Ed Tech Help Desk Shift	
11:15			Meet with Teacher 10		Meet with Teacher 17
11:30	ITC Worktime	ITC Worktime			
11:45			ITC Worktime		ITC Worktime
12:00	ICT Lunch Window	ICT Lunch Window	ICT Lunch Window	ICT Lunch Window	ICT Lunch Window
12:15					
12:30		Meet with Teacher 5	Division Directed Teacher Activities (Planning, Training, Staff Mtg, Etc) Teachers NOT available to meet with ITC	Meet with Teacher 13	ICT Planning Window
12:45	Meet with Teacher 2				
1:00		ITC Worktime		ITC Worktime	Meet with Teacher 18
1:15	ITC Worktime				
1:30		Meet with Teacher 6		Meet with Teacher 14	ITC Worktime
1:45	Ed Tech Help Desk Shift				
2:00		ITC Worktime		ITC Worktime	End of Wk Mtg with Tech Coor
2:15					
2:30	ICT Planning Window	ICT Planning Window		ICT Planning Window	Reflection Time
2:45					Window for research and project development
3:00	Support Onsite Interactive Whiteboard PD (Phase 2)	Support Onsite Interactive Whiteboard PD (Phase 2)	Support Onsite Interactive Whiteboard PD (Phase 2)	Support Onsite Interactive Whiteboard PD (Phase 2)	
3:15					
3:30					
3:45					
4:00	*End of Work Day (Contract Time)*				

Appendix B: Site and Email Use Permission

[redacted]

October 16, 2014

Nicole Yemothy
[redacted]

Dear Nicole,

Based on my review of your research proposal, I give permission for you to conduct the study entitled "A quantitative cross sectional survey study on improving Educational Technology Integration" within the [redacted]). As part of this study, I authorize you to recruit participants from the [redacted] teacher population through the school email system and share the results of the study at its conclusion with the [redacted] of the [redacted]

Individuals' participation will be voluntary and at their own discretion on their personal time outside of school hours.

We understand that our organization is not responsible for any part of this study. We reserve the right to withdraw from the study at any time if our circumstances change.

I confirm that I am authorized to approve research in this setting.

I understand that the data collected will remain entirely confidential, be fully de-identified, and may not be provided to anyone outside of the research team without permission from the Walden University IRB and the [redacted]

Sincerely,

[redacted]

[redacted]

Appendix C: Email Invitation to Participate

November 17, 2014

Dear [redacted] Colleague –

As you may be aware I am pursuing **my doctoral degree in Teacher Leadership focused on Technology Integration**. I have been researching technology integration in education at the classroom and teacher level for the past 2 years. On November 13, 2014, I received approval from my university's IRB to proceed with my research study.

This next phase of my study as a **doctoral student** includes collecting data from teachers as to their integration of technology in education. More specifically to complete a survey at my research site, which is [redacted] The survey is aimed to learn more from the teacher directly through self-reporting. **The survey focuses on the teacher's use of technology in education at a classroom level, with lesson prep, training, support, and barriers from their point of view.** Lastly the survey also inquires about the teacher's opinions on what more they need for best practice of technology integration.

At the end of this email is **a link to a 30 question survey** that should t**ake approximately 20 minutes** to complete. I would like to ask for your help in completing the survey so that I may complete my research and degree. **You have been selected because you are a certified (nationally or internationally) teacher employed by the research site working in a classroom teacher role. Participation is completely** confidential and **anonymous.** My research study needs 55 certified teachers or more from PK3 to 12th grade at my research site to complete the survey. **The survey is open today until November 30th *at 5pm CST.***

At no time in completing this survey will any information be recorded as to your identity (ie: name, email, etc.). The biographical questions as to years of teaching experience, grade level, and content area are general and cannot be used to identify who chooses to participate. There is no way for myself or any administration of [redacted] nor my university to know if you did or did not chose to participate. **Participation or nonparticipation in no way can affect your employment at [redacted]. You are under no obligation to participate and may choose to delete this invitation at any time. Although I am employed by the research site, I have no supervisory responsibilities over the teachers being asked to voluntarily complete this anonymous survey.**

The survey is completed online through the link (link to survey inserted here) and there is no means of knowing who opts to click the link and / or complete the survey. No tracking of DNS, server information, or IP address are being record.

If you chose to support my research and complete the survey, you are agreeing to the following:

- **You are voluntarily agreeing** to complete the survey.
- **You are giving consent** for the collection of the data from your submitted survey.
- **You may stop the survey at any time if you feel uncomfortable or no longer wish to participate.**
- **You will not be compensated** by any means for participating in the survey.
- You will complete the survey truthfully and honestly from your point of view and not that of your colleagues or students.
- You will complete the survey only once.
- You will not forward the survey link to any teacher outside of the research site (ISP).
- You will not discuss with co-workers your responses or participation.
- You are welcome to keep a copy of this invitation and consent agreement if you wish.

The results of the research study will be compile in to a comprehensive report and shared with the administration leadership team of [redacted]. A copy will be available to any teacher at [redacted] who requests a copy whether or not they participated in the survey. In the report all identifying information as to the research site, country, and its participants will be replaced with pseudonyms and general information to maintain privacy and confidentiality.

The goal in completing this research study about technology integration is to identify from a teacher's point of view issues regarding technology integration, uses of technology at the classroom level, and identify possible solutions or develop a plan for improving technology integration. There are minimal risks associated with this study. However, the potential benefits to [redacted] and its teachers may be the creation of program to improve technology integration support and programming. The results of the study will hopefully be identified by the data collected.

If you have questions about the study or the survey, you may contact me for clarification by email at [redacted]. If you have questions about your right as a research participant, you are welcome to the Walden representative who can discuss these with you by phone **(001-612-312-1210) or** email at irb@waldenu.edu.

Thank you for your time and consideration in participating in my doctoral research. Your support and survey responses are appreciated.

Nicole Yemothy
Doctoral Student, Walden University

Appendix D: Reminder Email Invitation to Participate

2nd Email – Reminder of Participation Window Closing Date To be sent electronically by email.

November 26, 2014

Dear [redacted] Colleague –

On November 17, 2014, you received an invitation email from myself to voluntarily participate in my doctoral research study regarding technology integration. A copy of that email is below. As the participation is anonymous, I do not know if you did or did not participate. If you have already completed the survey, thank you and please disregard this email. If you have not yet participated and may still wish to, there are 5 days remaining on the data collection window. Please review the original invitation email copied below, and if interested use the link to access the confidential anonymous survey. My study needs 55 certified teachers to participate so your time and responses are greatly appreciated.

Thank you and have a [redacted]-rific Day! Nicole

****
Copy of Original Invitation Sent on November 17, 2014 by e-mail

Dear Colleague –

As you may be aware I am pursuing **my doctoral degree in Teacher Leadership focused on Technology Integration**. I have been researching technology integration in education at the classroom and teacher level for the past 2 years. On November 13, 2014, I received approval from my university's IRB to proceed with my research study.

This next phase of my study as a **doctoral student** includes collecting data from teachers as to their integration of technology in education. More specifically to complete a survey at my research site, which is [redacted] The survey is aimed to learn more from the teacher directly through self-reporting. **The survey focuses on the teacher's use of technology in education at a classroom level, with lesson prep, training, support, and barriers from their point of view.** Lastly the survey also inquires about the teacher's opinions on what more they need for best practice of technology integration.

At the end of this email is **a link to a 30 question survey** that should t**ake approximately 20 minutes** to complete. I would like to ask for your help in completing the survey so that I may complete my research and degree. **You have been selected**

because you are a certified (nationally or internationally) teacher employed by the research site working in a classroom teacher role. Participation is completely confidential and **anonymous.** My research study needs 55 certified teachers or more from PK3 to 12th grade at my research site to complete the survey. **The survey is open today until November 30, 2014 at 5pm CST.**

At no time in completing this survey will any information be recorded as to your identity (ie: name, email, etc.). The biographical questions as to years of teaching experience, grade level, and content area are general and cannot be used to identify who chooses to participate. There is no way for myself or any administration of [redacted] nor my university to know if you did or did not chose to participate. **Participation or nonparticipation in no way can affect your employment at [redacted]. You are under no obligation to participate and may choose to delete this invitation at any time. Although I am employed by the research site, I have no supervisory responsibilities over the teachers being asked to voluntarily complete this anonymous survey.**

The survey is completed online through the link (link to survey inserted here) and there is no means of knowing who opts to click the link and / or complete the survey. No tracking of DNS, server information, or IP address are being record.

If you chose to support my research and complete the survey, you are agreeing to the following:

- **You are voluntarily agreeing** to complete the survey.
- **You are giving consent** for the collection of the data from your submitted survey.
- **You may stop the survey at any time if you feel uncomfortable or no longer wish to participate.**
- **You will not be compensated** by any means for participating in the survey.
- You will complete the survey truthfully and honestly from your point of view and not that of your colleagues or students.
- You will complete the survey only once.
- You will not forward the survey link to any teacher outside of the research site (ISP).
- You will not discuss with co-workers your responses or participation.
- You are welcome to keep a copy of this invitation and consent agreement if you wish.

The results of the research study will be compile in to a comprehensive report and shared with the administration leadership team of [redacted]. A copy will be available to any teacher at [redacted] who requests a copy whether or not they participated in the survey. In the report all identifying information as to the research site, country, and its participants will be replaced with pseudonyms and general information to maintain privacy and confidentiality.

The goal in completing this research study about technology integration is to identify from a teacher's point of view issues regarding technology integration, uses of technology at the classroom level, and identify possible solutions or develop a plan for improving technology integration. There are minimal risks associated with this study. However, the potential benefits to [redacted] and its teachers may be the creation of program to improve technology integration support and programming. The results of the study will hopefully be identified by the data collected.

If you have questions about the study or the survey, you may contact me for clarification by email at [redacted]. If you have questions about your right as a research participant, you are welcome to the Walden representative who can discuss these with you by phone **(001-612-312-1210) or** email at irb@waldenu.edu.

Thank you for your time and consideration in participating in my doctoral research. Your support and survey responses are appreciated.

Nicole Yemothy
Doctoral Student, Walden University

Appendix E: Educational Technology Integration Questionnaire

Educational Technology Integration Questionnaire

DEFINITIONS:

- **E-mail (Electronic mail) –** Refers to text messages transmitted across networks and usually accessible only by the addressee.
- **Distance learning** – Refers to the transmission of information from one geographic location to another via various modes of telecommunications technology.
- **Multimedia –** Refers to the use of a computer to produce any combination of text, full color images and graphics, video, animation, and sound.
- **Self-contained classroom teacher** – Teaches all or most academic subjects to the same group of students all or most of the day.

Because teachers use technology in different ways, the following questions refer to the way in which you use computers, technology and the Internet. Because your responses to some questions may be different for different classes/sections you teach, please select a single class/section to use in your responses. The class you select should represent a typical class you teach in your main subject area.

Consent and acknowledgement questions in order to proceed.

I acknowledge the information explained above. Yes.......... 1 No 2

I agree to follow the protocols identified here. Yes.......... 1 No 2

A) I will complete the survey truthfully and honestly from your point of view and not that of your colleagues or students.
B) I will complete the survey only once.
C) I will not forward the survey link to any teacher(s) outside of the research site (CAA).
D) I will not discuss with co-workers your responses or participation.

Technology Access

1. How many school provided computers (including laptops) are located in your classroom? ________
2. How many of these school provided computers (including laptops) located in your classroom
   a. have access to the Internet? ______
   b. are used for instruction? ______
   c. are used by students? ______
3. On average, you use computers or the Internet for instruction during class time?

a. Regularly – more than 75% of the time
b. Often – about 50% of the time.
c. Sometimes – about 25% of the time.
d. Seldom – less than 15% of the time.

4. Do you assign projects that require your students to use a computer:
   a. Inside the classroom? Yes.......... 1 No 2
   b. Outside the classroom? Yes.......... 1 No 2
5. Approximately, what percentage of your students have access to a computer at home? ______%

Technology Usage

6. Are the following available to you, and if yes, to what extent do you use them?

Available		If available, extent of use	
1 = Yes 2 = No	|	1 = Not at All	2 = Small Extent
		3 = Moderate Extent	4 = Large Extent

a. Computers in your classroom ....1 2 | 1 2 3 4
b. Computers elsewhere in the school (e.g., library, computer lab) ..... 1 2 | 1 2 3 4
c. Computers at home .... 1 2 | 1 2 3 4
d. Tablets or iPads in your classroom ....1 2 | 1 2 3 4
e. Internet in your classroom ....1 2 | 1 2 3 4
f. Internet elsewhere in the school (e.g., library, computer lab) ....1 2 | 1 2 3 4
g. Internet at home ....1 2 | 1 2 3 4
h. E-mail at school ....1 2 | 1 2 3 4
i. School network through which you can access the Internet from home ..1 2 | 1 2 3 4
j. Interactive Technology (e.g., SmartBoards, Mimio Bars)..................1 2 | 1 2 3 4
k. Classroom Technology (e.g., document cameras, scanner, cameras, etc.)..1 2 | 1 2 3 4
l. Virtual Learning Networks (e.g., Canvas, Moodle, Ed Modo, etc.)....1 2 | 1 2 3 4

7. To what extent do you assign students in your typical class, work that involves using computers or the Internet in the following ways? (If your school does not have these capabilities please circle 5.)

1 = Not At All 2 = Small Extent 3 = Moderate extent
4 = Large extent 5 = N/A

a. Practice drills 1 2 3 4 5
b. Solve problems or analyze data 1 2 3 4 5
c. Use computer applications such as word processing, spreadsheets, etc . 1 2 3 4 5
d. Graphical presentation of materials 1 2 3 4 5

e. Demonstrations or simulations... 1 2 3 4 5
f. Produce multimedia reports or projects 1 2 3 4 5
g. Research using CD-ROM or DVD 1 2 3 4 5
h. Research using the Internet 1 2 3 4 5
i. Use or read from e-books or i-publications 1 2 3 4 5
j. Correspond with experts, authors, students from other schools, etc.,
via e-mail or Internet 1 2 3 4 5

8. On average, how frequently do students in your typical class use each of the following during class time?

1 = Not At All 2 = Rarely 3 = Sometimes 4 = Often

a. Computers in the classroom 1 2 3 4
b. Computers in a computer lab or library/media center 1 2 3 4
c. Internet from the classroom 1 2 3 4
d. Internet from a computer lab or library/media center 1 2 3 4
e. Distance learning (ie: Canvas, Moodle, Ed Modo) via the Internet........... 1 2 3 4
f. Graphing calculators 1 2 3 4

9. For each objective listed below, please indicate how much you use computers or the Internet at SCHOOL to accomplish this goal.

1 = Not at All 2 = Small Extent
3 = Moderate Extent 4 = Large Extent

a. Create instructional materials (i.e., handouts, tests, etc.) 1 2 3 4
b. Gather information for planning lessons 1 2 3 4
c. Access model lesson plans 1 2 3 4
d. Access research and best practices for teaching 1 2 3 4
e. Multimedia presentations for the classroom 1 2 3 4
f. Administrative record keeping (i.e., grades, attendance, etc.) 1 2 3 4
g. Communicate with colleagues/other professionals 1 2 3 4
h. Communicate with students' parents 1 2 3 4
i. Communicate with student(s) outside the classroom hours 1 2 3 4
j. Post homework or other class requirements or project information 1 2 3 4
k. Other (specify) ____ 1 2 3 4

10. For each objective listed below, please indicate how much you use computers or the Internet at HOME to accomplish this goal.

1 = Not at All 2 = Small Extent
3 = Moderate Extent 4 = Large Extent

a. Create instructional materials (i.e., handouts, tests, etc.) 1 2 3 4

b. Gather information for planning lessons 1 2 3 4
c. Access model lesson plans 1 2 3 4
d. Access research and best practices for teaching 1 2 3 4
e. Multimedia presentations for the classroom 1 2 3 4
f. Administrative record keeping (i.e., grades, attendance, etc.) 1 2 3 4
g. Communicate with colleagues/other professionals 1 2 3 4
h. Communicate with students' parents 1 2 3 4
i. Communicate with student(s) outside the classroom hours 1 2 3 4
j. Post homework or other class requirements or project information 1 2 3 4
k. Other (specify) ____ 1 2 3 4

Confidence with Using Technology

1 = strongly disagree 2 = disagree
3 = undecided 4 = agree 5 = strongly agree

11. I feel confident that I could:

a. send an email to a colleague, student, or parent 1 2 3 4 5
b. send a document as an attachment to an email message 1 2 3 4 5
c. use an internet search engine (e.g. Google, Bing, etc) to find a website on a specific subject matter. 1 2 3 4 5
d. use a spreadsheet to create a pie chart on the proportions of the different colors of M & M in a bag. 1 2 3 4 5
e. use a web based subscription or program (RazKids, Spelling City, BrainPOP) in my classroom with my students. 1 2 3 4 5
f. configure settings such as headers, footers, margins, columns, tabs on a word processing document 1 2 3 4 5
g. create a newsletter with graphics and text in columns 1 2 3 4 5
h. use the computer to create slideshow presentation (PowerPoint)....................... 1 2 3 4 5
i. write a short essay describing how you would use technology in your classroom 1 2 3 4 5
j. create a lesson that incorporates subject matter software as an integral part 1 2 3 4 5
k. use technology to collaborate with other interns, teachers, or students who are distant from my classroom (Canvas, Moodle, Google Drive, etc). 1 2 3 4 5

Technology Barriers and Concerns

12. Please indicate to what extent, if any, each of the following are barriers to your use of school computers, technology, or the Internet for instruction.

1 = Not a barrier 2 = Small barrier 3 = Moderate barrier 4 = Great barrier

a. Not enough computers 1 2 3 4
b. Outdated, incompatible, or unreliable computers 1 2 3 4

c. Internet access is not easily accessible 1 2 3 4
d. Internet connection is irregular, unstable, or not dependable 1 2 3 4
e. Lack of good instructional software 1 2 3 4
f. Inadequate training opportunities 1 2 3 4
g. Lack of release time for teachers to learn/practice/plan ways to use
computers or the Internet 1 2 3 4
h. Lack of administrative support 1 2 3 4
i. Lack of support regarding ways to integrate technology into the
curriculum 1 2 3 4
j. Lack of technical support or advice 1 2 3 4
k. Lack of time in schedule for students to use computers in class 1 2 3 4
l. Concern of students' technology skills exceeding that of educator 1 2 3 4
m. Hesitation due to lack of personal knowledge about specific programs ...1 2 3 4
n. Concern with limited experience using specific software or websites 1 2 3 4
o. Concerns with limited experience using technology devices 1 2 3 4
p. Concern about student access to inappropriate materials 1 2 3 4
q. Lack of funding to purchase desired technology
(equipment or programs) 1 2 3 4
r. Other (specify) ____________________________ 1 2 3 4

Technology Training and Professional Development

13. In your opinion, how well prepared are you to use computers and the Internet for classroom instruction?

Not at all prepared...... 1 Somewhat prepared.... 2
Well prepared............. 3 Very well prepared...... 4

14. To what extent have each of the following prepared you to use computers and the Internet?

1 = Not At All 2 = Small Extent 3 = Moderate extent 4 = Large extent

a. College/graduate work 1 2 3 4
b. Professional development activities (outside of school)........................... 1 2 3 4
c. Professional development activities (at your school) 1 2 3 4
d. Colleagues 1 2 3 4
e. Students.. 1 2 3 4
f. Independent learning 1 2 3 4

15. How many hours of formal professional development in the use of computers and the Internet did you participate in during the last 3 years?

0 hours .... 1 9-32 hours................................. 3

1-8 hours.................................... 2   More than 32 hours 4

16. Does your school's administration:

1 = Yes   2 = No

a. Require technology training for teachers? 1 2
b. Encourage technology training without incentives? 1 2
c. Encourage technology training with incentives? 1 2
d. Leave it up to teachers to initiate participation? 1 2

17. Does your school make the following types of training available to you and, if yes, have you ever participated in these programs?

1 = I don't know if it is available   2 = No, not available
3 = Yes, but I do not participate   4 = Yes & I participate

a. Use of computers in general or basic computer training 1 2 3 4
b. Software applications (Word, Excel, PowerPoint, etc.) 1 2 3 4
c. Educational platforms (Canvas, RenWeb, Google Docs, etc.) 1 2 3 4
d. Educational subscriptions (iXL Math, Spelling City, RazKids, etc.).........1 2 3 4
e. Use of technology devices (ie: SmartBoards, iPads, Doc Cameras)
f. Use of the Internet 1 2 3 4
g. Use of other advanced telecommunications
(ie: interactive audio, video, skype) 1 2 3 4
h. Integration of technology into the curriculum/classroom instruction 1 2 3 4
i. Follow-up and/or advanced training... 1 2 3 4

18. If you do not participate in training that is available at your school, why not?
    a. Times training is offered during the school day conflicts with my teaching schedule.
    b. Other school commitments (after school sports, department responsibilities, committees, etc.)
    c. Training topics are not what I needs training for.
    d. Family or day care issues with after school options.
    e. I prefer more one-to-one support for my specific needs.
    f. Personal reasons
    g. Other ________________________________

Technology Support

19. Is there a "technology coordinator" (i.e., someone on the school who coordinates teachers' instructional use of computers and helps you or other teachers use computers) at your school?

Yes......... 1   No........... 2

20. Please indicate who at your school provides computer-related assistance to you for each of the following? (Circle all that apply.)

    1 = Use of computers 2 = Use of the Internet 3 = Technical support
    4 = Integrating technology 5 = Locating software 6 = Setting up
    Educational Programs

    a. Technology Coordinator 1 2 3 4 5 6
    b. Technology Specialist / Technology Teachers 1 2 3 4 5 6
    c. Library/Media specialist 1 2 3 4 5 6
    d. Fellow Classroom teacher(s) 1 2 3 4 5 6
    e. IT Help Desk Team...1 2 3 4 5 6
    f. Students 1 2 3 4 5 6
    g. No assistance provided 1 2 3 4 5 6
    h. Other (specify) _________________________ 1 2 3 4 5 6

Participant's Expanded Responses (open ended responses)

21. Supposed your school administration annually made additional resources available (e.g. release time for improving computer-based instruction, technology specialist training, technology support coaching, etc.) In your opinion:
    h. what kind of resources (programs or people) should they provide?
    i. how would you like to see those resources used in order to improve your instructional use of computers?
22. Describe the ideal use, if any, of computer technology in the classroom.
23. Describe the ideal instructional technology support system, if any, you would like to have available to you as an educator.
24. Describe how access to instructional technology support system described in your response to question 23 would impact your use of technology in the classroom.

Survey Participant's Biographical Background

25. Including this school year, how many years have you been employed as a teacher? _______Years (Include years spent teaching both full and part time and in public and private schools.)
    j. 1 year
    k. 2 to 3 years
    l. 4 to 6 years
    m. 7 to 10 years
    n. 11 to 15 years
    o. 16 to 20 years
    p. 21 or more years

26. Gender Male Female

27. What is the primary language you teach in:
    q. English

r. Spanish
s. Other_____________

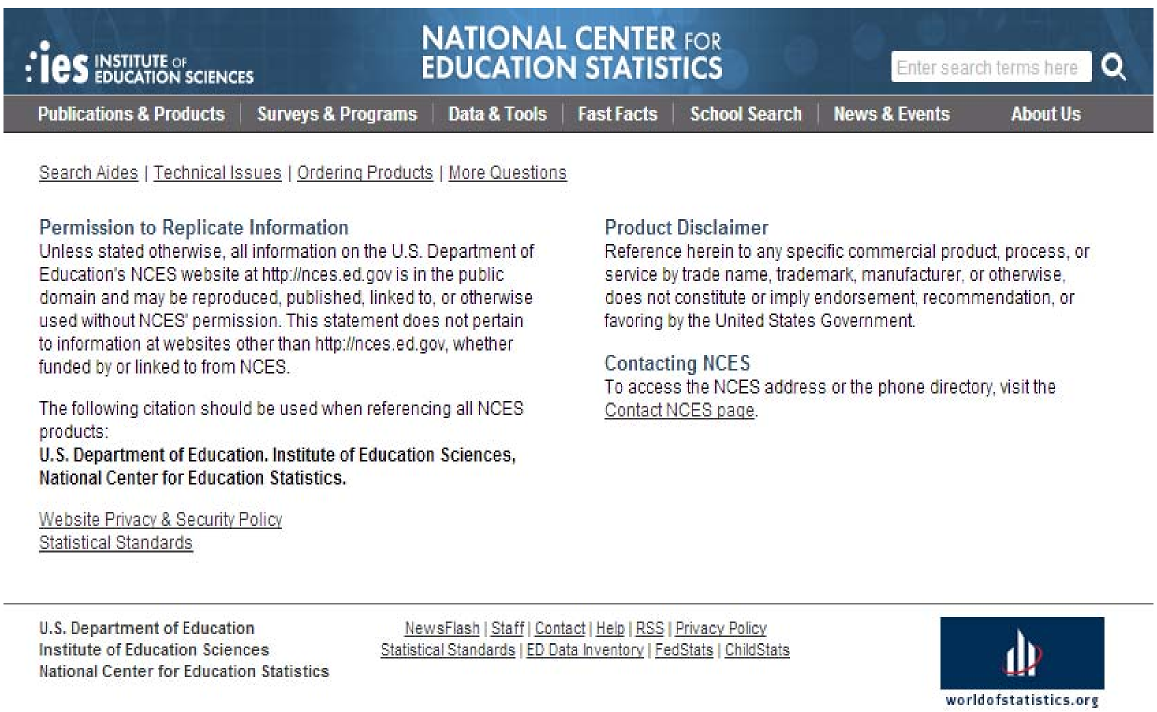
28. What grade(s) do you currently teach at this school?
(Circle the area where you spend the majority = 75% or more of your instructional time)
    a. Pre-Kinder & Kinder Program
    b. Elementary Level (Grades 1 to 5)
    c. Middle School Level (Grades 6 to 8)
    d. High School Level (Grades 9 to 12)
    e. Specialists or Coordinator across the multiple grade levels

29. What is your main teaching assignment (the field in which you teach the most classes)? (Circle one.)

Self-contained (see definition on cover) 1
English/language arts 2
Mathematics 3
Science 4
Social studies/social science 5
Foreign language 6
Arts (e.g., visual arts, music, drama, etc.) 7
Technology/computer science 8
PE/Health 9
Other (specify) _________________________ 10

Appendix F: Permission to Use the Public School Teachers Use of Computers and the Internet Survey

Permission to use the Public School Teachers Use of Computers and the Internet Survey was granted on the United States Department of Education's National Center for Education Statistics website: http://nces.ed.gov/help/. The full survey is available from http://nces.ed.gov/surveys/frss/publications/2000102/pdf/questionnaire.pdf


ies INSTITUTE OF EDUCATION SCIENCES

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Appendix G: Permission to Use TPSA Survey

Permission to use the TPSA survey was granted on the Integration of Technology into Teaching and Learning website: http://www.iittl.unt.edu/pt3II/book1.htm. The full survey is available from http://courseweb.unt.edu/gjones/summer2003/cecs5420/Sum2 .03.5420.1/TheresaOverall/instruments/tpsa.pdf.

Instruments for Assessing Educator Progress in Technology Integration

by

Gerald A. Knezek

Rhonda W. Christensen

Keiko T. Miyashita

Margaret M. Ropp

with contributions by Dana Arrowood, Elizabeth Gilmore , Darlene Griffin , Alan Livingston , Josi Reyna, Rebecca Swartz

This web site was created as part of the US. Dept. of Ed.
PT3 Implementation Grant #P342A000123A.
Last updated: January 01, 2002.
For comments or questions, contact Linda McDonald Robinson.

Appendix H: Permission to Use TIQ2 and TIQ3 Survey

Gmail by Google

Nicole Yemothy <nicole.yemothy@waldenu.edu>

Permission to use TIQ Survey V2 & V3 in Doctoral Study

[redacted]

Sun, Dec 1, 2013 at 3:51 PM

You have permission to use the TIQ provided you send a copy of the results, papers, and publications that arise from it's use.

[redacted]
Centre for the Study of Learning & Performance
LB-589-2, Concordia University
1455 DeMaisonneuve Blvd. W.
Montreal, Quebec CANADA H3G 1M8
514-848-2424 x2102 (phone)
514-848-2424 x2020 (sec'y)
514-848-4520 (fax)
[redacted]
http://doe.concordia.ca/cslp/

[redacted] writes:
>
>
>
>CENTRE FOR THE STUDY OF LEARNING AND PERFORMANCE
>McConnell Building, 1455 de Maisonneuve Blvd. W., LB-581
>Montreal, Quebec, Canada H3G 1M8 Tel: (514) 848-2020
>
>
>
>Dear Dr. Abrami, Dr. Lysenko, and Ms. Sclater,
>
>I am seeking permission to use the Technology Implementation
>Questionnaire (TIQ) survey - versions 2 and version 3. I have attached a
>copy of the survey for reference. I wish to use Sections 3, 4, & 5 of TIQ
>Version 2 and Sections 1 and 2 of TIQ Version 3.
>
>I am a doctoral candidate with Walden's university in their Ed Doctoral
>program with a focus on Teacher Leadership and more specifically
>Educational Technology. I am preparing a cross-sectional survey on