# An examination of technology training experiences
from teacher candidacy to in-service professional development

Mable Evans Williams
Jackson State University

ABSTRACT

The purpose of this qualitative study was to explore the perceptions of in-service teachers concerning the effectiveness of technology training from a teacher education preparation program to in-service professional development. The findings of the study revealed that in-service teachers have had varying degrees of technology experiences from their teacher education preparation programs to professional development training ranging from no experience to applicable experiences to help foster transition into classroom teaching and learning. An effective training system in teacher education programs should be implemented to ensure that, with the presence and introduction of new technology in the classroom, the teachers are equipped with newly developed skills. The technology skills that in-service teachers placed the most value on achieving related to the technology tools associated with their discipline of teaching. The skills of the teachers should be aligned with the technology integration expectations for school adopted technology. Therefore, it is important to ensure that the technology aspect of in-service teaching is applicable to different academic subjects such as reading and math for example.

Keywords: technology skills, technology training, teacher candidates, in-service teachers, professional development
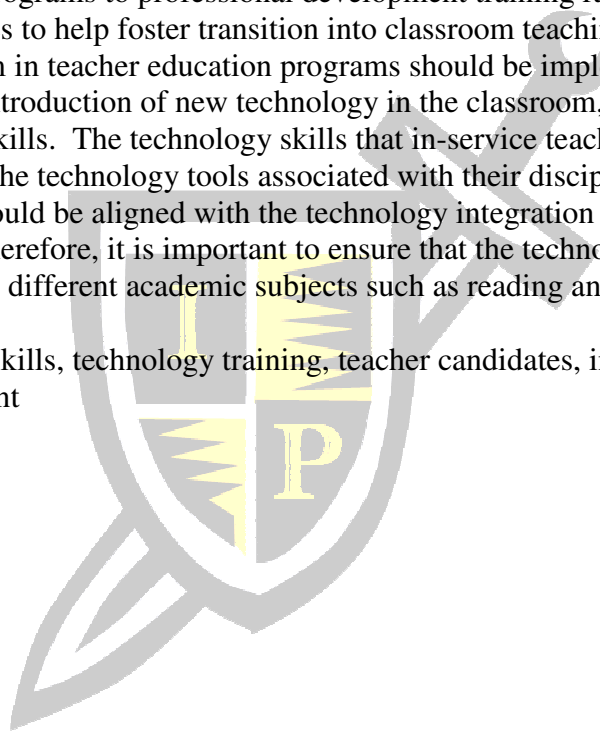
INTRODUCTION

Historically, the challenge to revamp the roles of education and learning for the 21st Century began over twenty-five years ago when the United States government reported spending more on information technology than industrial goods for the first time in its economy. Due to this phenomenon, the United States transitioned from an industrial driven economy to a knowledge driven economy. This historical period in the United States is referred to as the birth of the Knowledge/Information Age – an age that generates computerized data through information and knowledge resources (Afshari, Bakar, Luan, Samah, & Fooi, 2009; Goldman, Hamilton, Howell, Knezek, & McLaughlin, 2009; Trilling & Hood, 1999). The concept of integrating technology into curricula to infuse teaching and learning has long been one of the most critical reform initiatives in American educational history (Afshari et al, 2009). According to national world education rankings, the United States of America's education system is not working as it should in the 21st Century (Desilver, 2015; Goodman, Sands, & Coley, 2015; Peterson, Woessmann, Hanushek, & Lastra-Anadon, 2011; Sparks, 2015). At present, the U. S. Education system falls far behind other countries around the world in terms of positive graduation rates for high schools and postsecondary education (Ingram, 2014; Schleicher, 2012).

The United States Department of Education's Office of Educational Technology [OET] (2010) has worked vigorously to transform American education by establishing a National Education Technology Plan that includes recommended goals to connect student learning outcomes with technology for the present global knowledge-oriented society. The goals have been established for states, districts, the federal government, and other key stakeholders that are driven by technology integration for learning, teaching, assessment, infrastructure, and productivity. However, Bullock (2013) indicated that the responsibility rests with the Teacher Education Programs that serve as the foundation to prepare teacher candidates to apply enriched, digital literacy skills in the classroom. Conversely, other researchers claim that more than teacher education programs should be the focus of transforming the way that teachers have previously been trained to deliver instruction. A greater challenge exists with the school systems redesigning the learning climate with modern tools to support teachers in modeling effective teaching in the re-modeled learning spaces (Goldman, et al., 2009). Many of the failings in the public education system stem from the failure to engage the hearts and minds of the students we serve (OET, 2010). As a result, American students are ranked below average Internationally in terms of literacy and K-12 STEM (Science, Technology, Engineering, and Mathematics) education (Desilver, 2015; Harkness, 2015).

Technology Training Experiences of Teacher Candidates

Many stakeholders are involved in decision-making with teacher education programs across the nation from state-level governing bodies and institutions to teacher organizations, and the federal government. Politics on all levels, however, can get in the way of a shared vision among stakeholders concerning how to best train teacher candidates to understand and effectively integrate technology in 21st Century student learning. Considering that technologies that gauge student learning for real-world application change at a much faster pace than education preparation programs are able to learn, model, and practice, teacher candidates must be taught to understand how technology influences the lives of students and unite its relationship in

learning to application and purpose in society (Childress, 2014; Goldman et al., 2009). In fact, OET (2010) stated that:

> Many of the existing educators do not have the same understanding of and ease with using technology that is part of the daily lives of professionals in other areas. The same can be said of many educational leaders and policy makers in schools, districts, and states and of the higher education institutions that prepare educators for the field (p. 40)

According to several qualitative studies on strategies to prepare pre-service teachers to integrate technology, technology is considerably underutilized by pre-service teachers and a disconnect exists between technology experiences learned in program courses vs. practice for the real classrooms (Tondeur et al., 2012). Every teacher education program is governed by the Council for Accreditation Education Programs (CAEP, 2013). CAEP provides a national framework to measure the quality of education preparation programs through evidence-based analysis that prepare teacher candidates to teach effectively (Childress, 2014).

Several researches, however, have claimed that not all teacher education programs across the nation are able to successfully prepare teacher candidates to learn and transfer technology in the classroom. The argument is that there appears to be a disconnect in the way that teacher education programs understand what technology experiences should be taught for effective transfer to the classrooms. Further discoveries reveal that even when teacher candidates and students both are comfortable with using technology, the purpose and role of technology uses for learning is not taking place (Ottenbreit-Leftwich et al., 2012; Tondeur et al., 2012; Sutton, 2011).

In support of those claims, some in-service teachers indicated that they have had very little or no prior experience in the effective use of technology in the classroom (Chavis, 2015). The researchers assert that in-service teachers need assistance transforming teaching pedagogy that is enriched with creating a technology-enriched learning environment (Kereluik, Mishra, Fahnoe & Terry 2013; Mundy & Kupczynski, 2013; Spazak, 2013). Furthermore, research indicates that most teachers do not integrate technology into the curriculum (Afshari, Bakar, Luan, & Siraj, 2012). Teachers have been known to be uncomfortable with using technology with instruction due to its constant changing nature (Mundy & Kupczynski, 2013). Even when in-service teachers attend school assigned professional development, the choice in which professional development to attend is frequently optional. Therefore, many in-service teachers do not understand the importance of participating in an educational technology professional development session because they were not required to take educational technology courses during their teacher preparation program (Chavis & Kim, 2015).

Sutton (2011) noted several consequences that affect the success of pre-service teacher preparedness, according to the NETS.T Essential Conditions. Teacher education programs must have competent faculty who can demonstrate how to integrate technology into different instructional content areas. Additionally, students should be provided with authentic and hands-on learning experiences to create student-centered, technology enhanced lessons during their learning experience. Pre-service teachers should also be provided access to technology resources. Faculty should be evaluated by the institution based on their technology innovation. Brush and Hew (2008) discovered similar issues with the lack of technology resources and modeling of integrating technology in teacher education programs hinder teacher preparedness for the classroom.

In support of the discoveries, several recent recommendations to integrate technology throughout the CAEP standards were identified as follows:

- Consider all stakeholders as both teachers and learners.
- Avoid "piecemeal" or "add-on" approaches and focus on "infusion" across the program.
- Encourage and support the creation of technology-focused professional learning communities.
- Consider implementing a technology-related exit exam.
- Provide mentors to help guide the understanding of technology integration.
- Faculty must demonstrate knowledge/awareness of technology.
- Understanding and using technology must be incorporated into the promotion and tenure process.
- Ensure clinical placements are with cooperating school personnel who embrace technology.
- New teachers must receive induction training/materials to facilitate technology integration (Childress, 2014, p. 104)

Technology Training Experiences of In-Service Teachers

In the 21st Century, the role of the teacher has transformed from a teacher-centered environment to a student-centered environment that is connected to technology for better-quality student achievement (Mundy, Kupczynski, & Kee, 2012; P21, 2011). One major challenge for districts is preparing teachers who are well practiced in traditional classroom delivery methods to integrate educational technology into curricula. Moreover, some teachers and schools may lack the infrastructure or knowledge base to effectively integrate technology into instruction (Hanover Research, 2014). However, the switch to a student-centered environment does not diminish the importance of the teacher's responsibility in planning the best pedagogical strategies that compliment technology integration into student learning (Spazak, 2013). Schwab (2015) reported from "an ongoing action research project" that many in-service teachers still have a limited perception of connecting technology integration to pedagogy. Instead, the in-service teachers perceive the application of technology into teaching as a resource tool (para. 12).

Traditionally, common technology tools teachers are accustomed with using include pencils, paper, computers, and projectors. However, the use of digital and communication web-based tools require teachers to do more than just be aware of the Internet location and purpose of the tools, but to learn how to use the tools proficiently to model, facilitate, and provide technical interventions (Chavis & Kim, 2015). In addition, teachers that have learned to teach by traditional methods find it difficult to change their style of pedagogy. To that end, a host of barriers swirl around teachers' integration of technology into instructional content areas for delivery and transfer of active student engagement. Barriers can include lack of technology skills, understanding the important role of technology in a global economy, lack of building-level support, and lack of technology resources (Brown-Joseph, 2010; Tondeur et al., 2012).

According to a recent study by Mundy and Kupzynski (2013), teachers need help adjusting to the change in pedagogy to address technology integration in their instructional content areas. Teachers that were found comfortable with using technology only used it as a teacher-centered approach as a resource aid to lecture (Davies & West, 2013; Ottenbreit-Leftwich et al., 2012). In review of several research studies, Mundy, Kupczynski, and Lee

(2012) found that more than fifty percent of teachers who have computers in their classrooms are mainly using them for administrative purposes, not engaging students in technology rich content.

In a nationwide survey of K-12 teachers, answers revealed that technology infrastructure in schools has improved. Training support, however, must become a priority to ensure that teachers understand how to effectively integrate technology into their lesson plans. Sixty-percent of K-12 teachers believe adequate preparation has not occurred to support the level of implementation of technology to enhance student outcomes. Ninety-one percent of teachers believe that current training on using technology is necessary to model 21st Century learning. Furthermore, the responses of the survey reveal that teachers would like to receive an all-day professional development session on fundamental training, applying, and integrating technology. The teachers have additionally expressed being accommodated with pre-built lesson plans that incorporate technology integration (Business Wire, 2015; Mundi & Kupzynski, 2013).

According to Davies and West (2013), professional development training related to technology topics for teachers have been limited to five model types: (1) software-focus (2) demonstrations of sample resources, lessons, and projects (3) technology-based educational reform efforts (4) structured/standardized professional development workshops or courses, and (5) technology-focused teacher education courses. As a result, some scholars criticize the approaches of professional development efforts on technology integration because typically the sessions are limited to promoting teacher's self-efficacy and attitude toward technology.

The Department of Education's (OET) believes "effective teaching is an outcome of preparing and continually training teachers and leaders to guide the type of learning that we want in our schools" (2010, p. 5). To that end, teachers need adequate training time to become familiar with how to use the new kind of technologies for learning (Sabzian, Gilakjani, & Sodouri, 2013). Research showed that integration of technology does not happen over a short period of time. Teachers need to have the opportunity to model the technology, monitor student progress in behavior, motivation, and assessment which can take can take a number of years to see the technology effects on learning (Moeller & Reitzes, 2011). In some instances, teachers are faced with not being able to access the technology of choice because it is not available on the school network for the students to use so an alternative technology has to be taken into consideration (Davies & West, 2013).

Purpose of the Study

The purpose of this qualitative study was to explore the perceptions of in-service teachers about how their teacher preparation programs prepared them to utilize, transfer, and integrate technology into instructional content areas. In detail, this study explored the perceptions of in-service teachers' technology training received during the teacher education preparation program to their perceptions of in-service professional development training experiences.

Theoretical Framework

This study was grounded in the theoretical framework of ISTE's Essential Conditions that serve nationally as a foundation for universal technology integration for teacher educators and school leaders globally. The framework is research-proven "to guide implementation of the ISTE Standards, tech planning, and system-wide change" (ISTE Essential Conditions, para. 1).

Swanson (2013) defines a theoretical framework as:

> Theories that are formulated to explain, predict, and understand phenomena and, in many cases, to challenge and extend existing knowledge within the limits of critical bounding assumptions. The theoretical framework is the structure that can hold or support a theory of a research study. The theoretical framework introduces and describes the theory that explains why the research problem under study exists (para. 1).

Specific to teacher educators, 10 of the 14 ISTE Essential Conditions are significant for Implementing ISTE Standards for Teachers aimed at effective technology integration: (a) shared vision, (b) equitable access, (c) skilled personnel, (d) ongoing professional development, (e) technical support, (f) curriculum framework, (g) student-centered learning (h) assessment and evaluation (i) engaged communities, and (j) support policies as indicated in Table 1 (Appendix)

Research Design and Methodology

To research the perceptions of in-service teachers' technology integration experiences into instructional content areas, this study used a qualitative research design with a phenomenological approach. Qualitative research "is a means for exploring and understanding the meaning individuals or groups ascribe to a social or human problem" (Creswell, 2013, p. 246). The qualitative design is distinctive in its' characteristics concerning the natural setting, the multiple methods of data, inductive data analysis, emergent design, interpretive inquiry, and the holistic account (Creswell, 2013; Marshall & Rossman, 2010). Phenomenology is "the study of experience through reflection. The individual reflects on an experience and describes its essences through imaginative manipulation (an intuitive grasping of what is essential about an instance). It is not a passive process, but rather an active sifting through of contingencies and variables to perceive the essential character of an instance or experience" (Given, 2008, p. 614). Using the phenomenological study strategy, the researcher described meanings for the selected population regarding their experiences of a concept or a phenomenon. The simple purpose of phenomenology is to condense individual experiences with a phenomenon to a "description of the universal essence" (Creswell, 2007, p. 58).

Participation was requested from teachers who (1) were employed by the selected public school district during the 2015-2016 academic school year, (2) certified to teach K-12, (3) completed a traditional teacher education degree program at an accredited 4-year university/college, and (4) completed the Digital Opportunity Trust [DOT] TeachUp! USA Program. The population of interest was asked to participate in an electronic demographic survey and a semi-structured interview. The in-service teachers in the school district were selected based on their participation and completion of the DOT TeachUp! USA Technology Empowerment Program. The TeachUp! USA Program was a partnership between DOT USA

and the AmeriCorps Corporation for National Community Service [CNCS] organization to deliver a technology-integration and digital literacy program to high-need, low-performing schools. The direct role of AmeriCorps included providing Interns to serve as technology coaches that support teachers in improving instruction for at-risk students in K-12 schools (CNCS, 2012).

Description of the Site

The site selected for this study was a school district in the Southeastern United States. The school district was comprised of eight schools: one high school, one middle school, four elementary schools, one education center, and one vocational complex. Onsite interviews were conducted at two of the district's elementary schools. Elementary School I was supervised by one building administrator serving 480 students K-5. The number of staff at the school was 51, with 15 years' average teaching experience. Elementary School II was supervised by one building administrator serving 508 students PK-5. The number of staff was 76, with 11 years' average teaching experience.

Description of Participants

Jean is a 42-year-old female in her eighth year of teaching third grade mathematics. She has 10 years' experience as a teacher and holds a Specialist Degree and a Class AAA Educator License with endorsements in Elementary (4-6), English (7-12), Kindergarten (K-4), and Reading K-12). Jean believed that she was well prepared in the Teacher Education Program to apply technology integration in a classroom setting. She felt, however, that continuous technology training should be made available to support new and veteran teachers.

Leroy, a 34-year old male, was in his ninth year of teaching 3rd Grade Math, Science, English, Social Studies, and Health. Mr. Leroy had nine years' experience as a teacher and he had a bachelor's degree and a Class A Educator License with endorsements in Elementary Education (K-6), Mathematics (7-12), and General Sciences (7-12). In Leroy's experience with his undergraduate teaching program, he remembered the instructors demonstrating lectures with PowerPoints. Leroy felt confident in his ability to learn how to integrate technology through self-practice.

Caitlyn, a 38-year old female, was in her third year of teaching 5th Grade Math. Caitlyn had 14 years' experience as a teacher and held a specialist degree and a Class AAA Educator License with endorsements in Elementary Education (4-6), Kindergarten (K-4), and Reading (K-12). Caitlyn recalled varied instances of applying technology integration as an undergraduate student such as using the ERIC database, Microsoft Office, Clicker technology, and different types of classroom equipment such as a projector, scanner, etc. Caitlyn believed strongly in integrating technology tools in instruction because her students tended to be more engaged in learning Math skills. Unfortunately, Caitlyn often experienced loss of Internet connection due to the location of her classroom.

Julie, a 46-year old female, in her 10th year of teaching third grade math, science, English, and social studies. Julie had 16 years' experience as a teacher and she had a master's degree with a Class AA Educator License with endorsements in Elementary Education (4-6) Kindergarten (K-4) and Social Studies (7-12). Julie learned how to use Microsoft Applications to complete coursework in her undergraduate training. Julie believed that teachers should not be

subjected to restricted network access in the classroom to better accommodate the needs of the students.

Margaret, a 54-year-old female, is in her twentieth year of teaching fifth grade math. Margaret had over 25 years' experience as a teacher and she had a master's degree with a Class AA Educator License with endorsements in Elementary Education (K-6). When Margaret was in the Teacher Education Program, technology integration into curriculum planning was not available. However, Margaret expressed a strong interest in learning about different remediation technology tools that can help students to develop strong Math skills.

Zoe Grace, a 46-year-old female, is in her fifth year of teaching Kindergarten. Zoe Grace has 15 years' experience as a teacher and she had a master's degree with a Class AA Educator License with endorsements in Elementary Education (4-6), Kindergarten (K-4), and Pre-Kinder-Kindergarten. Zoe Grace gained experience using the SMART Board with a Mimio Pad and Mimio Connect in her Teacher Education Program. She realized, however, that other technology needs in the classroom can hinder helping the students have optimum experiences using technology in the classroom.

Francis, a 49-year-old female, was in her first year of teaching first grade music. Francis has four years' experience as a teacher and had a master's degree with a Class AA Educator License with endorsements in teaching Music Education (K-12). Francis was able to attend a music workshop in Nashville that demonstrated digital music sampling technology during her undergraduate course work. Though, she would like to have had hands-on experience with integrating technology for classroom instruction.

Phyllis was a 54-year-old female in her sixth year of teaching fifth grade English. Phyllis had 21 years' experience as a teacher and had a master's degree with a Class AA Educator License with endorsements in teaching Elementary (K-6), Reading (K-12), and Mild/Mod Disabilities (K-12). Phyllis, being a veteran teacher who completed the Teacher Education Program in the 80's, did not have technology integration experiences when preparing to enter the classroom. Phyllis took it upon herself to gain fundamental technology skills at a local community college.

DISCUSSION OF THE FINDINGS

The following themes emerged: (1) The teachers should have technology training experience to ensure that they are able to implement technological innovations in everyday teaching; (2) TeachUp! USA is a program that can enhance efficiency in teaching because the applications related to it are updated and appropriate for the new developments; (3) The professional development of teachers should also be considered in terms of the overall development in the education and technology sectors; (4) It is important to have technology integration skills for the teachers because they need professional support on how to implement and enforce the recent developments

Theme 1: The teachers should have technology training experience to ensure that they are able to implement technological innovations in everyday teaching.

Technology Training. The participants had different experiences in terms of technology training. According to Jean:

> As a teacher candidate in the education preparation program, the faculty provided a number of technology experiences to support technology for the classroom. After receiving a bachelor's in Teacher Education, additional training was provided in the master's program. As a requirement for obtaining a master's degree, teacher candidates were required to pass a technology course. Those experiences, in both undergraduate and graduate, supported applying technology integration in a classroom setting.

Conversely, Leroy mentioned that demonstration experience as a teacher helped in his technology training. Quoting him: "As for the technology training experiences in the teacher education preparation program, faculty demonstrating technology with a projector primarily through PowerPoint presentations. PowerPoint notes were commonly received in classes." It can be said that the participants began technology training in different aspects of their career.

The basic program of MS Office was the beginning of technology training for Caitlyn said:

> As a teacher in the education preparation program, Microsoft software applications such as MS Word, MS PowerPoint, and MS Excel were used to complete assignments throughout the program. The faculty also taught students to use the online ERIC database for research. Additional training included taking an introductory course on SMART Board Technology that taught students how to integrate the technology in the classroom. Also, students were taught how to use a projector, a scanner, and Turning Point Software (Clickers).

Phillis mentioned that the integration methods helped her in the development of technological skills as follows:

> During the time of the undergraduate studies for the Teacher Education Program in the mid-80's, no technology was integrated in lecture or student teaching practice to support preparation to enter the classroom as teachers. While teaching in the late 80's as a Special Education teacher and attending night classes for the Masters of Teaching program, the Internet was useful to research resources and PowerPoints were useful to support developing lesson plans assignments.

Useful Experience. Julie mentioned that, "All of the experiences supported classroom instruction; however, learning about the educational websites to integrate into lessons were very useful." Further, Margaret also opined, "The different tools demonstrated to students through the SMART Board and the technology tools that could be used to integrate in lesson plans were found to be relevant for teaching." The useful value of having technology training is also seen by Zoe Grace. According to her, "The learning experiences provided through the Intern were all beneficial. For example, the Intern demonstrated how to use online education games to track student data."

The use of some visual aids in facilitating the learning experience was also helpful for Francis, "The use of the SMART Board and the Mimio pad are both useful; however, it was difficult to remember how to use the Mimio pad with the SMART Board. So, the Mimio pad goes unused in the classroom."

According to Phillis:

> The SMART Board training and learning how to locate websites to improve student learning both were very useful for the classroom. The SMART Board is used to rotate the students in learning centers to practice skills through Internet games. In addition, education websites are used to find manipulatives for students to practice and develop their confidence in learning different subject concept skills. With the manipulatives, students practice learning one skill in multiple ways.

Not Useful Experience. The experience in technology training provided more positive than negative impacts. There are also negative impacts, however. According to Leroy, "As an in-service teacher that has incorporated PowerPoints, the discovery of new technology tools and applications on the Internet have replaced this technology resource. Every technology tool that is used in the classroom has been a resource." Further, Julie opined, "Each of the applications learned in the Teacher Educator Preparation Program are continuously used to support instruction." Zoe Grace furthered, "Every technology training that was received in the Teacher Education Preparation Program has been beneficial. Any kind of training is useful to build on technology skills." According to Francis, "Each of the technology experiences was relevant to the field of Music education." Phillis likewise mentioned, "The basic computer training experiences that was received from the community college was very useful. Prior to taking the classes on the Windows environment and Microsoft Office applications, it was a challenge to support integrating basic technology in the classroom."

Theme 2: TeachUp! USA is a program that can enhance efficiency in teaching because the applications related to it are updated and appropriate for the new developments.

TeachUp! USA. The experience of Jean with TeachUp! USA is as follows:

> During the TeachUp! USA program, an Intern was sent to the school to assist teachers with technology integration in the classroom. As a technology savvy teacher, no assistance was needed in the classroom from the Intern. The Intern did; however, provide support for those teachers that needed help with integrating technology in the classroom.

Leroy opined:

> The TeachUp! USA Intern did introduce a tool that was new to me called a Prezi. Prezi is just a newer form of a PowerPoint. However, from the standpoint of production or student engagement, the Prezi did not help in the classroom.   This tool did not particularly benefit classroom instruction.

It was furthered by Julie:

> The TeachUp! USA Intern provided helpful websites that could be used to integrate into the curriculum. The Intern was able to resolve technical issues that generally would be supported through the district's technical support technicians. Plus, the Intern was able to replace a computer monitor that went out in the classroom.

According to Zoe Grace, "As for the TeachUp! USA program experience, the Intern first met with the teachers in an in-service professional development to talk about ways to use the computer applications in lessons and the Intern demonstrated how to track student data." It was also mentioned by Francis, "In the experiences with the TeachUp! USA program, the Intern provided training on how to use the SMART Board and the Mimio pad, but it was mostly observing instead of a hand-on experience." On the other hand, Phillis said, "The Intern from the TeachUp! USA program provided a demonstration to learn how to use the SMART Board and to learn tips on how to engage student learning through online educational websites. However, the Intern did not come to the classroom to provide individual assistance."

Useful Experience. In general, the participants believed that TeachUp! USA provided useful experience. Leroy mentioned, "As a skilled technology mentor for the school, the intern did not have to provide assistance for the classroom. However, the Intern did make herself available to answer questions." Likewise, Caitlyn mentioned:

> The SMART Board training was very useful. The training included step-by-step instructions to learn the basic functions of interacting with the SMART Board and how to use a Mimio Pad that is a handheld tablet that supports controlling the SMART Board from anywhere in the classroom.

Julie also shared the fact that TeachUp! USA is helpful, "All of the experiences supported classroom instruction; however, learning about the educational websites to integrate into lessons was very useful." According to Margaret, "The different tools demonstrated to students through the SMART Board and the technology tools were relevant to support technology integration into lessons."

It was opined by Zoe Grace, "The learning experiences provided through the Intern were all beneficial. For example, the Intern demonstrated how to use online education games to track student data." According to Francis, "The use of the SMART Board and the Mimio pad are both useful; however, additional training could support help in remembering how to use the Mimio pad with the SMART Board." This view was also shared by Phillis who said the following:

> The SMART Board training and learning how to locate websites to improve student learning both were very useful for the classroom. The SMART Board was used to rotate the students in learning centers to practice skills through Internet games. The education websites were useful to find manipulatives for students to practice and develop their confidence in learning different subject concept skills. With the manipulatives, students practice learning one skill in multiple ways.

Not Useful Experience. According to Caitlyn, one bad experience with TeachUp! USA is that, "A TeachUp! USA Intern was in the building to help teachers learn how to use technology with their students in the classroom. The Intern was able to support teachers with little experience using technology integration. Online tutorials are quite useful to learn how to use technology tools." Further, Francis said that, "The technology training experiences received by the Intern were useful to implement in teaching."

It was also opined by Margaret:

> As a Math teacher, learning skills that support developing student math skills through technology-based programs are important. Students are expected to use input and output devices to interact in web-based

applications. The state exams are computer-based and the exams require that students know how to answer questions using technology. Furthermore, a teacher should be able to demonstrate through technology equipment, such as a SMART Board. Students learn best if teacher's can model using graphical images.

Theme 3: The professional development of teachers should also be considered in terms of the overall development in the education and technology sectors.

Professional Development. Jean noted that the most important part of teaching is the professional development attributed to it. According to her:

> The school district provided technology training on SMART Board technology to support the SMART Boards that were placed in the classrooms. Teachers in the district received in-service training on a new gradebook technology called SAMS 7. Additionally, in-service teachers received training from the school district on how to use Compass Learning – a digital learning environment that aligns with 21st Century skills learning for students.

According to Leroy:

> Since starting teaching, one of the first programs the school received training on was Study Island. This tool was immediately used in the classroom and training was provided to other teachers on how to effectively use this tool as remediation and as a skills practice tutorial to assist students with skill development. Additional training was received on Compass Learning and Mimio Connect once the system had been upgraded to support the SMART Boards. Additional training was obtained online with the Mimio vendor to become a Mimio Certified Trainer. The Mimio Connect took the place of the traditional PowerPoints. Compass Learning- a digital learning environment that aligns with 21st Century skills learning for students.

It was also mentioned by Leroy that trainings should be continuous and must always prioritize the development of the teachers:

According to Caitlyn:

> The school district provided technology training on SMART Board technology that uses a Mimio Pad and Mimio Connect to create lessons. Also, teachers were taught how to use the Turning Point technology – a technology that takes a document and scan it. The software allows teachers to create questions and students are able to respond through Clickers. Student responses to the questions are immediately displayed on the SMART Board.

One participant mentioned that the training is akin to the renaissance in their career. Quoting Julie, "The professional development received at the school was concerning Renaissance Reader and Accelerated Math. The trainer demonstrated the reporting features of the programs and demonstrated how to explain the report to parents to share how students were performing in these subject areas." It was also stated by Zoe Grace, "In-service professional development was provided to support the district adopted educational software such as Renaissance Place and Study Island."

Phillis said the following:

> In-service professional development for the education programs adopted by the District were provided to teachers to improve student achievement for state assessments such as Study Island, Renaissance Reader, and Compass Learning. Additionally, professional development session on the Turning Point technology that can be integrated with the education programs and SMART Board were offered.

Useful Experience. There are various useful experiences in terms of the professional development trainings received by the participants. According to Jean, "The SMART Board training was very useful. The training included step-by-step instructions to learn the basic functions of interacting with the SMART Board and how to use a Mimio Pad that is a handheld tablet that supports controlling the SMART Board from anywhere in the classroom." Leroy added that:

> Every technology training offered by the district has been found to be a useful experience. However, Study Island, is a very useful tool and the program can be used with the Clicker Response technology. Preference is given to Study Island because the program monitors student performance and evaluates how to help students who need additional skill practice. This program is more user- friendly in addressing weaknesses that students have with specific goals. After checking for student understanding of skills, adjustments are made to lesson plans to reinforce concepts and skills that are challenging for the students.

Julie also opined:

> Both training experiences with Renaissance Reader and Accelerated Math were important in supporting learning and understanding how to communicate to parents the gains and or missing skills that are in need of improvement for each child. However, the Accelerated Reader program was interesting because reading is the most challenging subject for the state mandated testing. Third grade students that do not reach the desired achievement score in reading will not be able to progress to the 4th Grade.

It is believed by Zoe Grace that professional development is greatly increased by the fact that there is the use of technology in teaching:

> All of the technology professional development has benefited classroom learning and assessment. For example, Renaissance Place is a very useful star reading program. With this program, the students reading level progress can be monitored through star reading tests. An instructional planning report can be generated that addresses specific state standards the students need to practice. The report also has graph illustrations to help teachers identify growth and deficiency levels of each student.

According to Francis:

> The technology experiences provided during professional development are useful for district assessment preparation. The sessions generally focus on core skill-building strategies for the Reading, Math, and Language teachers. However, Music teachers value learning about new instruments and the different ways to use music electronically.

Not Useful experience.   There were only few instances when the professional development of the teachers was not increased by the use of technology. According to Francis, "The in-house professional development did not relate to the Music or Arts discipline to help me apply new technology strategies for teaching Music. However, a colleague demonstrated how to use a digital program called MusicTech to create lessons." It was also mentioned by Phillis, "Even though the workshop on Turning Point technology was provided to learn how to integrate the education programs with the SMART Board, it was difficult to grasp how to effectively use the technology to support learning. The presenter did provide a handout, but hands-on learning to be the best training."

Jean said that professional development was generally useful. "The training provided to in-service teachers has been useful to support teachers in learning how to use technology adopted by the school district." It was supported by Leroy when he mentioned:

> Every program has some merit for certain areas in classroom learning. It is not unusual to prefer some programs over others. Compass Learning is more of a long-term independent study and it is hard for me to use Compass Learning to know right away what lesson adjustments need to be made for the students. The Compass Learning program has been found to be more of an independent study for the students.

Theme 4: It is important to have technology integration skills for the teachers because they need professional support on how to implement and enforce the recent developments.

Technology Integration Skills.   Technology integration skills are important to ensure success in the changing world that is currently now more dependent on technology. According to Jean:

> It is vital in the 21st Century that all teachers understand how to use a computer's operating system, peripheral devices, and applications that function with the computer. Teachers should know how to use education-based tools that support learning in the classroom such as a SMART Board, Mimio Pad, Clickers, etc.

Leroy also mentioned:

> > The first skill that all teachers need to have to effectively apply technology integration in the classroom is to be "Fearless" when it comes to learning technology skills. The veteran teachers are afraid to learn how to use technology tools to support instruction from computers and tablets. Moreover, the veteran teachers are quite comfortable with traditional methods of classroom delivery and pencil and paper activities. It is important to embrace learning technology and research the Internet to find teacher resources to support understanding how to effectively use the tools.

According to Caitlyn:

> > Teachers should know how to operate a computer and plus be able to use devices that interact with the computer such as printers, scanners, projectors, SMART Boards, tablets, and Clickers to apply technology integration into instructional areas. Teachers should also be able to connect to the Internet and find educational resources to support instruction.

Margaret said:

> Teachers should know how to research topics applicable to student learning and be able to download resources from the Internet. Teachers should also know how to create learning paths for students and understand how to assign specific skill lessons for students to practice.

According to Francis:

> One important technology skill to have as a teacher is the ability to track and interpret student data in terms of strengths and weaknesses. In order to maximize student learning in today's classroom, teacher's need to know how to use an iPad. Students need to be engaged in working in centers with a tablet. This is a computer world. Students need to learn how to use a tablet, not just sit at a desktop. A lot of jobs in the workforce are using iPads to perform some of their job duties.

CONCLUSIONS

The findings of the study revealed that in-service teachers have had varying degrees of technology experiences from their teacher education preparation programs to professional development training ranging from no experience to applicable experiences to help foster transition into classroom teaching and learning. An effective training system in teacher education programs should be implemented to ensure that, with the presence and introduction of new technology in the classroom, the teachers are equipped with newly developed skills. The technology skills that in-service teachers placed the most value on achieving related to the technology tools associated with their discipline of teaching. The skills of the teachers should be aligned with the technology integration expectations for school adopted technology. Therefore, it is important to ensure that the technology aspect of in-service teaching is applicable to different academic subjects such as reading and math for example.

REFERENCES

Afshari, M., Bakar, K. A., Luan, W. S., Samah, B. A., & Fooi, F. S. (2009). Factors affecting teachers' use of information and communication technology. *International Journal of Instruction*, *2(1), 77-104*.

Afshari, M., Bakar, K., Luan, W., & Siraj, S. (2012). Factors affecting the transformational leadership role of principals in implementing ICT in schools. *Turkish Online Journal of Educational Technology*, *11(4), 164-176*.

Brown-Joseph, T. D. (2010). A study of the barriers K-12 teachers encounter when integrating technology into the curriculum. ProQuest LLC, 2010.

Brush, T., Glazewski, K. D., & Hew, K. (2008). Development of an instrument to measure pre-service teachers' technology skills, technology beliefs, and technology barriers. *Computers in the Schools*, *25(1-2), 112-125*.

Bullock, S. M. (2013). Using digital technologies to support self-directed learning for pre-service teacher education. *Curriculum Journal*, *24(1), 103-120.* doi:10.1080/09585176.2012.74469

Business Wire. (2015). Survey finds majority of teachers do not feel prepared to use technology in classrooms. U.S. K-12 educators say they want more professional development on technology skills. (2015). *Business Wire.* Retrieved from http://www.businesswire.com/news/home/20150623006087/en/Survey-Finds-Majority-Teachers-Feel-Prepared-Technology

Childress, R. (2014). Best practices in integrating technology across new CAEP standards for accrediting initial teacher educator preparation providers (EPP). In J. Viteli & M. Leikomaa (Eds.), *Proceedings of EdMedia: World Conference on Educational Media and Technology 2014* (pp. 102-105). Association for the Advancement of Computing in Education (AACE).

Chavis, K., & Kim, K. (2015). Technology integration preparation and professional development of preservice teachers. In D. Slykhuis & G. Marks (Eds.), *Proceedings of Society for Information Technology & Teacher Education International Conference 2015* (*pp. 2247-2254*). Chesapeake, VA: Association for the Advancement of Computing in Education (AACE).

Council for the Accreditation of Educator Preparation. (2013). Unit standards in effect 2013. Conceptual Framework. Retrieved from http://caepnet.org/standards/introduction

Davies, R., & West, R. (2013). Technology integration in Schools. *Handbook of Research on Educational Communications and Technology, 4th Ed.* Retrieved from http://www.academia.edu/6214996/Technology_Integration_in_Schools

Desilver, D. (2015). U.S. Students improving-slowly-in math and science, but still lagging internationally. Retrieved from http://www.pewresearch.org/fact-tank/2015/02/02/u-s-students-improving-slowly-in-math-and-science-but-still-lagging-internationally/

Goldman, H., Hamilton, K., Howell, R., Gerald Knezek, G., & McLaughlin, R. (2009, December 7). Redefining teacher education for digital-age learners. Retrieved from http://redefineteachered.org/sites/default/files/SummitReport.pdf?q=summitreport

Goodman, M., Sands, M., & Coley, R. (2015). Millennials' weak skills threaten America's competitiveness. *The ETS Center for Research on Human Capital and Education, p. 1-65.* Retrieved from http://www.ets.org/s/research/30079/asc-millennials-and-the-future.pdf

Hanover Research. (2014). *Professional Development for Technology Integration.* Washington, D.C.

Harkness, P. (2015, May). Governing magazine: State and local government news for America's leaders. *Washington's Education Stalemate.* Retrieved from http://www.governing.com/columns/potomac-chronicle/gov-washington-education-stalemate.html

International Society of Technology in Education. (2008). Essential Conditions. http://www.iste.org/standards/tools-resources/essential-conditions

Ingram, C. (2014). The state of U. S. education: Above-average spending, below-average graduation rates. *The Washington Post*. Retrieved from https://www.washingtonpost.com/news/wonk/wp/2014/09/12/the-state-of-u-s-education-above-average-spending-below-average-graduation-rates/

Kereluik, K., Mishra, P., Fahnoe, C., & Terry, L. (2013). What knowledge is of most worth: Teacher knowledge for 21st century learning. *Journal of Digital Learning in Teacher Education (International Society for Technology in Education)*, 29(4), 127-140.

Moeller, B., & Reitzes, T. (2011). Integrating technology with student-centered learning. *A Report to the Nellie Mae Education Foundation*. Retrieved from http://www.nmefoundation.org/getmedia/befa9751-d8ad-47e9-949d-bd649f7c0044/Integrating-Technology-with-Student-Centered-Learning?ext=.pdf

Mundy, M., & Kupczynski, L. (2013). A qualitative study of technology integration into culture and sustainability in schools. *ISRN Education*, *1-6*. Article ID 967610. doi:10.1155/2013/967610

Mundy, M., Kupczynski, L., & Kee, R. (2012). Teacher's perceptions of technology use in the schools. *SAGE Open Mar 2012*. doi:10.1177/2158244012440813

Ottenbreit-Leftwich, A., Brush, T., Strycker, J., Gronseth, S., Roman, T., Abaci, S., vanLeusen, P., Shin, S., Easterling, W., & Plucker, J. (2012). Preparation versus practice: How do teacher education programs and practicing teachers align in their use of technology to support teaching and learning? *Computers & Education*, 59(2), 399-411.

Partnership for 21st Century Skills. (2011). *Framework for 21st Century Learning*. Retrieved from http://www.p21.org/about-us/p21-framework

Peterson, P., Woessmann, L., Hanushek, E., & Lastra-Anadon, C. (2011). Are U.S. students ready to compete? *EducationNext, Fall 2011, 11(4), 1-9*. Retrieved from http://educationnext.org/are-u-s-students-ready-to-compete/

Sabzian, F., Gilakjani, A., & Sodouri, S. (2013). Use of technology in classroom for professional development. *Journal of Language Teaching and Research*, 4(4), 684-692. Retrieved from http://www.academypublisher.com/jltr/vol04/no04/jltr0404.pdf

Schleicher, A. (2012). Education at a glance: OECD indicators 2012. http://www.oecd.org/unitedstates/CN%20-%20United%20States.pdf

Schwab, C. (2015). Scholarly communication, research & informatics, Virginia Tech Libraries. JOTS v32n2 - The Pedagogy of Technology Integration. Retrieved from http://scholar.lib.vt.edu/ejournals/JOTS/v32/v32n2/okojie.html

Sparks, S. (2015). U. S. millennials come up short in global skills study. *Education Week*, 34(21), p. 6. Retrieved from http://www.edweek.org/ew/articles/2015/02/18/us-millennials-come-up-short-in-global.html

Spazak, L. (2013). Secondary preservice teachers' perception of preparedness to integrate technology (Order No. 3558231). Available from ProQuest Dissertations & Theses Global. (1348684152). Retrieved from http://search.proquest.com/docview/1348684152?accountid=11661

Sutton, S. R. (2011). The pre-service technology training experiences of novice teachers. *Journal of Digital Learning in Teacher Education*, 28(1), 39-47.

Swanson, Richard A. *Theory Building in Applied Disciplines*. San Francisco, CA: Berrett-Koehler Publishers 2013.

Tondeur, J., van Braak, J., Sang, G., Voogt, J., Fisher, P., & Ottenbreit-Leftwich, (2012). Preparing pre-service teachers to integrate technology in education: A synthesis of qualitative evidence. *Computers & Education*, *59*, 134-144.

Trilling, B., & Hood, P. (1999). Learning, technology, and education reform in the knowledge age or "We're wired, webbed, and windowed, now what?" *Educational Technology*, 39(3), 5-18. Retrieved from http://www.wested.org/online_pubs/learning_technology.pdf

U.S. Department of Education, Office of Educational Technology. (2010). Transforming American education: Learning powered by technology, 1-80. Retrieved from https://www.ed.gov/sites/default/files/NETP-2010-final-report.pdf

APPENDIX

Table 1

International Society for Technology in Education ISTE Essential Conditions for Educators and School Leaders

Essential Conditions	Description
Shared Vision	Proactive leadership develops a shared vision for educational technology among all education stakeholders, including teachers and support staff, school and district administrators, teacher educators, students, parents and the community.
Empowered Leaders	Stakeholders at every level are empowered to be leaders in effecting change.
Implementation Planning	All stakeholders follow a systematic plan aligned with a shared vision for school effectiveness and student learning through the infusion of information and communication technology (ICT) and digital learning resources.
Consistent and Adequate Funding	Ongoing funding supports technology infrastructure, personnel, digital resources and staff development.
Equitable Access	All students, teachers, staff and school leaders have robust and reliable connectivity and access to current and emerging technologies and digital resources.
Skilled Personnel	Educators, support staff and other leaders are skilled in the selection and effective use of appropriate ICT resources.
Ongoing Professional Learning	Educators have ongoing access to technology-related professional learning plans and opportunities as well as dedicated time to practice and share ideas.
Technical Support	Educators and students have access to reliable assistance for maintaining, renewing and using ICT and digital learning resources.
Curriculum Framework	Content standards and related digital curriculum resources align with and support digital age learning and work.
Assessment and Evaluation	Teaching, learning, leadership and the use of ICT and digital resources are continually assessed and evaluated.

Table 1 (continued)

Engaged Communities	Leaders and educators develop and maintain partnerships and collaboration within the community to support and fund the use of ICT and digital learning resources.
Support Policies	Policies, financial plans, accountability measures and incentive structures support the use of ICT and other digital resources for both learning and district/school operations.
Supportive External Context	Policies and initiatives at the national, regional and local levels support schools and teacher preparation programs in the effective implementation of technology for achieving curriculum and learning technology (ICT) standards.