

TEACHER SUCCESS IN TECHNOLOGY INTEGRATION

by

Jessica Greenan

A Master's Thesis/Capstone Project

Submitted in Partial Fulfillment

of the Requirements for the Degree of

Master of Science in Education

Curriculum and Instruction Inclusive

Department of Curriculum and Instruction

Fredonia, State University of New York

Fredonia, New York

May 2015

Fredonia, State University of New York
Department of Curriculum and Instruction

CERTIFICATION OF THESIS/CAPSTONE PROJECT WORK

We, the undersigned, certify that this project entitled Teacher Success in Technology Integration by Jessica Greenan, Candidate for the Degree of Master of Science in Education, Curriculum and Instruction Inclusive], is acceptable in form and content and demonstrates a satisfactory knowledge of the field covered by this project.



Dr. Carrie Fitzgerald
Master's Capstone Advisor
EDU 691 Course Instructor
Department of Language, Learning, & Leadership

5/6/15
Date



Dr. Robert Dahlgren
Department Chair
Department of Curriculum and Instruction

5/6/2015
Date



Dean Christine Givner, PhD.
College of Education
Fredonia, State University of New York

5/15/15
Date

Abstract

The following study investigated how teachers successfully integrated technology into their classrooms by overcoming many barriers. Barriers included time, money, access, professional development, and understanding technology pedagogy. Teachers at the prekindergarten and elementary level completed a survey including multiple choice and constructed response questions. Professionals who responded to this survey used technology sometimes in their classrooms and discussed barriers they had to overcome, and are dealing with in order to successfully integrate technology. Teachers provided strategies and ideas on what they thought would be beneficial for helping the integration process. It was discovered that many teachers have not been taught ways of using technology effectively and need more professional development and guidance from administrators in order to use technology in a meaningful way. Most of these teachers dealt with issues with technology access, understanding technology pedagogy, and lack of support.

Table of Contents

Chapter 1: Introduction	1
Introduction	1
Statement of Problem	2
Purpose of Study	3
Chapter 2: Literature Review	5
Barriers impacting the Success of Technology Integration	5
Teacher Attitudes Impacting the Success of Technology Integration	8
School Factors Impacting Student Achievement	11
Student Factors Impacting Student Achievement	11
Programs and Systems that Affect Student Achievement	12
Types of Technology Used in the Classroom	15
Technology Integration Pedagogy	18
Models/Strategies for Technology Integration	21
Chapter 3: Methodology	24
Participants	24
Instruments	24
Data Analysis	25
Chapter 4: Results	26
Chapter 5: Discussion	33
Discussion	33
Limitations of the Findings	36

Conclusion	36
Recommendations for Future Research	37
References (APA 6th edition)	38
Appendix	43
Survey/Questionnaire	43

Introduction

According to Kopcha (2012), technology integration is a process that has been implemented all over in today's classrooms. Okojie, M., Olinzock, A. A., & Okojie-Boulder, T. C., (2006) stated that computer technology has been allowed to reinvent how teachers create, find, exchange, and think about information. According to Keengwe, J., & Onchwari, G., (2009), "about 90% of children today have used a computer." However, integrating technology has not been a simple transition.

Ertmer, Ottenbreit-Leftwich, Sadik, Sendurur, & Sendurur (2012) reported on a study involving twelve K-12 teachers. Their survey data reported many barriers. These included time, support, access, professional development and teacher's beliefs as preventing them from integrating technology successfully. Cakir, Delialioglu, Dennis, & Duffy, (2009) have found that school level factors and student level factors affect student achievement, even in the presence of technology. School level factors include geographical location, and student level factors include factors such as gender and motivation. Reported successful supports have included blended learning (Cakir, et al. 2009), communities of practice (Kopcha, 2012), and Tennessee EdTech Launch, or TnETL, (Lowther, Inan, Strahl, & Ross, 2008); these approaches have had collateral results, in producing gains in both student achievement and the extent to which technology has been used in instruction.

Harris, J., Mishra, P., & Koehler, M., (2009) acknowledged technologies up to date have been thus far "pedagogically unsophisticated." Educational technology integration changes the learning process including specific content-area learning and

pedagogical approaches. Banas, J. R., (2010) described technology as “learning with” or “learning from” technology. Learning from technology is the old notion of technology integration; the use of websites to gather information. Advanced types of technology have made it possible for students to learn with technology by taking responsibility for their learning and use higher level thinking and problem solving. Keengwe et al. (2009) stated that “technology should not drive instruction. Technologies are just tools that support learning.” Teachers must create “appropriate technology-based learning environments and developmentally appropriate activities for children,” to provide positive learning experiences with technology (Keengwe et al., 2009).

Statement of the Problem

Despite the growing increase of technology integration in the classroom, there has been little research done on how teachers successfully integrate technology into the classroom by overcoming barriers. Barriers include, but are not limited to, time, support, access, professional development, and teacher beliefs (Ertmer et al., 2012). School factors, and community factors are other barriers that teachers must consider when using technology successfully in the classroom (Cakir et al., 2009). Barriers affect how teachers successfully integrate technology in a range of circumstances. Teachers are involved and are constantly trying to use technology in the classroom, but are unable to gain access and find time to do so (Ertmer et al., 2012). Teachers are often unprepared without professional development or training. Teachers are losing instructional time in order to implement technology into the classrooms due to technological issues, absence of professional development, teacher attitudes, school factors, and community factors.

Concentrating on the barriers that affect integrating technology is incredibly essential for teachers to accomplish successful integration. By managing the obstacles, teachers will be able to work together as a community to overcome these barriers. Once these barriers are understood and managed, teachers will be more likely to accomplish the goal of successful integration.

Each year student factors will change and teachers will need to focus on the individualized barriers for each student. Barriers, such as time, professional development, and attitudes can be overcome before the school year begins. The time to fix barriers is before school starts. Teachers need plenty of instruction and practice to prevent technological issues in the classroom.

Previous research displays some programs or systems that have been used in the classroom to successfully integrate technology and increase student achievement. These programs include blended learning, Tennessee EdTech Launch, Effectiveness of Educational Technology Interventions, and professional development (Cakir et al., 2009; Lowther et al., 2008; Means, 2010; Kopcha, 2012). These studies show programs that worked effectively in specific areas of the country. However, successfully integrating technology in the classroom, without a set program, has not been shown.

Purpose of Study

Technology has the capability to increase student achievement in the classroom, if integrated successfully (Ertmer et al., 2012). The present student will investigate how teachers overcome barriers in order to successfully integrate technology into the classroom at the elementary level. Teachers that use technology in their classroom will be able to explain how they overcame barriers and how it affected their successes in

technology integration. Teachers will discuss what barriers were the least and most difficult to overcome, and what types of technology they use in their classrooms. The primary research question is: How do teachers successfully integrate technology into the classroom at the elementary level?

Through the present study, I hope to find out how to use technology in the classroom successfully. Technology has become extremely relevant in the classroom and is being incorporated into many aspects of education. It is important that future teachers understand technology and are prepared to use it in their classrooms. Potential benefits from this research include higher knowledge of technology integration for present and future teachers at the elementary level.

Literature Review

Barriers impacting the Success of Technology Integration

Ertmer et al. (2012) reported that both external and internal barriers impact technology use in the classroom. They studied 12 K-12 classroom teachers who were technology experts. External barriers were viewed as more influential than internal behaviors for technology integration. Ertmer et al. (2012) found that external barriers included support, money, access, time, assessment, and other teachers' beliefs. Ertmer et al. (2012) indicated the most frequent barriers are technology resources, teachers' knowledge and skills, and teachers' attitudes and beliefs. According to Ertmer et al. (2012), teachers want to use technology, however due to access and time constraints, are unable to do so. Similarly, Kopcha (2012), in his analysis of 18 elementary teachers' perceptions about technology barriers, identified time as a major concern. Much time was spent on planning, and dealing with technological issues such as signing in, error screens, and broken technology. Kopcha (2012) found the time barrier can be improved, in time, with the help from a mentor.

Kopcha (2012) reported that updating the ways that teachers plan, teach, and manage their classrooms is needed for technology integration to be successful. In his study, a professional development program was implemented, first involving a district-hired mentor to support technology integration into teachers' classroom practice. Kopcha (2012) found that impacts of mentor availability helped teachers overcome barriers of planning and implementing technology use, during Year 1 of the project. After the mentoring was discontinued in Year 2, the program delivered support through a community of practice. This was done by training a team leader for each grade level,

empowering them to hold meetings, do peer observations, and assist with equipment logistics. Over the course of the two-year investigation, Kopcha found that: (a) teachers had positive attitudes about vision, access, and integration barriers while being with their mentor; and (b) teachers continued to have negative attitudes about time barriers, and became more negative without the presence of their mentor. Teachers experienced problems generating ideas and finding resources during teacher-led practices, leading to negative perceptions of technology integration. Teachers experienced positive beliefs from the first year of the experiment with the availability of a mentor because of access to extensive supports and relevant classroom practices (Kopcha, 2012).

Like Kopcha (2012), Means (2010) studied the relevance of supports to effective technology integration. Means (2010) reported on the impacts of developing classroom routines, management, and teacher support for successful technology integration. She studied seven high achievement gain schools and seven low achievement gain schools teachers at each grade level, as well as the principal and technology coordinator at each school. Teachers reported the need for successful transitioning and log on routines for classrooms to run efficiently. Support from principals and other staff beyond verbal agreement for technology such as concrete actions, was also reported as beneficial.

Ertmer et al. (2012) indicated the absence of professional development often results in a decrease of technology integration in the classroom. Like Ertmer et al. (2012), Lowther, Inan, Strahl, & Ross (2008) studied the impacts of continued professional development. They reported that professional development could lead to an increase in technology integration, which could improve student

learning. Lowther et al. (2008) studied 26 schools that participated in a three-year implementation of the Tennessee EdTech Launch, or TnETL program which provided full time, on-site program coaches. Teachers showed positive attitudes toward technology integration and more confidence in their use of computers. Lowther et al. (2008) concluded that there was a limited variety of software use, which implies a need for continued professional development. Harris et al. (2009) reported that professional development still focuses on time constraints and affordances. According to Keengwe et al. (2009)

“components of professional development for successful technology integration include connection to student learning, hands-on technology use, variety of learning experiences, curriculum specific applications, new roles for teachers, collegial learning, active participation of teachers, on-going process, sufficient time, technical assistance and support, administrative support, adequate resources, continuous funding, and built-in evaluations.”

Ertmer et al. (2012) found that a common barrier seen is the continued change of technology as time progresses. Teachers believed technology skills training was a continuous process. Ertmer et al. (2012) showed a general decrease in the presence of barriers, however the elimination of barriers is a goal that will not be accomplished for a long time. Harris et al. (2009) describes technology evolution as “continually evolving as we develop new technologies, new ways of representing content, and new ways of helping different students learn.

Okojie et al. (2006) reported a “major part of the problem related to technology

integration is that most educators have not addressed the pedagogical principles that will guide their use of technology for teaching and learning.” They showed a need for national organizations involved in teaching standards to develop a foundation to build technology integration understanding for teachers. Abilities such as skills to support learning, and infusing technology into a curriculum are important as a component of instruction. “Technology could not support learning without teachers who know how to use and integrate it into subject-specific areas (Okojie et al. 2006).” Teachers need to consider technology fitting into objectives of lessons, methods of instruction, evaluation, feedback, and follow-up initiatives. The lack of guidelines in technology integration limits technology expansion beyond basic applications in teachers. (Okojie et al. 2006)

Okojie et al. (2006) acknowledged that teachers didn’t necessarily resist technology, but lacked the confidence, organizational skills, administrative support, and pedagogical knowledge to integrate technology. They also stated that “technology should not be treated as a separate entity but should be considered as an integral part of instructional delivery (Okojie et al. 2006).” Exploring the relationship between technology in education and technological pedagogy is important and encourages critical thinking in teachers. Okojie et al. (2006) reported competence and confidence in technology must be accomplished for technology to be a pedagogically useful tool.

Teacher Attitudes Impacting the Success of Technology Integration

According to Pierson (2001) “variations in technology use were closely linked to the teachers’ respective levels of general teaching expertise.” Personal teacher beliefs effected how technology was used (p. 425). Dragon et al. (2012) reported teachers who have the skills to teach using technology may not use technology in their classrooms if

they believe technology has no educational value. Similarly, Ertmer et al. (2012) found that a teacher's internal beliefs and enacted beliefs are aligned. Ertmer et al. (2012) found that teachers who prefer teacher-directed lessons used technology for teacher-led lessons such as computer worksheets, and drill and practice exercises; while teachers who prefer student-centered lessons used technology for student-led activities.

Dragon et al. (2012) indicated higher exposure to technology increased positive attitudes of teachers, and computer performance. Computer performance is defined as efficient use of the computer in the classroom setting and for lesson preparation.

Dragon et al. (2012) studied 20 pre-service elementary teachers' perceptions of technology integration. After providing the teachers with a two-year study of technology integration, interest and enthusiasm increased in teachers. Interest and enthusiasm increased with the use of technology, positive perceptions of computers, and positive beliefs of impacts in society. Similarly, Pan, & Franklin, (2011) reported that teacher beliefs of self-efficacy and professional development increase instruction using technology. Their study of 559 in-service K-12 public school teachers showed an increase in self-efficacy and willingness to integrate technology into their classrooms. Siven-Kachala & Bialo reported on the teacher being the most important determinant of student attitudes when using technology. The teacher creates an environment where the student feels safe, and willing to face multiple learning challenges. Dragon et al. (2012) found that positive perceptions of efficacy are necessary in technology integration if teachers are to develop positive attitudes. Positive attitudes toward technology integration correlate to teachers using technology effectively in their classrooms.

Similar to Dragon et al. (2012) and Pan et al. (2011), Kopcha (2012) reported that professional development and the help of a mentor can help teachers gain a positive perception of technology integration. He found that time concerns existed regardless of the existence of a mentor. However, the 18 teachers in his study reported that although their lessons improved over time, time challenges changed to include finding appropriate sites for the children, to plan technology integration effectively, and to learn or practice the skills needed. Kopcha documented teacher perceptions in both a mentor-supported and community-supported environment. Means (2010) illustrated that collaboration between teachers and the community in their schools was to be important for increasing technology integration and positive teacher perception.

Two teachers in Kopcha's (2012) study discussed the importance of collaborating together effectively and easily. The existence of an effective and strong collaboration between teachers leads to higher adoption of technology. Similarly, Moore-Hayes (2011) indicated that teachers believed collaboration with other teachers and support systems, and access to training can lead to successful integration. Moore-Hayes (2011) studied 350 pre-service and in-service teachers who reported the importance of being taught by an experienced teacher, availability of completing training in a technologically-advanced classroom, and the opportunity to learn as a student in an online course. Like Moore-Hayes (2011), Ertmer et al. (2012) reported an increase in teachers' adoption of technology integration in their classrooms, if their schools accept technology integration, offer technical support, and technological promoting agendas. Bitner & Bitner (2002) stated that "helping teachers overcome their fears, concerns, and anxiety is crucial to the success of the program" (p. 96).

School Factors Impacting Student Achievement

Cakir et al. (2009) found that computer and internet technologies have provided disadvantaged regions with the availability of high quality instruction. They reported that schools located in suburban and other regions receive different resources and curricular offerings, causing geographical location to impact student achievement. Cakir et al. (2009) reported on the impacts of curriculum, instruction, resources, and socioeconomic status on student achievement. They discovered these impacts when observing educational inequalities between urban and other schools. Cakir et al. (2009) studied 4,670 11th and 12th grade students at 386 high schools where teachers received 1-2 weeks of training in a Cisco Certified Network Associate, or CCNA, blended learning program and had access to online support at all times. Their research showed that achievement differences based on socioeconomic status are not affected by educational policies and resources. School level differences showed no significant change in student achievement based on class size or school location.

Student Factors Impacting Student Achievement

Cakir et al. (2009) indicated that when schools from different locations receive the same content resources as other schools, student factors such as gender, academic ability, computer knowledge, and motivation largely impact student achievement. According to Cakir et al. (2009), male students have shown greater interest in school than female students and usually show higher achievement than female students. Cakir et al. (2009) found student socioeconomic status, motivation, and instruction have the greatest impact on student achievement in testing. Students who showed an interest in their classes due to future careers or goals achieved more than students who took the

course for other reasons.

Research by Ertmer et al. (2012) demonstrated that children in general are deeply and permanently technologically advanced, which affects their opinions about what are engaging and relevant lessons. They found that teachers should find a variety of methods, find tools to engage students, and make content more relevant for the students. Allowing students access to more engaging content will lead to students using their full potential to learn and succeed (Ertmer, et al. 2012). Technology changes the way students interact with each other. With technology, students work collaboratively with peers, are more motivated, and develop positive attitudes about learning. Also, students have more opportunities to exchange information, use problem solving skills to resolve conflicts, and receive more correct answers when working with each other (Clements, 1994).

Programs and Systems that Affect Student Achievement

Cakir et al. (2009) reported on the option of blended learning as a method combining online and face-to-face instruction by providing the control of the content seen in classrooms, and leaving the pedagogy of teaching to instructors. Blended learning provides multiple instructional advantages, including immediate feedback and the availability to update course materials and curriculum often. Blended learning provides the opportunity for teachers and students to receive and use the same teaching and learning materials as other regions. Cakir et al. (2009) found that impacts of achievement gaps caused by availability of instructional resources and instructional gaps between different geographically located schools can be closed due to technology enabled learning environments.

Lowther et al. (2008) reported that TnETL programs were designed to meet No Child Left Behind laws by providing full-time technology coaches. Lowther et al. (2008) found these coaches helped teachers create lessons focusing on critical thinking and engagement of the student while using technology. Teachers provided lessons that incorporated more research-based practices and used computer technologies more effectively as a learning tool for instructional delivery. According to research done by Lowther et al. (2008), using TnETL programs can lead to an increase in student achievement within a few years on high-stakes tests. They reported that students who participated in this program showed more experience with using technological resources as a learning tool, and were more engaged in student-centered learning activities.

Similar to Lowther et al. (2008), Means (2010) used Effectiveness of Educational Technology Interventions (EETI), to examine reading software and mathematics software, and its effects on student achievement. Means (2010) reported that using EETI programming with students provided a significant correlation between the time the program began and student achievement gains. This was accomplished while using both effective classroom routines and the EETI program. Teachers effectively facilitated software use and provided feedback to all students, allowing students to gain more knowledge. Teachers used the software when it fit correctly into the curriculum to increase understanding of the content. However, Means (2010) reported that providing both software use and in-class instruction produced problems such as different vocabulary and methods of solving problems, which led to confusion and difficulty.

Means (2010) found that creating a motivational system while integrating

technology has a negative relationship with student gains. For example, she recommended solutions such as “creating a visible chart showing modules completed, giving certificates for accomplishments on the software, or using software performance in grading” (p. 297). The negative relationship was due possibly by the students’ want for extrinsic rewards. However, according to Shapley, Sheehan, Moloney, & Caranikas-Walker (2011), impacts of technology immersion showed positive gains, however none were statistically significant. Positive trends were shown for classroom activities such as using specific programs, small-group work, and technology proficiency. Positive gains were rarely shown for other applications in specific content subjects. Shapley et al. (2011) indicated successful technology integration involving more than just having software. Other variables are needed for success, such as technical supports and ongoing professional development to teach the instructors how to use the technology.

Kopcha (2012) highlighted the need to use “long-term situated professional development activities” (p. 1119), such as the mentoring and community of practice supports reported in his case study. Kopcha (2012) states that

“while communities of practice are promoted as a cost-effective alternative to mentoring, this case suggests that not all communities of practice can or will contribute to positive teacher outcomes when learning to integrate technology. It seems that the specific activities that occur as part of or even prior to establishing a community of practice may play a larger role in promoting changes in teacher attitudes and practices with technology” (p. 1119).

Kopcha (2012) indicates the use of effective professional development as a key to

overcome technology integration barriers and instruction. Professional development needs to be personally relevant, engaging, and knowledgeable of pedagogical processes of technology integration. Teachers need to understand how to motivate students, bridge gaps between social and academic technology use, and provide access for technology use for students (Steere, 2009).

Types of Technology Used in the Classroom

Okojie et al. (2006) defined technology used in education as a “technical device or tool used to enhance instruction (p. 66).” Types of these technical devices may include media, models, projected and no-projected visuals, audio, video, and digital media. Some educators believe that educational technology is confined to computers and computer software used for teaching purposes. (Okojie et al., 2006) However, Crichton, Pegler, & White (2012) reported that “no single device is the answer to every teaching and learning situation” (p. 29).

Cheung & Slavin (2013) defined educational technology as “a variety of electronic tools and applications that help deliver learning content and support the learning process.” They continue to breakdown educational technologies technology applications into four major types. These types include traditionally supplemental Computer-Assisted Instruction, or CAI, comprehensive models, small-group integrated supplemental programs, and Fast ForWord. Supplemental CAI applications provided instruction for students at individual levels. Comprehensive models use computer technologies as their essential reading method. Small-group integrated supplemental programs connect reading and small-group interaction. Fast ForWord use computer applications that slowdown and magnify acoustic changes in speech that increases effective brain

processing. (Cheung et al. 2013)

Hutchinson, Beschorner, & Schmidt-Crawford (2012) highlighted the introduction of iPads and other tablets changing the teaching possibilities for educators. According to Carr (2012), “game-based applications could be used to facilitate students’ solving abilities and conceptual understanding of mathematics (p. 273).” Getting & Swainey (2012) reported that students would instinctively collaborate with peers while using iPads, creating a collaborative learning environment. Apple Education and Microsoft vendors believe the presence of educational technologies in the classroom could alone provide enough to change school education reform perspectives. However results suggest investments in technologies has thus far been met with failure or mixed results. (Crichton et al., 2012). Crichton et al. (2012) discovered that iDevices can be successful if conditions such as specific mobile learning infrastructure was available to support educators, teachers were treated as students before using technology in the classroom, material was consistent with the curriculum, and personalization of devices, were met.

Technology has a wide range of applications, software and devices such as Microsoft photo story, free rubric makers, online sample lesson plans, graphic organizers, Microsoft applications, google applications, digital storytelling, Kidspiration, concept maps, and multi-media tools. (Keengwe et al., 2009) Online curricular resources such as Everyday Math esuite, scholastics programs, Read 180, and System 44 focus on skill building, while think central language arts journey and Rosetta stone focus on world language (How technology can transform student achievement, 2012-1013). Yuan & Lee (2012), showed Magic Board’s as a successful technology tool. Magic Boards have the ability to overcome difficulties in physical manipulatives such as

organization, space, clean-up, alteration, interactivity and multiple representations of problems.

Jackson, Brummel, Pollet, & Greer (2013) introduced interactive tabletops and using the concept of Computer Supported Collaborative Learning, or CSCL. CSCL are technologies specific to supporting and enhancing interaction among the students. They found interactive tabletops to be a resource to increase mathematical achievement in students and aide in effective instruction.

Moodle is an online support program used in research done by Alayyar, Fisser, & Voogt (2012). The researchers provided two types of support for technology integration: human support and online support. Human support was provided with pre-service meetings. Online support was provided through Moodle. Moodle is an “open source learning management system” that contained tutorials, lesson plan examples, technology applications, and examples of technology used in science education (Alayyar et al., 2012, p. 1302). There was the option for design teams, or groups of teachers who developed ways of think about technology and development, to share information on Moodle. Both human support and online support showed “significant positive effects on teachers’ attitudes, knowledge, and skills” for technology integration (Alayyar et al., 2012, p. 1310). Blended support, or using both human and online supports, provided highest gains in positive attitudes, technological knowledge, and technological pedagogy. (Alayyar et al. 2012)

According to Stanford, Crowe, & Flice, (2010) “technology offers many tools to help teachers decrease the gaps in reading, math, social studies, and science” (p. 4). Multiple websites such as *Natural Reader*, *It Can Say*, and *Free Dictionary*, as well as

excel, web 2.0 tools, blogs, podcasts, wikis, and web quests can be used to differentiate instruction in the classroom. Englert, Zhao, Dunsmore, Collings, & Wolbers, (2007) believed that “technology may have a critical role in supporting learners in performing the writing process” (p. 11). Technology is designed to scaffold and encourage routines and processes providing advanced learning of writing for teachers as well as students. Two types of organizational technology tools include mapping tools and graphic organizers, and assistive technologies. (Englert et al, 2007)

Jonassen, Carr, & Yueh (1998) discuss computers being used as mind tools. Mind tools are applications that engage learners in critical thinking, allow students to represent what they are learning, and require deep thinking. Mind tools are used to scaffold different forms of reasoning, and include semantic organization tools, dynamic modeling tools, information interpretation tools, knowledge construction tools, and conversation and collaboration tools. (Jonassen et. al., 1998)

Technology Integration Pedagogy

Wang (2008) described pedagogical design as “an ongoing process which cannot be simply pre-determined before a lesson” (p. 412). Pedagogical design focuses on the effective use of resources and scaffolding for students. Okojie et al. (2006) define technology integration as the use of existing tools, equipment, and materials for the purpose of learning. Teachers must select suitable technology that is specific to each student, and provide appropriate evaluation and follow-up activities. According to Diaz (2001) “faculty must learn multiple new skills within a vast array of hardware, software, and peripherals, and keep these skills current in the face of increasingly rapid technological change” (p. 1). Gess-Newsome, Blocher, Clark, Menasco, & Willis, (2003)

state that teachers need a professional knowledge base which includes three domains including “knowledge of the content, knowledge of the learner, and knowledge of the best ways and means to help students learn” (p. 325).

Okojie et al. (2006) state that “technology integration should be considered along with issues involved in teaching and learning” (p. 66). The issues are developing learning objectives, methods of instruction, feedback, and evaluation, and assessment strategies. “Technology integration not only involves the inclusion of technological artifacts, but also includes theories about technology integration and the application of research findings to promote teaching and learning” (Okojie et al., 2006, p. 66). The instruction process should include selecting technology, evaluating technology processes, and addressing instructional problems; and should be specified during planning.

Harris (2009) reported that each subject area follows a different framework, established practices, ways of acknowledging evidence and proof, and approaches for developing knowledge. Knowing this information is useless without knowing the correct pedagogical strategies for each area. Bitner et al. (2002) reported eight key areas of consideration when integrating technology. These include fear of change, training in basics, personal use, teaching models, learning-based, climate, motivation, and support. Teachers must know the basics of computer use, become aware of computer programs, and provide a climate that removes the fear of failure (Bitner et al., 2002).

According to Okojie et al. (2006), motivation and differentiated instruction for specific student needs is an important aspect of technological pedagogy. Different students prefer different learning styles and learn at different rates. A variety of teaching

methods is essential for meeting all student needs. Students must learn how to use new knowledge and evaluate how they use the information. Educational technology “is guided by learning principles about how individuals learn, retain knowledge and skills, and expectations for their outcome of learning” (Okojie et al., 2006, p.68).

Keengwe et al. (2009) reported on constructivism or the creation of knowledge through active learning, reflective learning, creation of authentic tasks, contextual learning, and collaborative learning. Leh (2005) states that “in the digital technology age, information is processed and passed on differently, teachers are no longer ‘information givers,’ and students may access nearly all information” (p. 30). Teachers become facilitators in the classroom through the use of technology, while students gain critical thinking and problem solving skills (Okojie et al. 2006). Keengwe et al. (2009) found that “constructivist teachers facilitate learning through activities and exercises, which challenge learners’ previous thoughts and feelings about a particular subject, or event” (p. 210). Constructivism focuses on students learning, teachers guide the students through mediation, modeling, coaching, scaffolding, and providing rich environments for the students. Rich environments in a technological integrated classroom must “embed authenticity, emphasize knowledge construction, use open-ended learning, include student cooperation and collaboration, and integrate mixed ability levels and differentiated instruction when appropriate and possible” (Keengwe et al., 2009, p. 211).

According to Keengwe et al. (2009), *The International Society for Technology in Education (ISTE) National Educational Technology Standards for Teachers* require teachers to facilitate and inspire student learning and creativity, design and develop

digital-age learning experiences and assessments, model digital-aged work and learning, promote and model digital citizenship and responsibility, and engage in professional growth and leadership. Keengwe et al. (2009), states

“Technology is an aide in the classroom, it does not replace instruction in the classroom. Teachers must dedicate themselves to integrate technology in ways that include multiple learning styles, learners, and abilities in the classroom. Teachers must continue to provide meaningful assessments for these lessons and activities prepared, and should be ongoing, strategic, and purposeful. (p. 215)

Okojie et al. (2009) stated that “it is important that practicing teachers and in-service teachers recognize that technology in education is considered part of pedagogy” (p. 69).

Bitner et al. (2002) reported that observing students using technology that has been integrated into the curriculum allows teachers to become aware of programs used and to understand how to facilitate teaching and learning.

Models/Strategies for Technology Integration

According to Gronseth, Brush, Ottenbreit-Leftwich, Strycker, Abaci, Easterling, Roman, Shin, & Van Leusen, (2010) multiple attempts have been researched for discovering strategies for successful technology integration. Various strategies include “blended technology skills courses with field experiences, and project based courses that focus specifically on technology integration strategies” (Gronseth et al., 2010, p.30).

Keengwe et al. (2009) reported many strategies for technology integration including school leaders requiring a technology requirement, technological professional development focusing on lessons, technology tools and infrastructure being up to date,

technological support following-up with teachers, and technological personnel answering and helping teachers with their questions. Schools should become better partners with surrounding schools while building their partnerships with technology practices. “Leadership is critical in establishing technology as part of a school culture” (Keengwe et al., 2009, p. 216).

Harris et al. (2009) reported five general approaches that summarized old and new technology integration efforts. These include “software-focused initiatives, demonstrations of sample resources, lessons and projects, technology-based educational reform efforts, structured/standardized professional development workshops or courses, and technology focused teacher education courses” (p. 394). Strategies thus far have focused on the technology being used instead of the individual student, called “technocentric”. Technocentric ideas focus on the technology first, then decide how to successfully integrate the skills into specific content areas and at different levels. According to these researchers, “Technological Pedagogical Content Knowledge, or TPACK-based learning activity types goes beyond technocentric strategies” (Harris et al., 2009, p. 395).

Harris et al. (2009) showed that TPACK allowed teachers to focus on developing and applying complete and individual understandings for technology, pedagogy, content, and context. The relationships among these aspects provide an effective way for teachers to integrate educational technologies. Teachers’ knowledge can be broken into three components, content knowledge (CK), pedagogical knowledge (PK), and technological knowledge (TK). Each type of knowledge can interact to form pedagogical content knowledge (PCK), technological content knowledge (TCK), and technological

pedagogical content knowledge (TPACK). Awareness of these knowledge interactions allows teachers to become aware of a full range of activities for the students based on content, learning abilities, learning preferences, and differentiation needs. (Harris et al., 2009)

According to Koh, & Divaharan, (2011), there are three stages of TPACK development. Phase one focuses on the teachers acceptance of technology as a pedagogical tool. Phase two continues development by building technological proficiency and pedagogical modeling. Phase three concludes with the pedagogical application and opportunities to make connections between different knowledge types. These three phases effectively combine to create the TPACK development system. (Koh, et al., 2011) Integration and Communication Technology integration requires teachers to plan thoughtfully and thoroughly before integration can occur (Wang, 2008).

Methodology

Participants

This study examines education professionals and teachers who have successfully integrated technology into their classrooms and use it in their everyday instruction. The education professionals and teachers work with students who are at the early childhood and childhood levels of education. This includes any children aged birth through sixth grade. This study did not include adolescent-aged teachers and focused on technology use in earlier grade levels. Participants vary between professionals working with two year olds and teachers from multiple grades, including kindergarten and second. Teachers and professionals are from different districts and different demographic backgrounds.

Instruments

. The researcher used a survey/questionnaire containing semi-structured questions and structured questions with Likert-scale type rating scales (both a five-point scale and a six-point scale), checklists, and response questions. Questions ask participants for information about demographics, barriers, perceptions, pedagogy, types of technology, technology usage, and strategies of integration (Appendix A).

The first question is a four point question with leading questions about demographics;

including gender, grade level, content area, and class size. The following four questions are based on a six-point Likert scale, with response options as follows: 1) everyday, 2) 2-3times a week, 3) once a week, 4) once every two weeks, 5) once a

month, and 6) not at all. These questions address technology usage, teacher pedagogy, and training.

There are also four checklist-structured questions. Participants read a specific question and chose items that fit their response from a list of items provided. Following the checklist questions are two questions based on a five-point Likert scale with response options as follows: 1) not at all, 2) minimally, 3) some, 4) quite a bit, and 5) extensively. These two questions focused on prior planning and achievement.

The survey/questionnaire continues with nine unstructured response questions. The participants had the opportunity to individualize their responses based on their own specific classroom or teaching area. These questions focused on teacher perceptions, specific strategies, and technology pedagogy.

Data Analysis

Responses to questionnaires and surveys were analyzed through inductive data analysis. The researcher gathered the evidence, categorized the information, and drew conclusions from the results. The results were interpreted and conclusions were drawn. The data were analyzed across teachers (aggregated) rather than individually.

The constructed responses were analyzed and coded based. The researcher read through participant responses while looking for salient words and phrases. These words and phrases were used to create codes and used to organize the data. Again, the results were interpreted and conclusions were drawn.

Results

A total of 11 teachers responded to and completed surveys. Some questions were not answered by all teachers. All teachers were female, with most teaching in all content areas. Some teachers were in special education settings, while one was a speech specialist.

A total of five teachers reported using technology everyday with their students. Three teachers reported using technology 2-3 times a week. One teacher reported using technology once a week, while one teacher reported not using technology at all. Two teachers stated that they worked with other professionals “everyday”. One teacher reported working with other professionals 2-3 times a week. Three teachers reported working once a month with other professionals, while five reported not working with other professionals at all.

When asked about the amount of involvement in professional development regarding technology, two reported that they were involved every day. One teacher reported being involved once a week in professional development. Another teacher reported being involved once every 2 weeks. Two teachers reported being involved once a month, while four reported not being involved with professional development at all.

Two teachers claimed they differentiated their instruction every day. Four said they differentiated their instruction 2-3 times a week. One reported on differentiating once a week, two reported at once a month, and two reported they did not differentiate their instruction at all.

When reporting on the toughest barriers to overcome when integrating technology, six selected time, five selected money, eight selected teacher access, one selected assessment, one selected teaching pedagogy, and three selected classroom management. None of the teachers selected teaching beliefs as being a barrier.

The types of technology available in these classrooms included iPads, computer software, audio technologies, smart boards™, interactive tabletops, assistive technologies, and “other technologies”. The most common type of technology reportedly used was computer software, with eight teachers indicating their use. Four teachers used SMART boards™, while three reported on using iPads or other technologies. Two teachers reported using audio technologies and assistive technologies. Only one teacher reported using interactive tabletops.

Types of strategies used in the classroom included blended learning (n=6), project based learning (n=3), school partnerships (n=1), professional development (n=3), and “other” strategies (n=2).

Participants indicated that they are using technology in whole- class settings, small group settings, individual settings, games and activity settings, and for early finishers, rewards, and providing examples. Eight teachers used technology in whole class and individual settings. Six used technology in small group settings and to provide examples. Seven teachers used technology for games and activities. Three teachers reported using technology for early finishers or as a reward.

When preparing to use technology with their students, seven teachers used professional development, while three reported not using professional development.

One teacher used professional development “minimally”, three used it “sometimes”, two used it “quite a bit”, and one used it “extensively”. Three teachers reported on collaborating with other schools “minimally”, while three teachers reported never collaborating with other schools. However, two teachers reported on collaborating with other professionals when preparing a lesson “everyday”. One teacher collaborated “sometimes”, and five collaborated “minimally”. Two teachers reported that they never collaborate with other teachers.

Three of the ten participants reported on extensively aligning their technology use with the lesson and curriculum. Four teachers did this “quite a bit”, while two claimed they did it “sometimes”, and one reported never doing this. One teacher claimed to understand the technology “extensively” prior to teaching a lesson. Four teachers understood the technology “quite a bit” and four teachers understood it “some”. One teacher reported never understanding the technology prior to the lesson.

When preparing a lesson, three teachers differentiated their lessons quite a bit, while five did it sometimes. Two teachers reported never differentiating their lessons when preparing lessons. In addition, one teacher reported preparing her assessment for her lesson “quite a bit” when preparing lessons. Two teachers did this “sometimes”, and three teachers did this “minimally”. Four teachers reported that they never prepare an assessment when preparing a lesson.

Three teachers reported on seeking technology leadership “quite a bit” when preparing a lesson. Two reported on doing this “minimally”, and five teachers reported never seeking technology leadership. One teacher reported seeking technology support “extensively” and four reported on doing this “quite a bit”. Two teachers sought technical

support “sometimes”, one teacher did this “minimally”, while two teachers never sought support.

When preparing a lesson, four teachers found ways to motivate students “quite a bit” and four teacher did this “sometimes”. One teacher consecutively reported on doing this “minimally” or “not at all”.

The participants also reported on the types of changes seen in their students when using technology. Two teachers reported on seeing higher engagement “extensively”, and four reported on seeing this “quite a bit”. Three teachers reported seeing higher engagement “sometimes”, while one reported on not seeing higher engagement. Six teachers reported on seeing higher achievement “quite a bit”. Three teachers claimed seeing higher achievement “sometimes”, and one teacher reported seeing this “minimally”.

Increased task behavior was seen “extensively” by one teacher. Six teachers reported that they experienced increased task behavior “quite a bit”, while three teachers saw only some increase. Higher motivation was seen “extensively” by three teachers. Six teachers reported higher motivation “quite a bit” and one teacher reported seeing some of this. Increased independence was seen “extensively” by one teacher, “quite a bit” by four teachers, some by three teachers, “minimally” by one teacher, and “not at all” by one teacher.

Technology proficiency in students when using technology was reported as “extensive” by seven teachers, while one teacher consecutively reported on technology proficiency happening “some”, “minimally”, and “not at all”.

The constructed-response questions were yielded a variety of responses. The first question asked the teachers what they believed the toughest barrier was when integrating technology. Four of the eleven teachers wrote about internet or Wi-Fi access being one of the toughest barriers. Two of the teachers discussed cost, and five teachers listed time being an issue. Seven teachers reported having difficulty with technology access in the schools. One teacher talked about professional beliefs being a main barrier. Two teachers reported access to professional development or pedagogical skills being the toughest barrier. Finally classroom management was included as a barrier by one teacher.

The next question asked the teachers whether their technological beliefs have changed since they began using technology in their classrooms. Seven of the eleven teachers reported that their beliefs had changed positively, while one teacher indicated that their beliefs had not changed. Three teachers did not comment on their beliefs. Common teacher responses included statements about increased student engagement, technology being good for many skills, and not using technology as the entire lesson but as a resource.

Types of technologies used by these teachers included tablets and iPads in five classrooms, SMART boards™ and DVDs in three classrooms, computers being used by nine of these teachers, projectors used by four teachers, using the Elmo or eBooks in two classrooms.

The teachers were also asked to discuss what types of information they would like to be trained in if they had the chance. Seven of the eleven teachers discussed more professional development in all areas. Seven teachers also discussed being

exposed to technology that can be used in the classroom or resources that can be used with the technology. This includes iPad applications, computer applications, and other technologies.

The teachers were asked about strategies used in their classroom with technology. Common answers included whole-group and individual strategies, and age-appropriate uses. Other strategies discussed were making technology learning goal-based, using more than just technology in a lesson, and working with weekly themes to incorporate technology.

When asked whether the teachers have seen any significant changes in their students when using technology, six teachers reported seeing changes, three reported on no changes, and three did not answer. Changes observed included technology proficiency in students, increased independency, increased motivation and engagement, and learning concepts quicker.

Pros listed about technology used in the classroom included technology being a good resource for students, increased student motivation and independency, and multiple forms of learning. Additionally, teachers indicated technology's was good for showing examples, teaching in whole- class settings, and differentiating instruction. Cons listed were student isolation, time constraints, access constraints, money constraints, and technological problems. Many teachers commented on the importance of hands-on activities and the importance of written and spoken language. Finally, one teacher discussed the desire to use only technology.

Participants indicated that in order for successful technology integration there should be goal-oriented lessons, frequent exposure and understanding of technology, understanding of rules and expectations when using technology, and ensuring that the lessons are linked to the assessment and curriculum. Teachers must be confident and make meaningful experiences with the technology. Technology should also not be the only resource when teaching.

The final question asked the teachers to provide suggestions for future technology integration. The teachers' responses included technology access, planning time, more funding, increased understanding of technology, and having set rules for technology usage for the students.

Discussion

The purpose of this study was to examine how teachers successfully integrated technology into the classroom. Eleven teachers filled out surveys about their technology use and what barriers had to be overcome in order to do this.

It was discovered that although technology usage is becoming increasingly relevant in the classroom, not all teachers use technology. Only 50% of the teachers who responded to this survey used technology every day. Of this 50%, all of the teachers were teaching at the pre-kindergarten level. As the grade level increased, the amount of technology usage decreased. This is likely caused by barriers such as time, internet access, funding, and a lack of technological pedagogy.

It was somewhat surprising that a small amount of teachers used resources like professional development, other professionals, and other schools when preparing and learning to use technology in the classroom. The teachers that participated in the study were from school districts in rural areas that quite possibly did not have many of these resources available.

One of the most shocking discoveries was the amount of teachers who differentiated their instruction. With technology, the opportunity to differentiate instruction to meet individual student needs has become increasingly easier to do. However, only 18% of the teachers used in this study claimed to differentiate their instruction on a daily basis. When preparing for a lesson, only 20% of the teachers reported individualizing their lesson plans. The lack of technological pedagogy could be a reason for this high number. However, when reporting on barriers, only 10% of the teachers claimed technology pedagogy was a barrier.

Ninety percent of the respondents reported that they did not prepare assessments before lessons. Sixty percent of the respondents claimed that they aligned their lessons with the curriculum when using technology, while 40% of these teachers reported that they did not align their lesson plans with the curriculum. Following the curriculum and planning quality assessments are crucial elements of lesson planning. This leads to the belief that understanding pedagogy in technology is more relevant than these teachers claim.

When discussing their own personal beliefs about technology, there were a lot of positive comments made. There were observations of increased student engagement, motivation, achievement, on-task behavior, and independency when using technology. These teachers believed technology to be important as long as there were clear rules and regulations for usage. Some teachers believed that technology should be used as a resource in the classroom instead of as the sole base for a lesson.

The teachers discussed using technology in whole-class settings, small group settings, individual settings, and to provide examples as important uses of technology in the classroom. However, some teachers reported concerns about students wanting to use technology instead of paper books and hands-on activities.

Respondents believed that in order to integrate technology successfully, professional development should be offered. Professional development should include training in potentially useful resources, different application that are beneficial, and specialized training for different classroom settings such as small group instruction.

Some positive strategies that could be used to increase technology integration are making sure the lessons have goals and are age appropriate for the students. One teacher discussed creating weekly themes and using technology to enhance lessons with examples and activities.

A common theme amongst these teachers was the importance of using technology as a resource and not as the sole lesson. They discussed using technology to provide examples, participate in activities, and to enhance skills learned. Seventy percent of these teachers claimed that technology was a good resource in the classroom.

The participants in this study listed key components in technology integration. These components included making sure students and teachers were exposed to the technology and had a complete understanding of how to use it, and having clear rules and regulations for usage. They also discussed making sure technology lessons were goal-based, age-appropriate, and linked to the lesson. Results indicated that teachers felt it was important to make meaningful experiences with technology and to use it to enhance a lesson or skill set.

For future technology integration, it was suggested that there should be increased technology and internet accessibility, more funding, and increased professional development or training. Also, students should have the chance to learn technology skills prior to use. As classroom technology integration continues to grow, it is important for teachers and students to understand how to use it in order for successful learning.

Limitations

The study was conducted in different districts, but schools were in similar demographic areas. Participants indicated similar demographic backgrounds which may impact their perceptions about technology. Not all schools or teachers responded to the survey -30 teachers were invited to participate, but only 11 teachers responded to surveys, and some participants only partially completed the survey. The participants were early-childhood and childhood-level teachers - there were no teachers of adolescents that participated. Teachers mostly specialized in pre-kindergarten, with a few in kindergarten and second grade.

Surveys were completed by professionals who had minimally integrated technology in their classrooms. Professionals had more limited access to technological infrastructure and technology support than teachers in schools with steady technology integration procedures.

Conclusion

Technology has become extremely relevant in the education system as its use continues to increase in today's society. Teachers must be prepared and understand how to use technology, teach with technology, and facilitate learning in a successful manner. Results from this study show that although technology integration in the classrooms is increasing, many teachers are still unprepared to use technology in their classrooms. School districts need to plan ways to train teachers in multiple skill sets in order to become successful with their use of technology in the classrooms. Professionals need to understand what types of technology to use in their classrooms, and to be involved with continuous professional development to become effective users

of technology. Barriers will always be present in classrooms, but providing technical support and other resources will decrease many of these barriers in the classroom and allow teachers to work towards successful technological classroom integration.

Recommendations for Future Research

Future research should include a larger sample for more generalizability of results. Researchers should focus on professionals who have integrated technology successfully, have technology available, and use different supports to learn technology pedagogy. Also, looking at more grade levels would allow increased generalization of information at the elementary level. Participants should be from a range of districts and a range of content areas.

References

- Alayyar, G. M., Fisser, P., & Voogt, J. (2012). Developing technological pedagogical content knowledge in pre-service science teachers: Support from blended learning. *Australasian Journal of Educational Technology, 28*(8), 1298-1316.
- Banas, J. R. (2010). Teachers' attitudes toward technology: Considerations for designing preservice and practicing teacher instruction. *Community & Junior College Libraries, 16*(2), 114-127.
- Bitner N., & Bitner, J., (2002). Integrating technology into the classroom: Eight keys to success. *Journal of Technology and Teacher Education, 10*(1), 95-100.
- Cakir, H., Delialioglu, O., Dennis, A., & Duffy, T. (2009). Technology enhanced learning environments for closing the gap in student achievement between regions: Does it work? *Association for the Advancement of Computing in Education Journal, 17*(4), 301-315.
- Carr, J. M. (2012). Does math achievement "h'APP'en" when iPads and game-based learning are incorporated into fifth-grade mathematics instruction?. *Journal of information technology education: Research, 11*, 11269-286.
- Cheung, A. K., & Slavin, R. E. (2013). Effects of educational technology applications on reading outcomes for struggling readers: A best-evidence synthesis. *Reading Research Quarterly, 48*(3), 277-299.
- Clements, D. H. (1994). The uniqueness of the computer as a learning tool: Insights from research and practice. In J. L. Wright & D. D. Shade (Eds.), *Young children: Active learners in a technological age*, (31-50).
- Crichton, S., Pegler, K., & White, D. (2012). Personal devices in public settings:

- Lessons learned from an iPod touch/iPad project. *Electronic Journal of E-Learning*, 10(1), 23-31.
- Diaz, D. P., (2001). Taking technology to the classroom: Pedagogy-based training for educators. *The Technology Source Archives*, volume, page numbers.
- Dragon, K., Peacock, K., Norton, Y., Steinhauer, E., Snart, F., Carbonaro, M. et al. (2012). Digital opportunities within the aboriginal teacher education program: A study of preservice teachers' attitudes and proficiency in technology integration. *Alberta Journal of Educational Research*, 58(2), 263-285.
- Englert, C., Zhao, Y., Dunsmore, K., Collings, N., & Wolbers, K. (2007). Scaffolding the writing of students with disabilities through procedural facilitation: Using an internet-based technology to improve performance. *Learning Disability Quarterly*, 30(1), 9-29.
- Ertmer, P. A., Ottenbreit-Leftwich, A. T., Sadik, O., Sendurur, E., & Sendurur, P. (2012). Teacher beliefs and technology integration practices: A critical relationship. *Computers & Education*, 59(2), 423-435.
- Gess-Newsome, J., Blocher J. M., Clark, J., Menasco, J., & Willis E. M. (2003). Technology infused professional development: A framework for development and analysis. *Contemporary Issues in Technology and Teacher Education*, 3(3), 324-340.
- Getting, S., & Swainey, K. (2012). First Graders with iPads?. *Learning & leading with technology*, 40(1), 24-27.
- Gronseth, S., Brush, T., Ottenbreit-Leftwich, A., Strycker, J., Abaci, S., Easterling, W., & Van Leusen, P. (2010). Equipping the next generation of teachers: Technology

- preparation and practice. *Journal of Digital Learning in Teacher Education*, 27(1), 30-36.
- Harris, J., Mishra, P., & Koehler M. (2009). Teachers' technological pedagogical content knowledge and learning activity types: Curriculum-based technology integration reformed. *Journal of Research on Technology in Education*, 41(4), 393-416.
- How technology can transform student achievement: An interview with Dr. Michele Hancock. (2013). *Our Children: The National PTA Magazine*, 38(3), 7-9.
- Hutchison, A., Beschorner, B., & Schmidt-Crawford, D. (2012). Exploring the use of the iPad for literacy learning. *Reading Teacher*, 66(1), 15-23.
- Jackson, A. T., Brummel, B. J., Pollet, C. L., & Greer, D. D. (2013). An evaluation of interactive tabletops in elementary mathematics education. *Educational Technology Research and Development*, 61(2), 311-332.
- Jonassen, D. H., Carr, C., & Yueh H. P., (1998). Computers as mindtools for engaging learners in critical thinking. *Tech Trends*, 43(2), 24-32.
- Keengwe, J., & Onchwari, G. (2009). Technology and early childhood education: A technology integration professional development model for practicing teachers. *Early Childhood Education Journal*, 37(3), 209-218.
- Koh, J. L., & Divaharan, S. (2011). Developing pre-service teachers' technology integration expertise through the TPACK-developing instructional model. *Journal of Educational Computing Research*, 44(1), 35-58.
- Kopcha, T. J. (2012). Teachers' perceptions of the barriers to technology integration and practices with technology under situated professional development. *Computers & Education*, 59(4), 1109-1121.

- Leh, A. S. C. (2005). Lessons learned from service learning and reverse mentoring in faculty development: A case study in technology training. *Journal of Technology and Teacher Education, 13*(1), 25-41.
- Lowther, D., Inan, F., Strahl, J. D., & Ross, S. (2008). Does technology integration “work” when key barriers are removed?. *Educational Media International, 45*(3), 195-213.
- Means, B. (2010). Technology and education change: Focus on student learning. *Journal of Research on Technology in Education, 42*(3), 285-307.
- Moore-Hayes, C. (2011). Technology integration preparedness and its influence on teacher-efficacy. *Canadian Journal of Learning and Technology, 37*(3).
- Okojie, M., Olinzock, A. A., & Okojie-Boulder, T. C. (2006). The pedagogy of technology integration. *Journal of Technology Studies, 32*(2), 66-71.
- Pan, S., & Franklin, T. (2011). In-service teachers' self-efficacy, professional development, and web 2.0 tools for integration. *New Horizons in Education, 59*(3), 28-40.
- Pierson, M. E. (2001). Technology integration practice as a function of pedagogical expertise. *Journal of Research on Computing in Education, 33*(4), 413-430.
- Shapley, K., Sheehan, D., Maloney, C., & Caranikas-Walker, F. (2011). Effects of technology immersion on middle school students' learning opportunities and achievement. *Journal of Educational Research, 104*(5), 299-315.
doi:10.1080/00220671003767615
- Siven-Kachala, J., & Bialo, E. R. Report on the effectiveness of technology in schools 1990-1994. Retrieved from <http://files.eric.ed.gov/fulltext/ED371726.pdf>

- Stanford, P., Crowe, M. W., & Flice, H. (2010). Differentiating with technology. *TEACHING exceptional children plus*, 6(4).
- Steere, L. (2009). New literacies and 21st century technologies. International Reading Association Brochure. Retrieved from http://www.reading.org/Libraries/position-statements-and-resolutions/ps1067_NewLiteracies21stCentury.pdf
- Wang, Q. (2008). A generic model for guiding the integration of ICT into teaching and learning. *Innovations in Education and Teaching International*, 45(4), 411-419.
- Yuan, Y., & Lee, C. Y. (2012). Elementary school teachers' perceptions towards ICT: The case of using magic board for teaching mathematics. *TOJET: The Turkish Online Journal of Educational Technology*, 11(4), 108-118.

Appendix

Survey/Questionnaire

1. Demographics

Gender: _____

Grade Level: _____

Content Area: _____

Class size: _____

2. How often do you use technology with your students?

Everyday	2-3 times a week	Once a week	Once every two weeks	Once a month	Not at all
----------	------------------	-------------	----------------------	--------------	------------

3. How often do you work with other professionals to plan technology use?

Everyday	2-3 times a week	Once a week	Once every two weeks	Once a month	Not at all
----------	------------------	-------------	----------------------	--------------	------------

4. How often are you involved in professional development or skills training regarding technology?

Everyday	2-3 times a week	Once a week	Once every two weeks	Once a month	Not at all
----------	------------------	-------------	----------------------	--------------	------------

5. How often do you differentiate your instruction when using technology?

Everyday	2-3 times a week	Once a week	Once every two weeks	Once a month	Not at all
----------	------------------	-------------	----------------------	--------------	------------

6. What has been the toughest barrier to overcome when integrating technology? Circle all that apply.

Support	Time	Money	Access	Assessment	Teacher beliefs	Technological Pedagogy	Classroom Management
---------	------	-------	--------	------------	-----------------	------------------------	----------------------

7. What types of technology are used with your students? Circle all that apply.

IPads Computer/Computer Audio SMART Interactive Assistive Other
 Software Technologies Boards Tabletops Technologies

8. What types of strategies do you use to integrate technology? Circle all that apply.

Blended Project- School Professional TPACK Other
 Learning Based Partnerships Development

9. What types of instruction do you involve technology in? Circle all that apply.

Whole Small Individual Games/ Early Reward Provide Other
 Class Groups Activities Finishers examples for a lesson

10. What do you do to prepare to use technology with your students?

Professional Development or Training	Not at All	Minimally	Some	Quite a Bit	Extensively
Collaborate with other schools	Not at All	Minimally	Some	Quite a Bit	Extensively
Align with Lesson and Curriculum	Not at All	Minimally	Some	Quite a Bit	Extensively
Understand technology prior to lesson	Not at All	Minimally	Some	Quite a Bit	Extensively
Collaborate with other professionals	Not at All	Minimally	Some	Quite a Bit	Extensively
Differentiate and personalize lessons	Not at All	Minimally	Some	Quite a Bit	Extensively
Prepare assessment	Not at All	Minimally	Some	Quite a Bit	Extensively
Seek Technology Leadership	Not at All	Minimally	Some	Quite a Bit	Extensively

Seek Technology Support	Not at All	Minimally	Some	Quite a Bit	Extensively
Prepare ways to Motivate Students	Not at All	Minimally	Some	Quite a Bit	Extensively

11. What types of changes have you seen in your students while using technology?

Higher Engagement	Not at All	Minimally	Some	Quite a Bit	Extensively
Higher Achievement	Not at All	Minimally	Some	Quite a Bit	Extensively
Increased On-Task Behavior	Not at All	Minimally	Some	Quite a Bit	Extensively
Higher Motivation	Not at All	Minimally	Some	Quite a Bit	Extensively
Technology Proficiency	Not at All	Minimally	Some	Quite a Bit	Extensively
Increased Independency	Not at All	Minimally	Some	Quite a Bit	Extensively

12. What has been the toughest barrier to overcome when integrating technology? Why?

13. What are your beliefs about technology integration? Have they changed since the beginning of technology integration?

14. What types of technology do you use in your classroom?

15. What types of supports or professional development would be useful in integrating technology?

16. What types of strategies work best when integrating technology?

17. Have you seen any significant changes in student achievement due to technology besides the ones listed above?

18. What were some pros and cons of technology integration in your classroom?

19. What are key components of successful technology integration in the classroom?

20. What types of suggestions do you have for future technology integration?