5-2016

Middle School Teachers' Perspectives On Promoting Effective Technology Integration

Yona Andrew Rose
University of New England

Middle School Teachers' Perspectives on Promoting Effective Technology Integration

By

Yona Andrew Rose

Bachelor of Science, Elementary Education (Shippensburg University) 1997
Masters Degree, Education (Holy Family College) 2002
Masters Degree, Educational Technology (Cambridge College) 2005

A DISSERTATION

Presented to the Affiliated Faculty of

The College of Graduate and Professional Studies

at the University of New England

In Partial Fulfillment of Requirements

For the degree of Doctor of Education

Portland & Biddeford, Maine

April 15, 2016

MIDDLE SCHOOL TEACHERS' PERSPECTIVES ON PROMOTING EFFECTIVE TECHNOLOGY INTEGRATION

Abstract

Technology integration reforms in education have increased in number and expectation throughout schools across the United States. Some instructors have experienced barriers with skill sets, attitudes, professional development opportunities, and collaboration time which have impacted their ability to model good practices. Pictures of qualified, confident teachers integrating technology into their classrooms with regularity and fidelity are unclear. Existing literature was reviewed regarding methods of increasing teacher comfort and knowledge related to technology integration so that the 21st Century Skills of critical thinking, creativity, collaboration, and communication can be addressed in public schools. This research study explored what middle school teachers who integrate technology into their classrooms do to build their skills, maintain positive attitudes, and train collaboratively in order to be proficient models for their students. Cultural Historical Activity Theory (CHAT) was utilized to explore middle school teachers' experiences and perceptions about technology integration and factors that impact their efforts to practice and improve their methods. Qualitative data was collected for this grounded theory study using an online questionnaire and a sixteen question, unstructured interview protocol in January of 2016. Eighteen middle school educators from three states, six school districts, and eight schools were contacted by email and interviewed over the telephone. The educators included different genders, grade levels and subject areas taught, age ranges, years of experience in teaching, and years teaching in middle schools. Data was analyzed using NVivo for Mac where frequency tests were used to develop emergent themes. The study found non-

technical skills such as a willingness to take risks and self-motivation were equally important as technical skills like application knowledge. Participants indicated that supportive environments helped them develop and maintain positive attitudes about technology integration. Finally, the study suggests that informal collaboration time supports increased knowledge building and positive attitudes. These findings concluded that transformative leaders create opportunities to increase skills, build positive attitudes, and support one another while integrating technology. It was recommended that transformative professional development designers and leaders create supportive cultures for middle school educators to improve technology integration.

Keywords: technology integration, middle school, teachers, educators, 21st Century Skills, skills, attitudes, professional development, collaboration

University of New England

Doctor of Education
Educational Leadership

This dissertation was presented
by

Yona Andrew Rose

It was presented on
April 15, 2016
and approved by:

Steven Moskowitz, Ed. D.
University of New England
Lead Advisor

Suzan Nelson, Ed. D.
St. Joseph's College
Secondary Advisor

Catherine Riva, Ed. D.
New-Hope Solebury School District
Affiliate Committee Member

Acknowledgements

This journey has long been a dream of mine. I have enjoyed the opportunity to work with brilliant people, study a topic that greatly interests me, and the feeling of accomplishment that fills my soul with the conclusion of this study. This journey would not have been possible had it not been for so many caring, thoughtful, and wonderful people.

First, I would like to thank my advisors, Steve Moskowitz and Suzan Nelson. They provided feedback over the course of this study that made me deeply consider and analyze my topic. Their comments and support helped me navigate my way and come to the completion of this study in an honorable and academically inspiring way.

Dr. Katie Riva, my affiliate committee chair, spent many hours reading my work, guiding me through the various parts of the process, and smiling as I finished each part. I am forever grateful for her willingness to take me on as an advisee and help me achieve a lifetime goal.

I would like to thank my mother, Paula Rose, for dusting off her transcriptionist skills and helping me to see the words I collected from my interviews. She took over ten hours of interviews and returned transcripts in less than four weeks. Her efforts were Herculean. Thank you for helping me grow up even as an adult. I would also like to thank my mother-in-law, Linda Dracopoulos, for helping me organize the final few interviews I needed to wrap up that phase of the project. Her guidance and help navigating her school district was kind and appreciated.

I would like to thank my colleague, Michele Hamill, for helping me keep my day job moving in a positive direction as she collaborated with me and helped me have my lessons ready for school while working through this doctoral program. It is my hope that she will always know how much she helped me while I achieved this goal.

Kate Garand, my fellow doctoral candidate in this journey has been an amazing confidant and sounding board throughout the dissertation process. Our regular communications and supportive comments have been so very helpful to me. I am excited to share this achievement with her at graduation after working so very hard the last three years to reach this milestone in our lives. Thank you Kate.

Finally, I would like to thank my wife, Sarah. You have been my rock throughout this journey. Each page you read and edited meant I could be more successful every day. Each day you let me vent and question myself helped me become the scholar I am today. Thank you for giving me the space to find my way and the love to keep me striving toward this achievement. This study and degree are so we may chase our dreams.

Table of Contents

List of Tables

List of Figures

List of Appendices

Chapter 1

Introduction

Public school teachers in the 21st century are constantly directed to reform their practices and incorporate new ideas and methods that may or may not better educate students. Trilling and Fadel (2009) suggested that reforming education to include more collaboration and technology-oriented activities would better prepare students for the 21st century. Fullan (2007) described a history of change in education since the mid-20th century that had been constant, but not entirely successful due to some approaches in professional development and government mandates. Hixon and Buckenmeyer (2009) explained that barriers exist beyond acquisition and support issues related to technology. They cited Hew and Brush's (2007) study, which identified the following five areas of concern related to educational technology reforms: a) resources, b) knowledge and skills, c) institution, d) attitudes and beliefs, and e) subject culture (p. 135). Fullan (2007) indicated a failure for most schools and organizations to reform in the mid-20th century due to a lack of recognition or management of systemic changes (p. 5). Educational reforms gained momentum during the 1980s as accountability became the focus. Learning from mid-20th century efforts to reform educational practices, changes in the 1990s and now into the 21st century are more focused and developed, designed to change the classroom cultures (Fullan, 2007, pp. 7-8).

Educational reforms related to integrating technology are a focus now as the Knowledge Age – "a new, advanced form of capitalism in which knowledge and ideas are the main source of economic growth" – motivates global economies and the workforce (Anthony, 2012; Berrett, Murphy, & Sullivan, 2012; Shiftingthinking, 2015; Trilling & Fadel, 2009). Research regarding teacher attitudes indicating low levels of confidence and perceived value about technology

integration may explain a limited change to teaching practices in the 21st century (Blocher, Armfield, Sujo-Montes, Tucker, & Willis, 2011; Banas, 2010; Hixon & Buckenmeyer, 2009; Minshew & Anderson, 2015). Hixon and Buckenmeyer (2009) supported the theory that knowledge, skills, attitudes and beliefs were impacted by resources, institutional efforts, and subject cultures.

Fullan (2001) described schools with the greatest number of innovations (i.e. - policy, personnel, or technology) as "not the winner(s)." He also contended that "depth and coherence" are lacking, which left schools failing to ingrain the changes into their fabric and culture (Fullan, 2001, pp. 35-36). Some teachers are unable to manage changes that are constantly happening (Berrett, Murphy, & Sullivan, 2012; Minshew & Anderson, 2015). They need time and opportunity to implement the changes and make them personal so those changes become part of the culture and norm within the school organization (Kotter, 2012). Without the proper supports through transformational technology leadership, accessible and appropriate professional development, and continuing opportunities to reflect and discuss reform, there is a diminished chance that any reform will be successful (Bennis & Nanus, 2007; Downes & Bishop, 2012; Downes & Bishop, 2015; Minshew & Anderson, 2015).

The early 21st century witnessed great strides in affordable electronic technology and Internet access enhancing educational, financial, and social aspects of everyday life. Public school education has quickly moved to providing technology and incorporating the Internet into learning platforms for students in kindergarten through high school. However, some teachers have not integrated it smoothly and in ways to best benefit their students (Brown, 2011, p. 50). Studies have shown that the majority of public school educators have realistic access or appropriate levels of training to implement technology reforms in their classrooms (Anthony,

2012: Berrett, Murphy, & Sullivan, 2012; Downes & Bishop, 2012; Downes & Bishop, 2015; Hew & Brush, 2007; Trilling & Fadel, 2009). The Partnership for 21st Century Skills has provided research and guidance for schools to integrate technology fluidly. Many states have signed on to the movement (Trilling & Fadel, 2009). Some school districts have implemented effective professional development that included encouragement and support for teachers while those teachers put a great deal of effort to learn and implement new, 21st Century Skills sets to transform schools into modern educational environments (Schrum & Levin, 2013, p. 39). Schrum and Levin (2013) explain that schools that embraced technology integration were led by principals who preferred to employ a distributive leadership style with staffs that enjoyed and sought out professional development and personal growth opportunities (p. 40). They reported that schools that utilize surveys to regularly receive feedback on initiatives and activities that deal with technology integration are more successful. Schrum and Levin (2013) stated that summer opportunities to enhance technology integration skills also enhanced the level of successful outcomes. However, some teachers still do not fully integrate technology into their classrooms and curriculum with regularity or fidelity because they do not put an emphasis on that approach to learning or a value on the available tools and knowledge that exists in the 21st century (Hew & Brush, 2007; Mishrew & Anderson, 2015).

This research study will examine how middle school teachers' skills, attitudes, professional development opportunities, and collaboration with peers about technology impact technology integration into their classrooms as they model 21st Century Skills for their students. Increasing evidence of computer and Internet access focuses the field on the factors that impact the level of teacher utilization of technology integration (Dilworth, Donaldson, George, Knezek, Searson, Starkweater, Strutchens, Tillotson, & Robinson, 2012, p. 130). Kuyatt, Holland, and

Jones (2015) identified instructional practices, curriculum alignment, and school culture as contributing factors to successful technology integration (p. 64). Kopcha (2012) discussed an "apparent gap between the amount of technology available in today's classrooms and teachers' use of that technology for instructional purposes" (p. 1109). He further suggested that mentoring teachers helps them overcome barriers to technology integration (Kopcha, 2012, p. 1110). This qualitative study will explore the perceptions of middle school teachers and identify factors that impact their skills or attitudes related to technology integration. Some factors were professional development, collegial support, time management, and opportunities for educators to learn and receive support with new applications or programs.

Problem

Educational reforms to integrate technology into classrooms to improve 21st Century Skills are being embraced by state and local educational leaders across the United States of America (Trilling & Fadel, 2009). However, some teachers tasked to utilize the 21st Century Skills and Technology, Pedagogical and Content Knowledge (TPACK) frameworks are not always aware, able, or willing to integrate the tools (Anthony, 2012; Downes & Bishop, 2012; Downes & Bishop, 2015; Berrett, Murphy, & Sullivan, 2012). The Partnership for 21st Century Skills (2015b) described assessments of 21st Century Skills for students and found their skills lacking. There is evidence that technology integration is not occurring given the technical and financial resources being supplied to local school districts (Hixon & Buckenmeyer, 2009; Kopcha, 2012; Mishnew & Anderson, 2015). Koehler and Mishra (2010) explained that teachers struggle to integrate technology with content knowledge and pedagogy, instead opting to use technology in very basic ways like typing within a word processing program rather than writing with pencil-and-paper.

In 2012, the Teacher Education Initiative (TEI) brought members of affiliated associations within the National Technology Leadership Coalition together, attempting to promote technology integration via college level, pre-service teacher education (Bull, George, Shoffner, Bolick, Less, Anderson, Slykhuis, Garofalo, Angotti, McKenna, West, Dexter, Herring, Hofer, & Brown, 2012). This coalition carried on the efforts of previous initiatives: Preparing Tomorrow's Teachers to Use Technology (PT3) and Microsofts's Partners in Learning (PIL). The goal was and continues to be to develop pre-service teachers to present information using technology and modern pedagogy following TPACK frameworks, because an un-even application of technology by classroom teachers still exists (Bull et al., 2012).

Dr. Rueben Puentedura presented frameworks to K-12 educators attempting to move their methods from basic uses of technology to higher learning levels utilizing technology in an effort to increase the number of teachers who utilize it well (Schrock, 2015). Puentedura developed a framework called SAMR [Substitution, Augmentation, Modification, and Redefinition], which encourages teachers to go beyond basic uses of technology like word processing in place of paper-and-pencil tasks to developing their knowledge via creative and higher level thinking tasks like videography and collaborative activities presenting knowledge (Schrock, 2015). The International Society for Technology in Education (ISTE) is currently organizing an effort entitled Project ReimaginED in collaboration with the National Center for Literacy Education (NCLE) designed to promote technology use in K-12 environments to prepare students for the 21st century (ISTE, 2015b). These efforts promote effective technology integration. These efforts are necessary because there are still some teachers who do not employ best practices and techniques of technology integration into their lessons (Minshew & Anderson, 2015).

The problem to be examined is how skills and attitudes about technology integration and the districts' curriculum efforts to include technology affect teachers' levels of technology usage in their classrooms. Hixon and Buckenmeyer (2009) discussed the role of professional development as helping to overcome barriers interrupting technology integration. This study will explore the barriers of skills and attitudes related to technology integration that may exist for middle school teachers. It will also examine how professional development and peer collaboration are able to overcome barriers. If teachers will not model and incorporate technology into their lessons, how will students effectively learn to utilize available technologies and learn new hardware and software as it is developed? Data collection and analysis are regularly used to support decision-making and to engage best practices in all types of educational settings. There remains a need to identify and understand how teachers overcome barriers that preclude some teachers from integrating technology regularly into their classrooms (Berrett, Murphy, & Sullivan, 2012; Hixon & Buckenmeyer, 2009).

Purpose

The purpose of this grounded theory study is to examine conceptual systems influencing various levels of technology integration by middle school teachers at public middle schools in the winter of 2016. Grounded theory is a methodology developed by Glaser and Strauss (1967) that builds a theory from qualitative data collection and analysis (Corbin & Strauss, 2008, p. 1). This study will explore impressions and experiences by middle school teachers in various disciplines and what motivates them to use or not use technology regularly as an appropriate teaching tool. Furthermore, this study will investigate how peer collaboration effects the level of technology integration to better inform professional development designers and administrators

about teaching staff perceptions, which may lead to more effective programming to increase and support teacher utilization.

Research Questions

The following questions guided this study:

1) How does a teacher's comfort level with technology skills affect the amount of technology integration in classrooms?
2) How do teacher attitudes about technology integration impact usage in a classroom?
3) How do professional development and peer collaboration affect technology integration?

Conceptual Framework

Activity theory is a conceptual framework that identifies "purposeful, transformative, and developing interactions between actors ("subjects") and the world ("objects)" (Kaptelinin, 2015). It identifies effects and impacts that alter outcomes beyond the person or people performing the tasks. This theory links a mediating tool, technology integration, and relates observations and data about subjects to rules, community and a division of labor within the scope of the territory of research and how it ultimately effects the outcome (Anthony, 2012). When computers and Internet access are supplied to a group of educators, there are still many factors that affect the utilization and integration of those technology tools into a classroom. Continuing research about barriers teachers experience with regards to applying technology integration techniques is still needed to support professional development efforts and increase teacher levels of comfort with new technologies and teaching techniques. This is a common problem nationally. While many efforts are underway to improve technology integration, there are relatively few signs of increased participation by teachers in educational reforms including technology (Dilworth et al,

2012; Koehler & Mishra, 2009; Kopcha, 2015; Kuyatt, Holland, & Jones, 2015; Thomas, Herrying, Redmond, & Smaldino, 2013).

Teachers' knowledge and skill levels along with their beliefs and attitudes towards technology integration are affected by many aspects of the educational landscape as they participate in learning opportunities and then choose to what extent they will transfer those efforts into classroom activities and student engagement (Anthony, 2012; Berrett, Murphy, & Sullivan, 2012). Diaz and Bontenbal (2000) found that teachers generally focus on initiatives with which they are most comfortable or are in favor of using previously successful techniques or methods without technology. Downes and Bishop (2015) worked extensively to identify and support appropriate uses of technology that help teach middle school students 21st Century Skills. The Partnership for 21st Century Skills believes 21st Century Skills to be vital for successful, global citizens in the new century (Trilling & Fadel, 2009). These skills include: creativity and innovation, critical thinking and problem solving, communication and collaboration, information literacy, media literacy, ICT (information, communications, and technology) literacy, flexibility and adaptability, initiative and self-direction, social and cross-cultural, productivity and accountability, and leadership and responsibility skills (Partnership for 21st Century Learning, 2015d). Downes and Bishop's (2015) study described their observations and opinions of technology integration efforts after receiving professional development and continuing support in Vermont middle schools, but a gap remains in the research to support and explain why teachers still do not integrate technology more effectively after receiving professional development and support.

Assumptions, limitations, scope

This study assumes that all study participants teach students with access to computers and the Internet on a regular basis in school. Furthermore, these teachers had the opportunity to expand their level of technology knowledge through workshops, in-service activities, and school district supports from technology professionals. Teachers who utilize computers and Internet resources to present lessons will be interviewed. This researcher will limit bias during interviews while participants share their perceptions that may differ from the interviewer's.

Given the focus on middle schools, the results cannot be generalized to elementary or high schools. This study may not be useful to private or charter schools which may function differently than a public school. Private or charter schools may have fewer state mandated expectations to achieve or have more supports available given different types of budgetary circumstances that tuitions may cover and tax dollars do not in public schools. Private or charter schools may also have different types of foci that public schools cannot enjoy due to requirements of equal educational opportunities mandated by state or federal governments.

A potential bias will be demographic information about participants. This researcher will need to maintain objectivity when considering participants' ages, years of experience, subjects or grade levels being taught to avoid preconceived notions of these populations. This researcher is a middle school teacher and is aware of various middle school philosophies and current reforms in middle schools. Awareness of this bias along with support from advisory committee members will help control for issues of bias. Transparency will be vital to ensure participants that information shared will be confidential so responses can be honest. Comprehensive data collection techniques allowing for peer review and debriefing of transcripts and facts supported

by triangulation will help uphold the integrity of the study and validity of information collected (Creswell, 2013, p. 251).

Significance

The proposed study is significant because it will provide school teachers' insights, experiences, and practices about integrating technology into lessons, allowing students to build upon their skills and meeting 21st Century Skill standards upon graduating from K-12 education. School districts will be able to utilize this study to improve technology implementation efforts through professional development activities. Data may assist professional developers to design programs that promote knowledge sharing and allow teachers to overcome barriers when integrating technology. Professional development may be improved when teachers' perceptions are considered through reflective practices and restructuring future experiences based on current feedback (Downes & Bishop 2015; Downes & Bishop, 2012). Educational organizations may benefit from this study as it provided current thinking about technology integration and provided reflections about improving practices.

This study may also provide some understanding about the degree to which teachers accept direction to reform their practices based on how their administrators interact with and evaluate some participants for making changes (Levin & Wadmany, 2008). Teachers are the key to educational reforms because it is they who will present, support and uphold the standards of 21st century skills for their students (Terhart, 2013; Thomas et al, 2013; Stickney, 2006). Therefore, improving teachers' abilities and methodologies will lead to better student outcomes in the 21st century (Kopcha, 2012; Kuyatt, Holland, & Jones, 2015; Thomas et al, 2013; Trilling & Fadel, 2009). This study will explore the factors influencing the implementation of technology reforms in this school setting.

Definition of Terms

21st Century Framework: The development of academic subject knowledge simultaneously learned along with essential skills such as critical thinking, problem solving, communication and collaboration that higher education and the business world require of students and employees respectively (Partnership for 21st Century Learning, 2015d, p. 1).

Collaboration: Groups of people working synchronously (real time) or asynchronously (contributions happen at various times, not live) to complete a common goal or task. Collaboration includes awareness of grouping for a shared purpose, motivation to complete tasks, self-synchronization as groups work out timelines for work completion, participation inclusive of all stakeholders, mediation as varied ideas come together, reciprocity of knowledge, reflection of everyone's thoughts and engagement which requires group members to actively work on the task rather than "wait and see" (Association for Information and Image Management, 2015).

Content Knowledge: Teachers' knowledge about the subject matter to be learned or taught (Koehler & Mishra, 2009).

Digital Immigrants: A person born prior to the widespread usage of digital technology or a person born since widespread usage of digital technology, but were not given access to learn (Techopedia, 2015a).

Digital Natives: A person exposed, from birth, to widespread usage of "digital technology like the Internet, computers and mobile devices" who gain a deeper understanding given the time and developmental experiences at young ages (Techopedia, 2015b).

In-service Teachers: "Of, relating to, or being a full-time employee" (American Heritage, 2011).

Integration: "The act or process or an instance of integrating: as coordination of mental processes into a normal effective personality or with the environment" (Merriam-Webster, 2015).

Interaction: The process of talking with, looking at, sharing with, or engaging in actions with another person (Vocabulary.com, 2015).

Knowledge Age: An era of time following the Industrial Age when knowledge and ideas are more valued than previous goods like land or natural resources. Workers are now valued for their abilities to think critically and problem solve. Businesses are looking for people that can "locate, assess, and represent new information quickly." This era no longer seeks to reward people with the ability to learn information, but rather celebrates workers who can innovate and respond to rapidly changing situations (Shiftingthinking, 2015).

Pedagogy: The understanding of how students learn and the processes to help them develop skills. It includes techniques and methods to engage learners at the level and push them to build knowledge or acquire skills. To understand pedagogy, one must be aware of cognitive, social, and developmental theories about a given age group (Koehler & Mishra, 2009).

Professional Development: In education, this term explains "specialized training, formal education or advanced professional learning" designed to advance the knowledge of participants. The goal is to increase the skill levels of school staffs so that student outcomes improve when employing new methods of instruction or approaches to concepts (The Glossary of Education Reform, 2013).

Professional Learning Communities: Any group wishing to improve learning for students who meet to discuss and reflect on teaching practices. The focus must remain on student learning rather than educators teaching. This can be achieved through collaboration

amongst teachers, administrators, and support staff focusing on the results of their efforts and constant changes to regularly improve outcomes for students (DuFour, 2004).

Educational Technology: Any device or medium that provides information or the ability to present information in a variety of ways. This term is constantly changing with improved methods of accessing and providing knowledge building to develop new ideas and develop critical thinking skills. In the mid- to late 20th century, this could have been an overhead projector. Today, access points to the Internet and the ability to present ideas and concepts via laptop computers or tablets are common forms (Koehler & Mishra, 2009).

TPACK: A framework describing how teachers can integrate technology, pedagogy, and content knowledge to improve student learning. This framework builds on Lee Schulman's work about understanding teachers' depth of knowledge and how they present that knowledge to students. This framework is widely accepted in education and gaining support for expanded use around the world (Koehler & Mishra, 2009).

Conclusion

Chapter 1 introduced the study, providing background information about the need to improve classroom technology integration. The 21st century, the Knowledge Age, requires a critical thinking society unlike the task performance and rule following the Industrial Age (Trilling & Fadel, 2009). Some teachers are not conforming to the needed changes in education reform, so it becomes imperative that research explores their reasoning and provides ideas to alter professional development to ensure students receive an appropriate education (Terhart, 2013). This study will also provide insight into the correlation of teacher interactions with administrators about technology integration and the level of technology integration teachers

attempt (Levin & Wadmany, 2008). Chapter 1 also provided explanations about the research questions, assumptions and limitations, significance, and relevant terms about the topic.

To continue this exploration and to achieve these goals, Chapter 2, Literature Review, will present current works and theories explaining the new norm in the Knowledge Age. A brief history of educational reform efforts from the late 20th century to the present will focus this study on the gap that exists between teacher evaluations and the level of technology integration teachers provide. Subsequent chapters include: Chapters 3, Methodology, a phenomenology of interviews to explore technology integration of middle school teachers; Chapter 4, Results; and Chapter 5, Conclusion.

Chapter 2

Literature Review

Twentieth century education primarily focused on learning information and training students to use that knowledge in their work. Times have changed with the advancements of computer technology, the Internet, and the costs associated with supplying equipment to schools. Jerald (2009) presented a report for the Center for Public Education, which described how the world has changed and educational reform including thorough technology integration is necessary to compete on a global stage (p. 1). Gray, Thomas, and Lewis (2010) reported that 93 percent of the computers brought to school or supplied by the schools had access to the Internet (p. 3). According to their report, a ratio of 5.3 students to 1 computer existed (Gray, Thomas, & Lewis, 2010, p. 3). In the new century, education must help develop new abilities in students so they can achieve academic and career success after grade school (Trilling & Fadel, 2009).

Twenty-first Century Skills is a framework that combines nine content areas, four major themes, and three skill sets organized to develop students so that they will be successful in a rapidly changing world (Kay, 2009). Grade school is an important place to learn the content and to practice the necessary skills to manage jobs, continuing education, finances, and shopping in the new century. Teachers are reluctant to educate students in these skills even with access to equipment and monetary support (Anthony, 2012; Wetzel, Wilhelm, & Williams, 2004). It is incumbent on educators to learn these skills and incorporate them into lessons that will prepare students for the rigors of college education, global competition for jobs, and survival in a world that provides instant and constant information via the Internet. Professional development designers need to assess the level of success and usage of technology by classroom teachers to

guide professional development and support increased technology integration wherever it is needed (Koehler & Mishra, 2009; Minshew & Anderson, 2015; Storz & Hoffman, 2013).

Fadel (2015) explained a need to revise educational approaches in the new century (p. 212). As technology advances and more hardware or software becomes increasingly available, less than than 50 percent of teachers reporting on the national study, The Teachers' Use of Educational Technology in U.S. Public Schools: 2009, utilized or directed students to integrate technology with problem solving, conducting experiments or measuring, developing multimedia presentations, developing demonstrations or models, and designing and producing a product (Gray, Thomas, & Lewis, 2010, p. 14). This study also stated that over 50 percent of reporting teachers indicated utilizing technology for professional development activities, trainings, and independent learning (p. 17). The research noted 66 percent of teachers reporting spent eight or fewer hours receiving professional development in the 12 months prior to their survey (p. 18). Governments and oversight organizations have failed to define a set of accepted technology skills required by members of the global community (Fadel, 2015, p. 213). Instead, sets of suggestions from the International Society for Technology in Education (ISTE), the Partnership for 21st Century Learning (P21), and the National Technology Leadership Coalition (NTLC) have been developed for classroom teachers to consider utilizing in their teaching (ISTE, 2015c; Partnership for 21st Century Learning, 2015c; National technology Leadership Coalition, 2015).

There is a strong, educational reform movement in the United States seeking to develop and integrate 21st Century Skills into schools in greater and more specific depth. The U.S. Department of Education (2014) released the National Education Technology Plan, outlining guidelines that school districts can utilize to enhance technology integration in grade schools. The U.S. Department of Education (2010) also released an initiative to educate and enhance

school district staff abilities levels with the Professional Learning Through Online Communities of Practice and Social Networks to Drive Continuous Improvement report. The U.S. Department of Education also supports programs like Ed Tech (Enhances Education Through Technology), Innovative Programs, and Technological Innovation and Cooperation for Foreign Information Access grants that will broaden student access to technology project learning.

This literature review will focus on in-service teachers and how they deal with identified barriers to integrating technology. Because such a large population of in-service teachers are reluctant to integrate technology (Trilling & Fadel, 2009; Wetzel, Wilhelm, & Williams, 2004) and are, in fact, not presented with effective professional development to increase 21st Century Skills (Blocher, Armfield, Sujo-Montes, Tucker, & Willis, 2011; Chesbro & Boxler, 2010; Duran, Yaussy, & Yaussy, 2011), students are not receiving the necessary skills they will require in college and the workforce. This literature review will reveal a gap in knowledge with respect to overcoming barriers to technology integration efforts, which may guide professional development of teachers to overcome these barriers and then pass their knowledge on to students.

Literature Search

This literature review began with research that explained 21st Century Skills and how they might improve student achievement. School reformers have achieved movement in areas like technology integration, but it is not clear how effective the efforts have been (Banas, 2010; Berrett, Murphy, & Sullivan, 2012; Downes & Bishop, 2012; Downes & Bishop, 2015; Hew & Brush, 2007; Hixon & Buckenmeyer, 2009; Koehler & Mishra, 2010; Partnership for 21st Century Learning, 2015b). This idea demands further exploration related to 21st Century Skills, how in-service teachers are being trained to present these skills, and how barriers are managed

by teachers that must support student learning (Hew & Brush, 2007; Koehler & Mishra, 2009; Koehler & Mishra, 2010; Minshew & Anderson, 2015; Riordan, Caillier, & Daley, 2015; Rotherham & Willingham, 2009).

The information search began with database inquiries using ERIC, EBSCO, and ProQuest Central, which led to categories of information. Category I gathered information explaining 21st Century Skills and the framework's design. Category II explained professional development efforts that either improved or failed to initiate movement towards 21st Century Skills. Category II also identified barriers to technology integration. Category III described perspectives of the educational community with regard to technology integration and educational reforms demanding in-service teachers change their approaches to teaching in the 21st century. Category IV included research about evaluation methods of teacher integration of technology. All categories moved beyond database searches as the information "snowballed," exposing new sources to consider for the reference section.

Evolving Standards of PreK-12 Education

Educational standards reflect different interests, perspectives, and policy-makers. The next section includes standards from several organizations that influence middle school educators in all disciplines.

21st Century Skills

Twenty-first Century Skills push students to be problem solvers rather than just information learners (Partnership for 21st Century Learning, 2015d). The idea of helping students to become "deeper learners" is a growing area of educational reforms (ISTE, 2015a). Deeper learning is the process where rigorous academic content is learned via critical thinking and problems solving in collaborative settings (Chow, 2015, p. xii). The educational community

agrees that English, reading or language arts, the arts, economics, geography, government and civics, world languages, mathematics, science, and history are essential content areas in which students need to develop knowledge and understanding to be active and responsible citizens in the 21st century (Bellanca, 2010, pp. 33-36; Trilling & Fadel, 2009). The aforementioned content must fit into the context of a fast-paced, information rich, and global community. Fadel (2015) discussed metacognition in 21st century learning and explained that it is vital to successfully achieving goals, no matter what area those goals may include (p. 226).

The new reality in and out of schools is the regular inclusion of technology throughout our lives in virtually all aspects of society (Fadel, 2015, p. 208). The 21st Century Skills movement seeks to view content and learning through new lenses that focus on four distinct themes (Partnership for 21st Century Learning, 2015e). Educational leaders, business leaders, and government officials organized the Partnership for 21st Century Skills because they realized that the world was changing and required new ways of thinking to solve problems and so students could be good candidates for jobs that have yet to be created in the 21st century (Trilling & Fadel, 2009). The four lenses are 1) Global Awareness, 2) Financial, Economic, Business, and Entrepreneurial Literacy, 3) Civic Literacy, and 4) Health Literacy.

Global Awareness is being aware of cultures around the world in an effort to interact more appropriately and openly (Partnership for 21st Century Learning, 2015e). It is vital as colleges increase online access for students from around the world. Businesses have expanded their abilities to hire from outside geographic confines in a global market (Trilling & Fadel, 2009, pp. 7-10). The Internet has opened the world to students in new ways where they need to be able to communicate in various languages. They must be able to understand the histories and geographical issues that led to current political and economic situations. The content must be

provided so that students may be globally aware of situations that will affect their lives (Bellanca, 2010, p. 53; Partnership for 21st Century Learning, 2015d).

Financial, Economic, Business, and Entrepreneurial Literacy is increasingly important as money covers the world in a web of buying and selling (Kay, 2009). For example, retirement will require citizens to understand various means of saving money to supplement Social Security, such as online banking, investing, and planning. Therefore, students must become competent in content areas that will support a lifetime of financial needs. Large factory jobs are automated now, demanding the workforce become more technical and requiring higher level thinking skills along with applied skills that students must learn if they are to support themselves in the growing global society (Partnership for 21st Century Learning, 2015d; Trilling & Fadel, 2009, p. 8).

Civic Literacy is the expectation that global citizens will respect and act ethically with one another (Partnership for 21st Century Learning, 2015e). It extends beyond just one country now that the world is more connected and countries are affecting each other in various, political ways. President Obama's first campaign brought out millions of young, new voters who wanted to get involved in changing the nation through government. Students need a strong background in civics to effectively work with their communities, states, or country (Bellanca, 2010, pp. 327-328). The 24-hour news cycle has created a need for people to learn how to sift through massive amounts of information and then make decisions based on their understandings (Trilling & Fadel, 2009, p. 17). 21st Century Skills are designed to develop citizens into information managers and problem solvers. Educators must constantly evaluate their efforts to present material through technology integration to increase the chances that students will enter society, prepared to participate in modern ways (ISTE, 2015a).

Technology usage in education provides a medium for students to collaborate. They learn to share and problem solve together. Downes and Bishop (2012) discussed research about school children working together and their connection to technology. They found that students increased their abilities to work together as well as achieve more based on their experiences with technology (Downes & Bishop, 2012, p. 10). Teachers are responsible to develop children's communication skills and must learn to facilitate growth in this area.

Health Literacy includes awareness of healthcare opportunities, personal health, and wellness plans (Partnership for 21st Century Learning, 2015e). Accessing healthcare has become a major issue in the United States and citizens are expected to have health care in various ways (Bellanca, 2010, pp. 327-328). Students must learn about the healthcare system, personal health, and health technologies so they may make educated choices and be aware how those decisions affect not only themselves, but also their country's economy and the healthcare options for others (Trilling & Fadel, 2009, pp. 17-18).

Through these four lenses, the 21st Century Skills movement strives to develop learning and innovation skills of critical-thinking, collaboration, communication and creativity (Kay, 2009, p. 42). Trilling and Fadel (2009) provided a history of learning from the Agrarian Age, through the Industrial Age, and now into the Knowledge Age; students now need to consider how they will contribute to their future jobs, develop their personal, technological traits, fulfill civic responsibilities, and carry forth traditions and values (pp. 14-15). Global citizens today need to solve problems in new ways. People from around the world are dealing with issues, working together and communicating over time zones and boarders, to develop answers to problems that plague the planet. Fadel (2015) shared that technology tools alone will not help students learn, but rather, technology is a useful tool to deliver information in new and engaging

manners (p. 215). Educational reformers must help teachers overcome their reluctance to innovate and integrate technology in classrooms.

Solutions must be new and innovative, demanding creative approaches never before attempted in a less technical world (Rotherham & Willingham, 2009, pp. 16-18). While these four themes are not new concepts that teachers must instill in their students, the methods that today's students must employ are more technologically integrated with the Internet. Banas (2010) explained the challenge exists between the connections of content, technology and pedagogical applications (p. 115). The Internet has connected the world and information into a seamless flow that must be effectively managed and manipulated.

Twenty-first Century Skills also demand that information, media and technology skills be integrated into educational reforms (Kay, 2009, p. 42). The Internet has brought people together and shared extreme amounts of knowledge in a dramatically short time. Our world now uses technology to inform, relate, and learn across global societies (Fadel, 2015, p. 208). Teachers must include technology skills in their curriculum and pedagogy structures so their students may participate in the advancing workforce (Koehler & Mishra, 2010, p. 4). The globalization of banking, shopping, education, and an evolving workforce requires citizens to connect, communicate, and work together (Trilling & Fadel, 2009, pp. 67-71). Students must learn to keep up with technology applications that allow them to communicate via the Internet and interact with a variety of cultures as they solve challenging problems. They must access, engage, and use information moving at lightening speeds through the Internet.

Those who teach 21st Century Skills seek to improve and maintain life and career skills (Kay, 2009, p. 42). Trilling and Fadel (2009) explained that students must be flexible and adapt to new situations as they arise (p. 74). Also, social and cross-cultural skills will be paramount, as

geographic locations no longer dictate who will be present at meetings and in work scenarios. Leadership and the responsibility for others will change as these concepts integrate more types of people into groups (Bellanca, 2010, pp. 334-335). Students must develop their initiative and self-direction because society is moving quickly; job proficiency and production are expected without excessive training or support (Trilling & Fadel, 2009, p. 78). The workforce is now global, so it is imperative that students learn to be productive and accountable in new ways. There are more people seeking jobs than there are available jobs. Students have to be able to perform or they take the chance of not gaining employment or maintaining their jobs (Trilling & Fadel, 2009, p. 82). Trilling and Fadel (2009) explained that educators can use reformed and technologically current methods to build student abilities to solve problems and present materials in a variety of modern ways.

Twenty-first Century Skills represent a framework of learning that will drive education through the 21st Century. In the United States of America, almost half the states have formally adopted 21st Century Skills into their education legislation (Bellanca, 2010). The 21st Century Readiness Act HR347 (2013) and S1175 (2011) are bills submitted for consideration in the U.S. Congress directing schools to incorporate 21st Century Skills in every state (Partnership for 21st Century Skills, 2015a). Laws enacted from the passing of these bills will require teachers to know how their students learn given advances in technology and the globalization of so many aspects of society. Teachers will now need to include technological pedagogy in their repertoire so they may guide students through skill acquisition and development. This bill is evidence that education is moving away from rote learning and moving toward integrating problem solving while using technology tools as resources.

Technology Pedagogy

Koehler and Mishra (2009) recognized that technology has moved so rapidly that teachers are hard pressed to learn it and integrate it into student activities (p. 61). Their work to relate technology, pedagogy, and content knowledge (TPACK) informed educational reform movements and teacher education since 2009 (Koehler & Mishra, 2009). The concept outlines a need for teachers to include technology into classroom learning activities that are pedagogically appropriate and related to grade level content (Thomas, Herring, Redmond, & Smaldino, 2013). Sometimes teachers assume students can already manipulate technology within the content without direct instruction (Koehler & Mishra, 2010). While students are coming to school with some level of technology proficiency, they are not ready to make connections with the content and their technology knowledge base (Storz & Hoffman, 2013). Sardone and Devlin-Scherer (2010) purported that 21st century students are generally focused on social media and digital gaming (p. 410). Fadel (2015) reported that based on the incredible speed at which the world has connected via the Internet, information and ideas are moving around the globe faster, increasing "complex interactions" (p. 218).

Technology savvy students demand more from their teachers with regard to technology usage and engagement (Minshew & Anderson, 2015). Google and other search engines are the main sources of knowledge today, along with social networking opportunities to solve problems when information is not readily available (Downes & Bishop, 2012, p. 7). Students are more willing to interact with content if it is stimulating (Sardone & Devlin-Scherer, 2010). Students today are demanding fun and collaborative environments in which to learn as they increase their creativity through independent and group learning opportunities (Downes & Bishop, 2012, p. 9).

Technology is appropriate at all age levels, but teachers must ensure appropriate amounts of access and monitor its use throughout activities given the common misunderstanding is that children already understand how to use technology. Rotherham and Willingham (2009) pointed out that students do not come to school with the knowledge teachers assume they possess about techniques and applications of technology, so plans are not developed to explicitly teach specific skills such as web searches and presentation tools (p. 16). In fact, students rarely choose to engage in technology that will develop their critical-thinking or creativity skills (Calvani, Fini, Ranieri, & Picci, 2012). Instead, they grasp onto the applications and abilities that support their lifestyles, and hyper-focus on those skills only (Rotherham & Willingham, 2009).

Koehler and Mishra (2009) described the need for students to expand their technology usage through meaningful activities that allow for a variety of options of technology (p. 62). Accepting the complexities of technology integration, the pedagogy requires teachers to facilitate usage rather than teach isolated applications out of content context. The more comfortable teachers become exploring and infusing technology, the more technology their students will attempt to incorporate into learning activities (Koehler & Mishra, 2010, p. 6). According to technology pedagogy expectations, teachers must know the difficulty levels students are prepared to handle and how deeply students are able to apply technology in their efforts to learn material (Thomas, Herring, Redmond, & Smaldino, 2013). The technology is also convenient to present knowledge and develop communication and collaboration skills (Kay, 2009, pp. 43-44).

In their study, Blocher, Armfield, Sujo-Montes, Tucker, and Willis (2011) explained that teachers do not possess the technological knowledge to integrate it proficiently (pp. 158-159). Blocher et al. described a teaching force that did not receive adequate training in their college educations or since attainment of their degrees. These teachers are referred to as digital

immigrants because they are just now coming to technology as a means of teaching and learning. Students, on the other hand, are considered digital natives, having grown up with technology and regularly exploring new devices or applications as they grow up in the new century. There is a need for professional development to close the gap between the digital groups (Ottenbreit-Leftwich, Brush, Strycker, Gronseth, Roman, Abaci, vanLeusen, Shin, Easterling, & Plucker, 2012). Students increase their usage of technology beyond their social proclivities and enter a more academic use of advancing technologies when their teachers confidently teach by integrating technology (Storz & Hoffman, 2013).

Professional Development

Teachers require training to learn 21st Century Skills. Riordan, Caillier, and Daley (2015) contended that professional development traditionally took place in school districts where administrators may or may not have provided opportunities for teachers to develop, collaborate, and refine their practices (p. 154). Blocher et al. (2011) studied professional development that incorporated technology into content and pedagogical knowledge of teachers as they collaborated to develop curriculum (p. 160). They found those teachers' comfort levels improved when they received support and the opportunity to communicate with peers about ideas and approaches. It is important to note that this study took over three years and constant supports were provided to guide the participants. This effort is not the norm for professional development. Riordan, Caillier, and Daley (2015) explained that teachers today are expected to teach 21st Century Skills in an environment that is not organized or set up for the 21st century where teachers' traditional methods of teaching are still employed (p. 142).

Many school districts in the United States have provided access to computers and Internet, but usage is still limited (Hixon & Buckenmeyer, 2009, p. 133). Teachers have been

reluctant to use the technology and chose to continue the methods they knew and trusted (Rotherham and Willingham, 2009, p. 19). Hixon and Buckenmeyer (2009) suggested that teachers must overcome their attitudes and beliefs in technology to increase their willingness to integrate the technology into lessons (p. 142-143).

Riordan, Caillier, and Daley (2015) explained "…that teacher development is social as well as personal. It is a matter of building a culture of collaboration and mutual support… we have found the use of protocols and collegial coaching to be vital to the growth of new and veteran teachers" (p. 146). Berrett, Murphy, and Sullivan (2012) studied four middle schools and the results of technology integration with the assistance of a grant to purchase materials and provide training. The study found that success was linked to administrative support. Berrett, Murphy, and Sullivan (2012) asserted that teachers must have a "conceptual understanding of what technology can do" so that they can make connections and use it wisely in their classrooms (p. 216). Kopcha (2012) reported that teachers were more successful when they received support and appropriate professional development.

Rotherham and Willingham (2009) described teacher use of problem-based learning and project-based learning as appropriate and accepted pedagogy (p. 19). These approaches fit nicely with the 21st Century Skill framework as students think critically about a problem, collaborate in teams to solve the problem, communicate with their teams and those who view their solutions, and develop their creativity as they use a variety of vehicles to present their knowledge and solve their problems (Partnership for 21st Century Learning, 2015d). However, Rotherham and Willingham (2009) explained that teachers rarely incorporate such concepts into their courses (p. 19). They shared that some teachers have embraced 21st Century Skills in their lessons, which led them to the question; why are the majority of teachers reluctant to integrate

21st Century Skills, specifically technology oriented skill, into their programs after receiving professional development?

Successful Integration of Technology in Middle School

Downes and Bishop (2012) organized a grant in Vermont to provide technology in three middle school settings. While the population was not diverse, there was a consistent level of technology usage by staff members. Downes and Bishop's (2012) study used a qualitative method to interview and assess the use of technology after supporting professional development and equipment support was provided to limit issues and motivate teachers (p. 8). The study's conclusion was positive, as interview responses were supportive and appreciative of the opportunity to use technology with regularity. Teachers would need to continue learning technology tools and opportunities, but overall, the study found technology use desirable.

Middle school students in Delaware, Ohio develop 21st Century Skills through their science curriculum. Duran, Yaussy and Yaussy (2011) presented the program, *Race to the Future*, where they guide students in a creative, technologically integrated search for information as students solve problems collaboratively, communicating their responses clearly and concisely (p. 99). The authors describe five tasks that students must complete while teaching information, but more importantly, developing critical-thinking skills using 21st century methods (Duran, Yaussy, & Yaussy, 2011, p. 104). The five tasks include information searches on the Internet, using video and audio technology to guide information searches, and manipulatives that present team building and group dynamic opportunities for students to develop. Subject specific information may be altered with content areas in addition to science. Students are motivated by the project-based approach rather than sitting through a lecture course. The authors contended that this approach may be used in any content area as a teaching, reviewing, or assessment

method for students (Duran, Yaussy, & Yaussy, 2011, p 105). Duran, Yaussy, and Yaussy (2011) concluded that future research about technology integration is necessary. They suggested more research is needed to identify ways that teachers can learn and evaluate their efforts to constantly develop their methods of instruction would be appropriate.

Sardone and Devlin-Schere (2010) studied the effects of digital games on 21st Century Skill development in students. The researchers studied sophomore level pre-teaching students from a midsized private university in New Jersey in a variety of secondary fields, and provided them with digital games from which to choose, learn, and teach secondary level students through a tutoring program attached to the university (Sardone & Devlin-Scherer, 2010, p. 413). This program sought to provide 21st Century Skills and better understand how the pre-teaching students felt about the process of learning and implementing the games. Their findings were mixed. Most students found the use of games motivating, creative, and challenging, however, they were still reluctant to state with confidence their intentions to use the games in a real classroom upon graduation and acquisition of a teaching position (Sardone & Devlin-Scherer, 2010, p. 422). The games clearly promoted 21st Century Skills, yet they were not received well by the teaching community because there was little evidence that such activities would truly improve knowledge building.

Koehler and Mishra (2010) hypothesized that teachers need more support to learn and integrate programming that will improve 21st Century Skills in their students. Given appropriate equipment and access, professional development, and regular opportunities to reflect on lessons integrating technology, it is possible for 21st Century Skills to be taught in middle schools. However, if regular assessment and evaluation of efforts does not happen, it is possible that integration efforts will fail (Koehler & Mishra, 2010).

Professional Development Opportunities Needed

Many in-service teachers were not taught the technology skills required of 21st century problem solving or workforce prerequisites. The Internet and rigorous pace of information management systems challenge in-service teachers' elected methods to ready students for college and employment (Wright & Wilson, 2011). There is a need for in-service teachers to receive professional development that integrates technology usage into the content and appropriate pedagogy rather than only teaching technology applications and hardware (Blocher et al., 2011, p. 168). Teachers need time to collaborate and explore societal changes to better prepare lessons and curriculum that will develop students' 21st Century Skills (Rotherham & Willingham, 2009, p. 19). Even with this research, Riordan, Caillier, and Daley (2015) found that policies requiring research-based practices do not support those practices by motivating or supporting teachers (p. 152).

Chen (2011) referenced research from Darling-Hammond and Bransford (2005), which stated that "intellectually superficial teacher training" does not support teacher usage of technology in their teaching practices (p. E5). Chen (2011) believed research was necessary to fill a gap in our understanding about evaluation methods that could improve teacher training existed. Chen (2011) studied the effects of problem-based learning methods of professional development for in-service teachers. Extant research recognizes that teachers come to work with a diverse set of technology skills and like students, need to develop those skills in a manner that builds on itself (p. E7). Teachers need opportunities to collaborate and improve technology integration by working with other teachers and within the content they actually use. Kay (2009) stated that today's students will inherit an economy and society that requires teachers to prepare them in a new way, different from any previous generation (p. 41). Teachers also need to be

prepared in new ways to improve their methodologies and the integration of technology with appropriate content and pedagogy. Professional learning communities offer such an experience to develop sophisticated understandings of information processing techniques, communication, critical thinking, collaboration, and self-evaluation (Chen, 2011, p. E7).

John Kotter (2012) explained that professional development is most powerful when collaboration occurs and follow-up support is provided (pp. 111-112). Preparing to increase rigor in content learning and technology integration is more successful when in-service teachers are able to work in groups to discuss and explore new ideas together (DuFour, 2004). As secondary teachers prepare their students for college and the workforce, it makes sense to bring the in-service teachers together with those who teach in the colleges and work in the businesses that students desire to gain employment (Frost, Coomes, & Lindeblad, 2012, p. 26). By working together, there is no question what the students will need as they progress through their education. Participants in such collaborative groups increase their confidence and communication skills that carry over to students (Frost et al., 2012, p. 29). Opportunities such as these would support proper training for more teachers if they occurred more regularly.

Professional development may become hyper-focused on minor issues and fail to give participants the opportunity to learn and develop 21st Century Skills. However, when given freedom to explore and prepare activities that support 21st Century Skill development, teachers may produce creative and unique opportunities for students (Clark, 2009, p. 68). Opportunities to grow and increase skills require more facilitation rather than direct teaching so that teachers gain knowledge organically (Chesbro & Boxler, 2010, p. 52). There is wisdom to be gained from all participants in professional development, not just the leader. This bank of knowledge needs to be recognized and utilized (Chen, 2011, p. E7). Teachers need support to move their

cultural views of education beyond their current understandings. Berrett, Murphy and Sullivan (2012) discussed from their study of middle schools integrating technology from administrators' perspectives, that change threatens culture and slows down reforms (p. 215). They contended that attention must be given to these concerns to help all stakeholders move forward with technology integration.

Professional learning communities are an excellent method of bringing in-service teachers together with the technology and content that must be integrated. Tapping into the experiences of larger cohorts provides an opportunity for personal growth and increased skill acquisition (Chen, 2011, p. E7). This learning must happen regularly so that in-service teachers maintain their drive and continue to access new methods of improving 21st Century Skills while receiving appropriate supports (Rotherham & Willingham, 2009, p. 20). Educational leaders at the federal, state, and local levels must move past the idea that teachers come to the classroom already knowing how to integrate technology into lessons and develop professional development plans that constantly educate staff members (Rotherham & Willingham, 2009, p. 20).

Preparing In-Service Teachers to Model 21st Century Skills

A major opportunity for students to learn 21st Century Skills is in classrooms, where the methods are modeled and opportunities to practice are possible (Partnership for 21st Century Skills, 2015c). As the new century unfolds, problems will change as globalization alters the way we do business and communicate across the planet (Kay, 2009, p. 41). The 24-hour news cycle and Internet outlets of information force global citizens to develop critical-thinking and problem-solving skills.

Critical thinking has been an educational focus throughout time. Socrates engaged his students in discussions, pushing them to consider new perspectives and dig deeper into ideas

than others before his time. Socratic circles are an accepted activity in many classrooms today (Larson & Miller, 2011, p. 122). Johnson and Reed (as cited in Larson & Miller, 2011) explained that John Dewey "proposed an education 'grounded in experience,' in which students interact with the ever-changing world" (p. 122). Teachers must prepare to present modern ways for students to build and manage knowledge by learning 21st Century Skills and how to incorporate the philosophies into appropriate activities. Education must be reformed to ensure that students emerge with a strong sense of 21st Century skills that will serve them for life (Kay, 2009, p. 45).

In-service teachers may integrate 21st Century Skills (Partnership for 21st Century Skills, 2015c). Some believe these skills are a stand-alone component of education. However, the content must be woven into technology and life-long learning activities (Larson & Miller, 2011, pp. 122-123). Professional development opportunities must prepare teachers by allowing them to learn a new technology, and include the time to integrate that technology into existing content and curriculum expectations (Rottingham & Willingham, 2009, p. 19). Failure to advance in-service teacher education will increase the number of citizens without the skills to function in a technologically advanced society that relies on the Internet and information management to exist.

Celano and Neuman (2010) contended that increased opportunity to develop 21st Century Skills would improve all students' ability to be successful in college and the workplace. They said that 21st Century Skills would level the playing field for low socio-economic students as jobs become more technically demanding (Celano & Neuman, 2010, p. 53). Access to technology must increase, but so too must the teacher preparation required to manage the technology. Jobs that do not require technologically literate employees are decreasing around the world as societies move into Internet-based economies (Larson & Miller, 2011, pp. 122-123).

It is vital that all students receive a complete education from in-service teachers who are ready to present 21st Century Skills.

Evaluating Technology Integration

Technology integration has been ongoing since the invention of the chalkboard, printed books, the overhead projector, and now computers or tablets for every student (Trilling & Fadel, 2009). Districts mandate the use and claim successful implementation of technology into curricular areas without really evaluating the outcomes (Downes & Bishop, 2015). The Knowledge Age age has pushed technology development to a speed that teachers struggle to learn and implement between phases of change (Kopcha, 2012). Given all the changes, it is necessary to evaluate and evolve the integration of technology into schools.

Sherman, Sanders, and Kwon (2009) stated that schools do not differentiate between learning how to utilize technology and learning through uses of technology (p. 369). Recently, a movement has begun to allow student interests to lead the different types of uses for technology (Sherman, Sanders, & Kwon, 2009, p. 369). Professional development programs offer an opportunity to develop skills and reflect on efforts to integrate technology, but these opportunities are not always provided for teachers (Sherman, Sanders, & Kwon, 2009, p. 372). Teachers that participate in professional development may only be learning the processes and do not self-evaluate or receive evaluations from technology leaders (Mouza, 2011).

Mouza (2011) presented a study about integrating technology through a TPACK (Technology, pedagogy, and Content Knowledge) framework. Teachers in the study were very successful with support and guidance. However, Mouza (2011) acknowledged that there was no reflection or evaluation of the program itself. The success was identified in survey responses

about skills and abilities. There remained a question about the appropriateness of the activities and plans (Mouza, 2011, p. 25).

Unless technology integration is part of regular evaluations, teachers may not use technology. Chai, Koh, and Tsai (2013) purported that teachers are more likely to avoid technology if it is only considered an add-on piece of programming (p. 46). Their study found that collaborative reflections and supportive evaluations were needed to promote regular technology integration. The current lack of evaluative tools and methods to assess teacher use of technology in classes presents a need to determine if the lack of evaluation diminishes the use of 21st Century Skills in middle schools.

Conceptual Framework

Technology accessibility is increasing across the United States of America, but studies have shown that teachers are not utilizing equipment and the Internet to enhance student experiences (Anthony, 2012; Banas, 2010; Gray, Thomas, & Lewis, 2010). Banas (2010) found that teachers were not always trained sufficiently to integrate technology well (p. 124).

This researcher is employed in a school district with desktop computers for staff K-12, laptop computers for all staff and students 6-12, and high-speed Internet access points for all stakeholders in all buildings. There are regular technology trainings offered to the teaching staff throughout the year. However, there is no system to evaluate usage, appropriateness of activities, or a means by which to understand exactly which technologies have been used. This is a common problem across the nation as there are very few means of evaluating the successes or failures of technological integration efforts (Abbitt, 2011; Koehler & Mishra, 2009; Kopcha, 2012; Kuyatt, Holland, & Jones, 2015).

Teachers' negative attitudes towards technology integration and a lack of clear direction and evaluation for the implementation of programming pose problems in modern education (Anthony, 2012; Berrett, Murphy, & Sullivan, 2012; Laferrière, Hamel, & Seasron, 2013). Teachers focus on initiatives about which they are more comfortable and complete educational mandates using prior techniques and methods without technology (Diaz & Bontenbal, 2000). Downes and Bishop (2015) have worked extensively to identify and support appropriate uses of technology that help teach middle school students 21st Century Skills which the Partnership for 21st Century Skills believe to be vital for successful, global citizens in the new century (Trilling & Fadel, 2009). Downes and Bishop (2015) observed and reflected on their opinions of technology integration efforts, but there is still a gap in the research to support and explain why teachers do not integrate technology more effectively.

There is a movement to utilize the framework of Technological Pedagogical and Content Knowledge (TPACK), which integrates 21st Century Skills with appropriate teaching practices and pedagogy so that technology is included rather than considered an add-on piece to educational programming (Bull, et al., 2012; Hofer & Swan, 2006; ISTE, 2015a; Partnership for 21st Century Skills, 2015d). Koehler and Mishra (2009) began developing TPACK in 2006, basing their research on Lee Shulman's earlier work that identified the framework of pedagogical content knowledge. Shulman (1986) explained that teachers needed to not only understand the methods of teaching, but also the content and vehicles to convey information to help students completely develop their understandings (p. 8). Koehler and Mishra (2009) identified a need to evaluate the concepts built into TPACK and how technology pedagogy is best applied. Schrock (2015) discussed Dr. Ruben Puentedura's work on the SAMR model that explained how teachers could transform their lessons through substitution with technology tools

to improve the functional purpose of tasks and move student work further up Bloom's taxonomy to applying knowledge, moving away from simply recalling information or showing understanding. Puentedura explained that once tasks were integrated with technology, they could then be modified and redefined by students who would then have more ownership of the work, increasing their abilities to analyze, evaluate, and create new knowledge (Schrock, 2015).

Cultural Historical Activity Theory (CHAT) is an appropriate theoretical framework for this study. Kaptelinin (2015) defined the theory as "activity, which is understood as purposeful, transformative, and developing interaction between actors ("subjects") and the world ("objects")." The theory examines a subject or subjects performing a task and seeks to explore what relevant variables impact the subject or subjects' performance outcome.

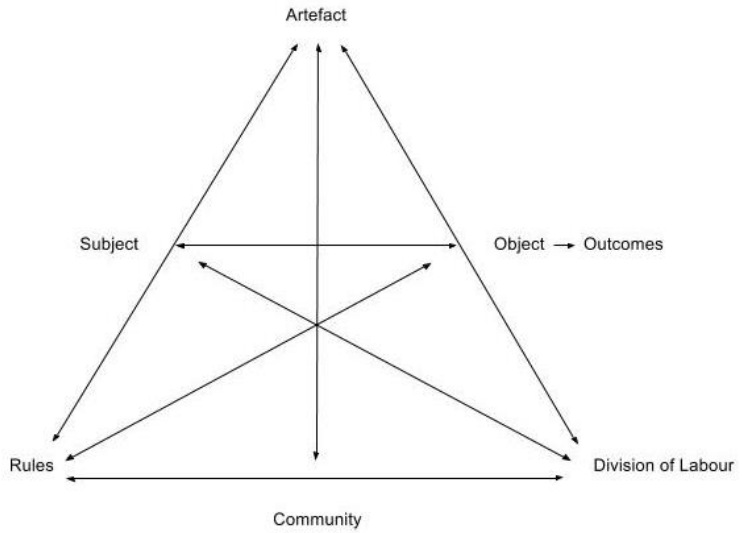
Lev Vygotsky was a Russian psychologist researching theories related to cognitive development in the early 20th century (McLeod, 2014). Vygotsky's premise was cognition developed through social interactions and "making meaning" through communal relationships (McLeod, 2014). He is credited with the first generation model of activity theory, describing the relationship between a subject, a mediating tool like a machine, a speaking method, music, or gesturing, and the outcomes of the subject's behavior (Artefact, 2015). He made a succinct connection between a stimulus and response based on 'complex' and 'mediated act'" (Engeström, 2001, p. 134). Vygotsky strongly believed that culture and social interaction affected learning for an individual's behavior (McLeod, 2014).

A second generation of activity theory is credited to Aleksei Leontiev, another Russian psychologist. He focused on and expanded the thinking about activity being a key function of psychology, transforming objectivity into subjectivity (Kaptelinin, 2015). Leontiev explored conscious and unconscious mental phenomena affecting outcomes. He is credited with

solidifying insights between the mind and activities subjects perform, “most notably the idea of structural similarity between internal and external processes” (Kaptelinin, 2015).

Yrjö Engeström expanded Vygotsky’s work further, to include more views about what may affect behaviors and outcomes for subjects in a communal context (Engeström, 2000). The original pioneers of activity theory were Russian and based their research primarily on children’s learning and playing in a communist community. Engeström delved into a wider understanding of activities being done to influence a subject in the 90s (Engeström, 2001). Boundaries were crossed for individuals when various cultures mixed and influenced each other in the West, moving away from communist Russia (Engeström, 2001). Engeström expanded the second generation of CHAT into the current form. He defined four influences upon a subject that impacts the outcome of an activity (Heo & Lee, 2012). The triangular shape relating the four influential concepts is shown in Figure 1.0.

Figure 1.0 Second-generation CHAT ‘activity triangle’ (Engeström, 1993)



Yrjö Engeström contended that individuals were placed into a context, dynamically changing while creating its own history, and mediating artifacts rather than directing artifacts

that influence outcomes (Heo & Lee, 2012). As a result, a third generation of CHAT was born, including the components causing changes to actors (subjects) and their outcomes (objects), but also linking multiple subjects' situations which ultimately affect each other (Bourke, Mentis, & O'Neill, 2013). The current form of activity theory focuses on how individuals or organizations are influenced by the fluid cultures engaged in constant interactions and activities that alter the initial ideas and tasks being studied to unique and fluid outcomes (objects) in constant flux (Engeström, 2001).

This study will focus on the second generation of CHAT, because individual teachers and their experiences with the activity of technology integration are being studied. This research will not attempt to link multiple interacting activity systems, which is a factor in the third generation of CHAT (Engeström, 2001). In this case, middle school teachers are the subjects, and this study will look at how skills, methods of acquiring those skills, attitudes, and collaborative efforts effect the outcomes of integrating technology. The study will also include rules set forth by organizations and how the organizations attempt to break down the work for subjects which may affect the outcomes as well. The teachers are charged with the task of managing the tool based on the rules set forth by their organizations and the community surrounding their efforts. The division of labor deals with the manner in which teachers are taught and supported while applying the tool (Anthony, 2012; Lim, 2002).

Figure 2.0. Exploring The Integration of Technology Through An Activity Theory Lens.

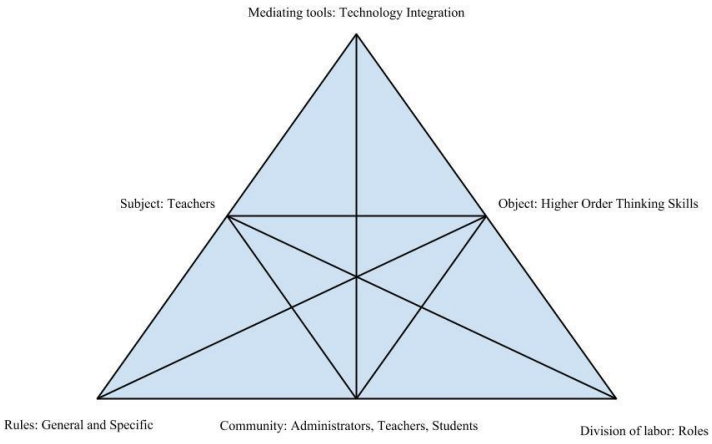


Figure 2.0, displays various aspects that interact while an activity like integrating technology occurs. There are many variables that could affect the outcomes of the mediating tool that must be considered and analyzed to identify what caused the final products. Adapted from "Activity Theory as a Framework for Investigating District-Classroom System Interactions and Their Influences on Technology Integration," by A. B. Anthony, 2012, Journal of Research on Technology in Education, 44(4), p. 338. Copyright 2012 by the International Society for Technology in Education.

CHAT (Engeström, 1993; Westberry & Franken, 2015) is designed to explore activities and the socially situated and mediated artifacts that impact learning. When looking at a fluid educational system, CHAT can examine multiple actors and actions within that system (Bourke, Mentis, & O'Neill, 2013). The research applications of this theory, therefore, exist in organizations where learning is happening and the information being learned changes due to external situations outside the actors' ("subjects'") control, and in formal and non-formal processes (Engeström, 2001; Heo & Lee, 2012; Snoek, 2013). Given the number of influential and impactful factors that alter a teacher's outcomes of technology integration, the activity theory is an appropriate theory to employ in this study.

A transformative framework is also a useful tool in this research study as the findings will help the middle school as an organization identify and make changes to current understandings and expectations as they relate to technology (Creswell, 2013, pp. 25-26). Once the information becomes available, the staff will be able to work together to make positive changes related to integrating technology. The constructivist framework may show how technology integration is or is not enhancing student learning through the construction of knowledge with the support of teachers rather than the handing down of knowledge by teachers (Creswell, 2013, pp. 24-25). Interview data will provide deeper understandings of teacher approaches and methods that may explain how some overcome barriers and other may learn to also regularly integrate technology.

This researcher is seeking to understand how barriers to integrating technology cause tensions (issues) for teachers, creating a scenario whereby those teachers may not utilize technology on behalf of their students. This information will present itself through a qualitative grounded theory study. Interviews and questionnaires including qualitative questions of middle school teachers with access to computers for students and Internet technologies will provide data for analysis. Demographic data for all participants will be gathered. The questionnaire data will provide an opportunity to triangulate information about technology integration attempted by middle school staff, pedagogically appropriate teaching methods with technology, and the use of statistics. The analysis will identify emergent themes from which a theory grounded in the data will be developed. This grounded theory study will identify how barriers are overcome and managed by middle school teachers so that professional development designers can create programming that helps move more teachers towards integrating technology in their teaching methods.

Conclusion

This literature review explored successful efforts to integrate 21st Century Skills after professional development and ongoing support is provided (Angell & Tewell, 2013; Downes & Bishop, 2012; Duran, Yaussy & Yaussy, 2011; Sardone & Devlin-Scherer, 2010). However, these successes are few in comparison to the number of in-service teachers and who still do not embrace 21st Century Skills (Gray, Thomas, & Lewis, 2010; U.S. Department of Education, 2010). All students must obtain a complete education, weaving technology skills with life skills and content knowledge that will make them capable, global citizens (Celano & Neuman, 2010; Fadel, 2015; U.S. Department of Education, 2010). It is easy to say that using the 21st Century Skills framework is difficult if computers, tablets, and Internet resources are not readily available. However, acquiring equipment and access is proving to be simpler now (U.S. Department of Education, 2010). There remains a need for in-service teachers to fully integrate technology and content to prepare 21st century students with 21st Century Skills and regularly evaluate their actions to make appropriate changes as needed (U.S. Department of Education, 2014).

Professional development must improve to meet the 21st Century Skills that students need to navigate college and workforce expectations (Downes & Bishop, 2015; Rottingham & Willingham, 2009). In-service teachers can work with their content and existing supports to develop a modern approach to critical-thinking, collaboration, communication, and creativity. Some in-service teachers are experiencing powerful, professional development, and yet, they still convey reluctance to utilize technology (Sardone & Duval-Scherer, 2010). The educational community is responsible for identifying potential reasons for this reluctance in order to close the

gap in learning 21st Century Skills for all students and improves society by completely preparing all citizens.

Students need 21st Century Skills integrated into their daily education to increase college and workforce readiness (U.S. Department of Education, 2014). Teachers must be trained and prepared to facilitate 21st Century Skills into their classroom teaching methods. This study will gain perspectives about how barriers encountered by middle school teachers affect the integration of technology and the presentation of 21st Century Skills. These perspectives may then be considered by professional development programmers seeking to achieve global commitment of in-service teachers to integrate 21st Century Skills into their teaching methodologies.

Chapter 3

Methodology

Teacher perceptions of technology integration dictate the level of student involvement with technology in their K-12 classroom experiences (Anthony, 2012; Downes & Bishop, 2012; Downes & Bishop 2015; Berrett, Murphy, & Sullivan, 2012). This study will examine teacher perceptions related to technology integration in middle schools to determine how barriers such as skill, attitudes, and collaboration are experienced (Hixon & Buckenmeyer, 2009).

This chapter includes an explanation of the methodology and conceptual framework for this study, the study setting, participants' descriptions and alignments with the study, types of data and collection methods, analysis explanations, and potential limitations of the study.

The following questions guided this study:

1. How does a teacher's comfort level with technology skills affect the amount of technology integration in classrooms?
2. How do teacher attitudes about technology integration impact usage in a classroom?
3. How do professional development and peer collaboration affect technology integration?

This was a grounded theory study of middle school teachers with access to computers, Internet, and computers for their students. Each teacher was interviewed about his or her skills, attitudes, and collaborative efforts related to technology. Using Activity Theory, this study explored how social interactions impacted technology integration. The information presented in this study adds value to the field of professional development in education as it may be used to help prepare in-service teachers to present modern and ever-evolving technology with regularity and confidence. The study may be valuable to administrators attempting to increase staff skill levels and improve attitudes connected to integrating technology.

Setting

The study is set in middle schools in the Mid-Atlantic and Northeast regions of the United States of America. Grade configurations varied from school to school, inclusive of grades six through nine. Schools differed in regards to the number of building administrators, faculty and support staff, and the number of students. Some middle schools were surrounded by affluent communities, while others were in depressed socio-economic areas. The schools provided different numbers of computers per student (1:1), computer carts, and differing policies that permit students to bring their own devices for use in classroom settings. Each school provided Internet access to students and teachers.

Middle schools are appropriate settings for such a study because student bodies are increasing their ability to function on the Internet and obtain knowledge independently. Elementary school students are still learning to read and learn in general. High school students are goal-oriented and schools are organized by content-directed classes working to prepare students for college. The middle school is a place where students develop their learning styles and begin to explore the world independently. Middle school teachers are tasked with the job of helping students make good personal and academic choices while improving their communication and collaboration skills.

Each participating school organizes students on grade level teams. Teachers from various schools will be interviewed from a variety of school districts and schools within the districts. Participants were not informed of other teachers within their schools being interviewed to limit any bias and to maintain confidentiality. Interactions between participants at each school varied based on the size of the schools and the districts. This study collected data about teacher

perceptions and reported the information anonymously, protecting participants. No students were contacted or observed, limiting any ethical concerns on their part.

Settings for the study occurred where participants were located and who responded to requests to participate. District representatives were located to identify schools with staffs who would be willing to participate in the study. Contacts were made to organizations with criteria that met standards for this study. Teachers were invited to participate via e-mail after district representatives reached out to explain this study and the search for participants.

Participants/Sample

Theoretical sampling was employed to gather participants for this study. Creswell (2014) defined theoretical sampling as a theory being generated with data that is purposefully collected from text and images. This study focused on participants based on their teaching assignments as middle school teachers, technology availability, and their availability to participate in the study to identify trends and perceptions of technology integration, collaboration and organizing curriculum, and teaching methods. Sampling various content areas allowed this researcher to collect data from a variety of perspectives and organize theories about technology integration that may promote deeper learning of content through technological means.

Potential participants were contacted via e-mail. The initial contact explained the purpose of the study and the requirements for participation. Participant rights were explained so that potential participants could excuse themselves from the study at any time. The sample group was asked to respond to a brief, demographic questionnaire to identify gender, age range, department, years of experience, grade levels taught, and skill level description. The main data collection tool was a brief interview intended lasting 15 to 30 minutes. This researcher

monitored demographic information to ensure that a random sample was maintained and no single group was interviewed. Demographic information is provided in Chapter 4.

Obtaining data from samples outside of this researcher's middle school and school district helped to maintain anonymity of participants. Participants had the opportunity to respond without fear of retribution from administration or fear of job loss due to comments. This sample provided insights while crossing school district, community, and state boundaries, providing information themes rich in depth and breadth. Participants were contacted after inquiries were made to principals and district or building technology leaders for teachers who might participate in such a survey. This snowball approach increased the speed and rate of responses (Creswell, 2014, p. 146).

The various represented departments held opinions and beliefs about technology integration that provided insights about technology integration in a middle school setting. The various years of experience by the participants provided insights into the study's focus. Each participant had access to technology supports and trainings that led to the choices individual members made about techniques and applications related to technology integration used in lessons.

Data

Triangulation of data was achieved through interviews, questionnaires, and rigorous analysis of data utilizing multiple levels of organization. This method was important because it validated findings. Qualitative data allowed this study to be generalized with other middle school teachers and technology integration efforts with similar circumstances. Individual, unstructured, open-ended interviews were held for approximately 15 to 50 minutes with 18 middle school teachers, in a variety of departments, across grades 6-9. This researcher

conducted the interviews during day and evening hours, audiotaped them, and had all data transcribed. Data was coded and themes were identified for analysis. Considerations of the data included "accuracy, completeness, and usefulness in answering research questions" (Creswell, 2014, p. 223).

Analysis

The data was collected and stored in computer files and secure, paper files as deemed appropriate. Transcriptions of all interviews were created in a digital format for coding purposes. Opportunities to read data occurred as it was collected to provide this researcher with a "general sense of material" (Creswell, 2014, p. 237). Emerging design was utilized immediately as interview notes were reviewed and transcripts became available. Creswell (2014) defined emerging design as the immediate analysis of data, which guides future data collection (p. 43). Coding followed in order to break data into descriptive or thematic categories for consideration.

NVivo for Mac is a Computer Assisted Qualitative Data Analysis tool (CAQDAS) that stores, organizes, and allows for multilevel analyses of various data types like interview transcripts, printed documents, images, or videos which may be used to manage and code materials to identify emerging themes. Data matrices were developed for emergent themes. Constant comparison data analysis takes specific information and relates it to other information in a broad way while "connecting categories by comparing incidents in the data to other incidents" (Creswell, 2014, p. 434). Overlap and redundancy may occur and assist in focusing on themes.

Theory generation occurred through interpretation of the data. It was abstract in nature as it was grounded in the data collection process and only applicable to this study and similar situations. The theories presented in this study will be in narrative form.

Participant Rights

University of New England IRB protocols were followed to protect participant rights. Risks were identified and minimized prior to any questionnaire dissemination or interviews. Risk/benefit assessments were completed with the advisory committee to ensure the least negative impacts possible. As explained earlier in this chapter, each subject was selected based on their affiliation in a middle school. Each subject in this study was coded to protect his or her identity. Subject responses were maintained in confidentiality.

Each subject received an informed consent form prior to participation. Each subject was told that they may excuse themselves from this study at any time for any reason. These forms will be stored and maintained for seven years. A signed copy of each form will be provided to each subject upon request.

Interview questions were tested to exclude presumptuous or leading questions to maintain authenticity and ethical treatment. Data was kept safeguarded and stored in encrypted files. Safeguards were discussed with the advisory committee and employed to ensure the lowest possible level of vulnerability to coercion or undue influence that any subject may encounter.

Unintended outcomes of this study have been limited. No issues were foreseen since participants will be coded and were not aware of each other's participation in this study. Administrators will not have access to transcripts, so no job loss or financial issues are expected for participants. Since participants are unaware of one another, no issues in current relationships are expected.

Potential Limitations of the Study

This study may only be generalizable to other middle schools with staff sizes and support levels similar to this study (Bloomberg & Volpe, 2012). Another limitation of this study was the small samples of certain subject areas like foreign language and music compared to several teachers of Social Studies and English. These limited perceptions may not have presented a thorough perception of subject areas. Through conversations with professional peers, this researcher has been privy to discussions about technology integration at various grade levels throughout southeastern Pennsylvania school districts. These biases were considered while data collection occurred. There is little chance of conflict of interest in this study because this researcher's goal was to document technology integration efforts in several settings. This study will identify how teachers manage potential barriers that could guide professional development staff when preparing programs.

Pilot Study

Interview questions were tested on one middle school, seventh grade math teacher teacher whose data was not included in the study. This informal interview provided this researcher an opportunity to reword and reorganize questions into a coherent set of questions that guided the interviews. Instrumentations were discussed with administrators as needed. The advisory committee conveyed valuable considerations and suggestions which helped to focus the questionnaire and interview data collection process.

Chapter 4

Results

The purpose of this qualitative study was to learn more about the skills, attitudes, collaborative approaches or efforts, and professional development experiences that middle school teachers have experienced while integrating technology into their classrooms. Credit is due the educators attempting to integrate transformative technologies into their classrooms, schools, and districts for educational purposes and the endeavor to implement them with fidelity. Chapter four presents the findings of this grounded research study, and describes emergent themes that were identified from analyzing the interview data. This chapter also displays demographic data about the middle school teachers interviewed for this study. The findings reflect teacher attitudes and perceptions about technology integration and use in the classroom. Finally, the findings address the types of professional development and and experiences with peers that support implementing technology.

The following research questions provided guidance for the study:

1) How does a teacher's comfort level with technology skills affect the amount of technology integration in classrooms?
2) How do teacher attitudes about technology integration impact usage in a classroom?
3) How do professional development and peer collaboration affect technology integration?

Chapter four describes the methods of organizing raw data collected from 18 interviews with middle school classroom teachers. Descriptive statistics are also presented from data gathered in quantitative questionnaires. The researcher then explained first cycle coding of raw data and the creation of approximately 100 initial codes and emergent themes. Saldaña (2013) described a code as "a word or short phrase that symbolically assigns a summative, salient,

essence-capturing, and/or evocative attribute for a portion of language-based or visual data" (p. 3). Chapter four then discusses second cycle coding which narrowed the codes into categories or themes and identified additional emergent themes. Saldaña (2013) explained that second cycle coding requires the researcher to employ analytic skills such as classifying, prioritizing, integrating, synthesizing, abstracting, conceptualizing, and theory building as data are refined and knowledge is pulled from the raw data (p. 58). The chapter concludes with a summary of results and hypotheses drawn from the outcomes.

Analysis Method

Participants in the study received an alphabetical identifier ranging from A through R. Each participant completed a questionnaire attached to their invitation before participating in the research study. The questionnaire was a Google Form. Upon completion of the brief questionnaire, submissions filtered into a Google Sheet, allowing the researcher to organize data and calculate descriptive statistics. Demographic data included gender, age range, years of teaching middle school range, description of current practice using technology in instruction, grade configuration of school, grade(s) taught, subject(s) taught, the amount of technology used by students in class (Daily, Weekly, Infrequently, Never), years of teaching range, and the amount of technology used by teachers in lessons over time.

Participants were interviewed utilizing a phone and recording device. Interviews ranged from 15 to 50 minutes. Data analysis was broken into two cycles: first and second. First cycle coding utilizes qualitative data and breaks it into "discrete parts, closely examines them, and compares them for similarities and differences" (Saldaña, 2013, p. 265). Second cycle coding requires the researcher to classify, prioritize, integrate, synthesize, abstract, conceptualize, and develop theories by reorganizing first cycle codes into groups and develop themes (Saldaña,

2013, p. 58). In this study, first cycle coding began with hand written notes taken during each interview to identify emergent themes while transcripts were unavailable. Raw interview data were formatted in an MP3 file and delivered to a transcriptionist who transcribed each file within one week of the final interview. Transcripts were received in a Word Document through email and compared with the audio file for accuracy and completeness. The files were constantly being assessed for emergent themes as interviews were replayed and transcripts were viewed for more than five weeks.

When transcripts were ready, they were loaded into a Computer Assisted Qualitative Data AnalysiS (CAQDAS) program to continue the first cycle coding, where data were organized and coded in great detail and depth (Gibbs, Clarke, Taylor, Silver, & Lewins, 2011). NVivo for Mac, a CAQDAS, was the program selected to perform analysis tasks with interview data. Saldaña (2013) explained that the software provides a means to gather, organize, manage, and reconfigure data so a researcher can easily reflect upon the information (p. 28). It was also used to relate demographic data to interview data and assisted the researcher identifying relationships and emergent themes.

First cycle methods included highlighting phrases, sentences, and paragraphs the researcher deemed relevant to the research questions and developing codes (nodes) to categorize data. Initial coding techniques were utilized during first cycle coding as qualitative data were broken apart from the interview and categorized in nodes after careful examination and consideration (Saldaña, 2013, pp. 100-101). Saldaña (2013) indicated that Initial coding is appropriate for qualitative studies and novice qualitative researchers (pp. 100-101). This method incorporated Process coding and In Vivo coding approaches (Saldaña, 2013, pp. 100-101). Process coding utilized gerunds to identify actions taking place by the participants, whether

physically or conceptually (Saldaña, 2013, p. 96). In Vivo coding takes the actual words used by the participant as the title of the category, utilizing vocabulary directly from the sources of information (Saldaña, 2013, p. 91).

First cycle coding produced a total of 96 nodes. Sixteen codes were developed based upon the interview questions. Those 16 codes were used to locate word frequencies and common responses per interview question. The remaining 80 codes were unique comments organized for further analysis during second cycle coding. Word frequency tests and word clouds were utilized to identify emergent themes. Node frequency was also considered as themes were developed throughout second cycle coding.

Axial coding techniques were employed to narrow the data into five themes and 18 subthemes. Saldaña (2013) explained that Axial coding is the process of reviewing Initial coding further, reassembling data broken apart during first cycle coding (p. 218). Codes with limited references and unrelated references were dismissed from the theme development. Prominent codes were reorganized and grouped in the creation of the primary themes and subthemes (Saldaña, 2013, p. 218). Parent nodes are thematic category folders created in InVivo for Mac where first cycle codes were grouped into appropriate collections. Codes containing multiple sources were considered strong connections to themes given their broad coverage of participants (Saldaña, 2013, p. 207).

Presentation of Results

The findings of the study are presented first as demographic data of the participants. There are descriptive statistics about work experience and use of technology. The analysis of interviews is then presented thematically.

The Questionnaire and Developing Themes

A demographic survey was completed by each participant prior to the interview. Participants provided data about their gender, age range, years of teaching, years of teaching middle school, the grade configuration of their school, the grade(s) taught, the course(s) taught, their practice of using technology, their integration of technology, and how often students used technology in their classes. The participants were from six different school districts and eight different middle schools. Descriptive statistics for each questionnaire item are presented below.

Theoretical sampling was used to locate and organize 18 interviews with middle school teachers in three states in the United States of America. Theoretical sampling is the process where researchers collect and consider qualitative data, such as interview data, "that will yield text and images useful in generating a theory" in a purposeful manner (Creswell, 2014). Fifty-six percent of the 18 participants were female and 44% were male. Fifty percent of respondents taught in middle schools with a grade configuration of seventh and eighth grades in the building. Twenty-eight percent of the participants taught in a middle school with seventh, eighth and ninth grades, and 22% taught in a school with sixth, seventh and eighth grades. One teacher taught sixth grade, three teachers taught seventh grade, seven teachers taught eighth grade, two teachers taught ninth grade, four teachers taught both seventh and eighth grades, and one teacher taught seventh and ninth grades. Participants taught the following courses: English, Foreign Language, Math, Music, Reading, Science, and Social Studies.

Figure 4.1. Gender

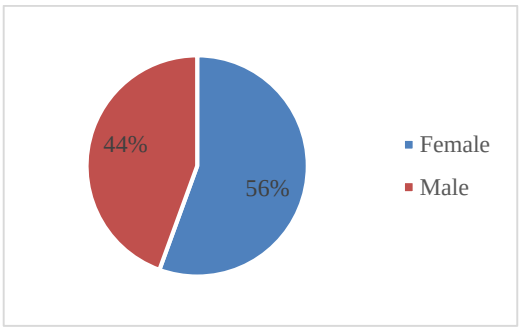


Figure 4.1 shows the distribution of female and male participants.

Figure 4.2. – Grade Configurations of Participant Schools

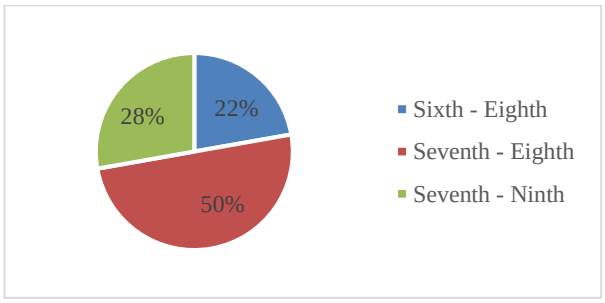


Figure 4.2 displays the percent of each grade configuration for schools in which participants taught.

Figure 4.3. Participant Grade Levels Taught

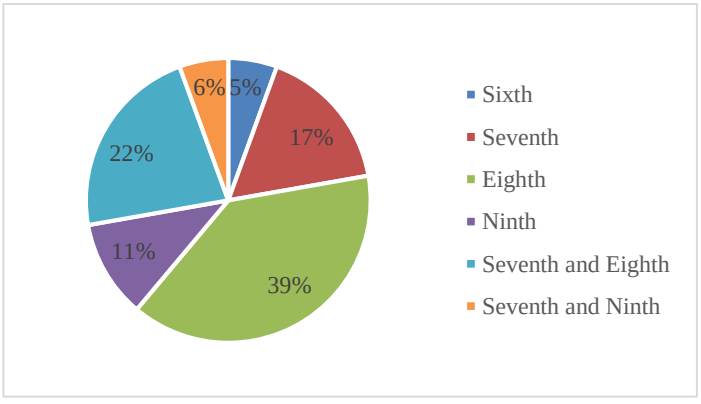


Figure 4.3 displays the percent of participants who teach a particular grade or grades.

Figure 4.4. Course or Courses Taught by Participants

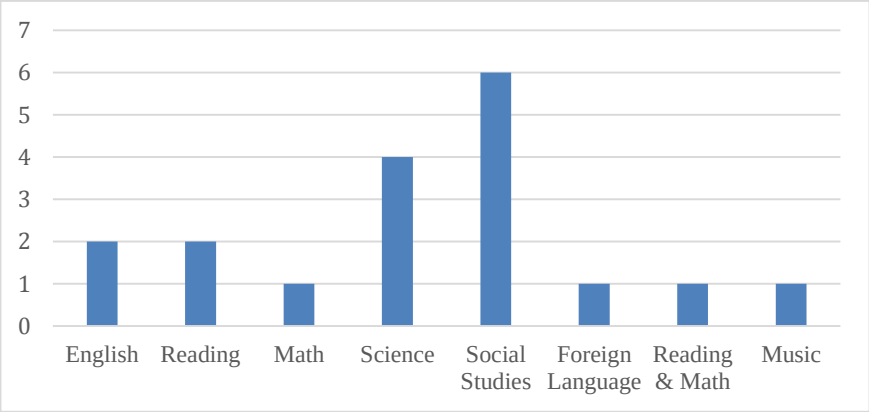


Figure 4.4 displays the number of participants who taught each content area listed.

Of all participants, 17% of respondents were ages 22-33, 56% were ages 34-45, 17% were ages 46-57, and 11% were ages 58 or older. The majority of participants have taught twenty or fewer years, indicating their technology integration efforts have been developing since the turn of the century, when 21st Century Skills emerged as a focus in educational reforms (Trilling & Fadel, 2009). Approximately 39% of the participants indicated they had taught for one to ten years, while 39% indicated eleven to twenty years of teaching experience. Seventeen percent have taught for twenty-one to thirty years and five percent taught for thirty-one years or more. The majority of teachers have taught in middle schools for the majority of their careers indicating strong connections between the pedagogy of an adolescent learner and the change efforts to integrate technology since the beginning of the 21st century. Forty-four percent of the participants reported teaching middle school for one to ten years. Another 44% said they taught middle school for eleven to twenty years, 11% taught twenty-one to thirty years, and 11% taught middle school for thirty-one years or more.

Figure 4.5 Age Ranges of Participants

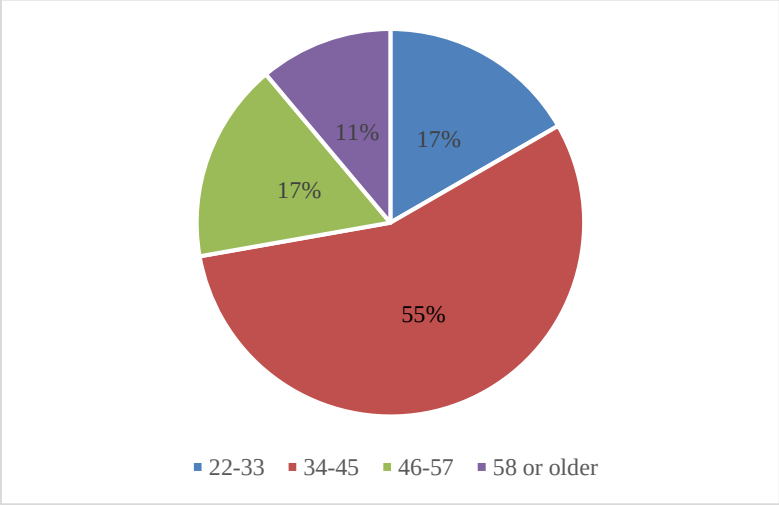


Figure 4.5 displays the percentage of participants in each age range.

Figure 4.6 Participant Years of Teaching

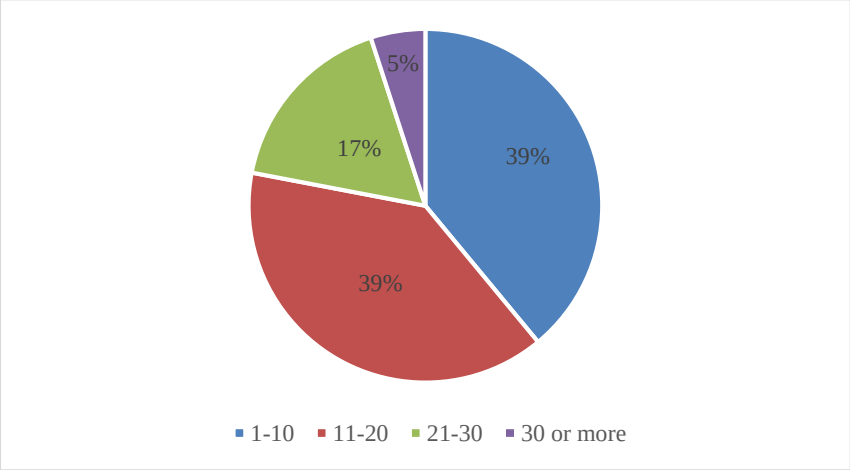


Figure 4.5 displays the percentage of participants teaching in each range of years.

Figure 4.6 Participant Years of Teaching Middle School

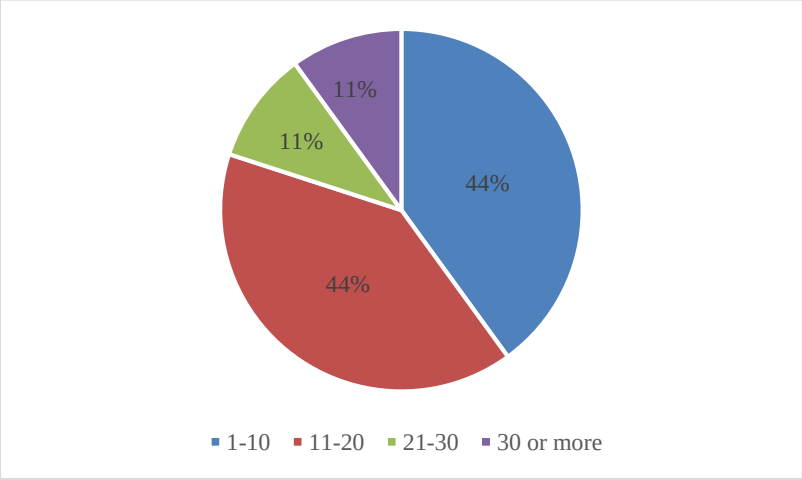


Figure 4.6 displays the percentage of participants teaching in middle schools by range of years.

The participants were asked to best describe their practice using technology in their instruction and given four choices from which to select. Only two answers were selected. The answer – I often use whole group presentation style, but sometimes facilitate students in their use of a variety of information resources and hands-on activities. – was selected by 67% of the respondents. The answer – I almost exclusively facilitate student learning by encouraging students to use information resources and hands-on activities. – was selected by 33% of the respondents. The remaining answers can be seen in Appendix B, and indicate progressively decreased integration of technology and student-centered teaching methods in classrooms. The data indicated that previously discussed demographics have limited impact on 21st Century Skill application efforts by the respondents. The gender, grade configurations of schools, grades taught, courses taught, age, years of teaching or years of teaching middle school had limited or no significant effect on the participants' usage of technology to engage and educate their students. The teachers all found ways to integrate technology regularly to enhance their programing.

The participants were asked how often they utilize technology in their classrooms and were given four choices of which two were selected – Daily and Weekly. This regular usage is a positive indicator that the respondents understood the world in which their students will be entering and the power of constant usage of technology to educate their students. Eighty-three percent of the respondents indicated daily use and 17% responded weekly. The participants were also asked how often their students utilized technology in the classroom. Seventy-two percent stated daily use and 28% reported weekly usage. These responses indicated that the participants recognized the need for students to interact with technology directly, no matter the grade level, subject matter, or years of experience teaching, so the students would have direct practice with modern knowledge building techniques, collaborative presentation styles, and communication skills.

The descriptive statistics for items in the questionnaire are detailed in Table 4.1. Teachers indicated a great deal of technology usage by their students and within their lessons. The majority of teachers have taught less than 20 years. It appears that teachers are entering the profession with the desire to utilize technology. The participants have spent the majority of their experiences in middle schools which indicates they have developed their skills in the settings being studied.

Table 4.1

Descriptive Statistics: Middle School Teachers and Technology Integration

Question	Mean	Valid	Min	Max	Standard Deviation ∑
1. Please select the appropriate age range.	2.2222	18	1	4	0.87820
2. How many years have you been teaching?	1.8889	18	1	4	0.90025
3. How many years have you been teaching middle school?	1.7222	18	1	4	0.82644
4. What best describes your current practice of using technology in instruction?	3.2222	18	2	4	0.54831
5. How often do your students utilize technology in your classes?	1.2777	18	1	2	0.46088
6. How often do you integrate technology into your classroom lessons?	1.1666	18	1	2	0.38348
7. How much technology does your school supply the students?	2.2777	18	1	3	0.75190

Following 18 interviews with teachers from six school districts and eight middle schools, the raw data were available in the form of transcripts. The transcripts were imported in NVivo for Mac, where this researcher initially developed over 90 unique nodes (codes), categorizing information into groups. The data were also grouped by interview questions and research questions in NVivo for Mac to review common threads. After first cycle coding, various statistics were studied and compared with emergent themes of collaboration, skill development, and professional development techniques to prepare for second cycle coding. The statistics included:

1. Number of coding references
2. Number of words coded
3. Number of sources coded

Grounded theory is designed to generate theories about processes from participants' experiences and perceptions (Bloomberg & Volpe, 2012, p. 33). The theories emerge from the data after careful analyses are performed to identify similar experiences. The aforementioned statistics guided this researcher to the emergent themes that developed more as interview data were coded. For example, codes like *"Knowing Skills"* and *"Collaborating"* each held all 18 sources and 42 and 73 references respectively. These codes were given more attention during second cycle coding. Nodes such as *"Varying Usage of Technology"* and *"Willing to Learn Technology"* only held quotes from two sources each with three and two references respectively. These nodes were not given a great deal of attention due to their limited use.

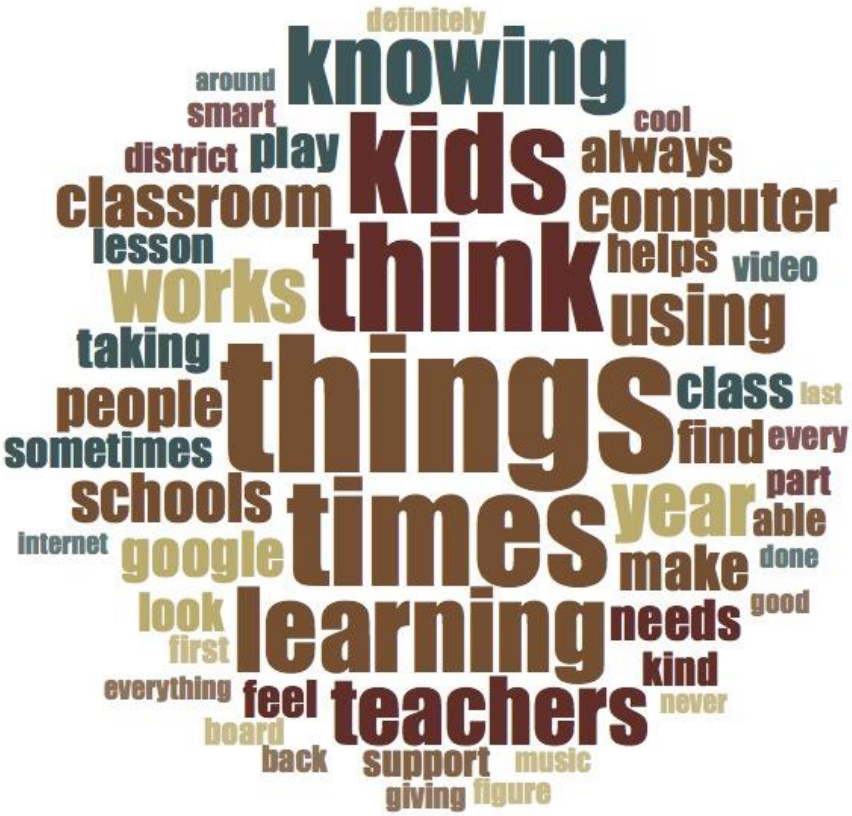
Table 4.2

Coding Frequency

Code	Number of Sources	Number of Reference
Knowing Skills	18	42
Collaboration	18	73
Varying Usage of Technology	2	2
Willing to Learn Technology	2	3

Word clouds were also used to visually represent the most commonly used words in the data. The top fifty words are displayed in Figure 4.5.

Figure 4.5 NVivo for Mac Word Cloud



A word frequency test was also performed within NVivo for Mac. The report (Table 4.3) listed the base word, the word length, word count, weighted percentage, and similar words. This researcher was able to develop themes and subthemes for this study based on these reports and axial coding techniques employed during second cycle coding.

Table 4.3

Word Frequency

Word	Length	Count	Weighted Percentage	Similar Words
Think	5	458	1.59%	think, thinking
Times	5	457	1.59%	time, times, timing
Kids	4	420	1.46%	kids, kids'
Learning	8	349	1.21%	learn, learned, learning
Knowing	7	318	1.11%	know, knowing, knows
Teachers	8	276	0.96%	teacher, teachers
Works	5	250	0.87%	work, worked, working, works
Year	4	245	0.85%	year, years
Using	5	239	0.83%	used, useful, uses, using
Computer	8	198	0.69%	computer, computers
Classroom	9	193	0.67%	classroom, classrooms, classroom'
Schools	7	185	0.64%	school, schools
People	6	175	0.61%	people
Google	6	172	0.60%	google, googling
Class	5	154	0.54%	class, classes
Always	6	153	0.53%	always
Needs	5	152	0.53%	need, needed, needs
Taking	6	151	0.53%	take, takes, taking
Play	4	150	0.52%	play, played, playing, plays

The 90 nodes were then regrouped and manipulated several times, which showed relationships between this researcher's initial ideas and larger *categories* or *"families"* sharing a pattern (Saldaña, 2013, p. 9). Axial Coding guided this researcher as the nodes were grouped and regrouped into themes and subthemes. By regrouping the data, this researcher organized conceptual categories (Saldaña, 2013, p. 218).

This researcher triangulated the data to ensure good research practices. Creswell (2014) explained that triangulation enhanced studies by *collecting and converging* various types of data about a phenomenon (p. 536). Triangulation can be achieved with the use of multiple sources of data, cross-checked in many ways from different times, places, and or interview data collected

from multiple sources (Merriam, 2009, pp. 215-216). This study included a pre-interview questionnaire, semi-structured interviews, data analysis tools and current research to achieve triangulation, supporting findings and conclusions discussed in Chapter 5.

Emergent Themes

Five themes evolved following meticulous coding and analyses of over 100 pages of transcript data. This researcher connected the themes to the research questions as indicated below:

Table 4.4

Emergent Themes

Identified theme	Research question
Collaboration	How do professional development and peer collaboration affect technology integration?
Knowledge Building	How do professional development and peer collaboration affect technology integration?
Positive Support	How do attitudes about technology integration impact usage in a classroom?
Engaging Students	How do skill sets affect the amount of technology integration in a classroom?
Engaging Teachers	How do attitudes about technology integration impact usage in a classroom?

These emergent themes are consistent with current research about integrating technology and the teachers that are responsible for making the changes. Nicoll (2014) concluded that paradigm shifts are necessary in the educator's mind-set in order to make necessary changes to teachers' abilities to learn and present new materials in a transformative manner. Research reported that teachers' attitudes and skill sets directly impact their level of integration into the classroom setting (Brown, 2011; Chesbro & Boxler, 2010; Downes & Bishop, 2012; Downes & Bishop, 2015; Hew & Brush, 2007; Kopcha, 2012; Levin & Wadmany, 2008; Riordan, Caillier, & Daley, 2015; Shaunessy, 2007). Kale and Goh (2012) suggested clear ideas about how to teach technology integration to educators, which are necessary to provide strong instruction to students. Gorder (2008) identified the need for appropriate professional development to support

technology integration. Jones and Dexter (2014) suggested that school districts could do more to holistically prepare and support teachers as they learn to engage students in technology-based activities to enhance learning. Undoubtedly, the data and themes identified in this study are harmonious with current research.

The following is a summary of every identified theme, subtheme, and the connection of these data to the research questions.

Table 4.5

Subthemes

Identified theme	Subthemes
Collaboration	Sharing Ideas Motivation to Learn Real-Time Learning
Knowledge Building	Sharing Knowledge Skill Development Positive Attitude Independent Learning Lesson Planning
Positive Support	Availability of Support Leadership Community Support
Engaging Students	Teacher's Responsibility Student Participation in Teaching and Learning Teacher Connections with Students
Engaging Teachers	Professional Development Time Flexible Approaches

Collaboration. Each interviewee expressed a level of comfort and appreciation for collaboration opportunities with peers which evolved into the first theme. The idea of teaching skills with technology can be unnerving considering the isolation from colleagues during a

school day and the limited number of structured opportunities to meet and discuss experiences. Every chance to speak with colleagues, whether in specific teams, departments, or grade levels, provided an opportunity to learn new methods, confirm previously attempted efforts to integrate technology, or increase positive feelings based on the efforts to integrate technology with fidelity. Every opportunity to collaborate increases the possibility that teachers will improve their skill and attitude levels (Jones, & Dexter, 2014). This theme is directly associated with research question three: How do professional development and peer collaboration affect technology integration? Regular collaboration creates a setting where a growth mindset can develop and strategies to pass information along from member to member promotes increased confidence and awareness (Nicoll, 2014). Questions five, eight, nine, twelve, thirteen, and fourteen produced information related to this particular theme. Three subthemes emerged from this main theme including (a) sharing ideas; (b) motivation to learn; and (c) real-time learning. The data clearly indicated the participants felt collaboration is a positive and necessary part of technology integration in middle schools. The three subthemes expressing the participants' perceptions are described below.

Sharing Ideas. Technology applications are constantly being developed and are virtually impossible to keep up with given educational mandates. Sharing ideas becomes a vital part of learning and developing technology integration skills because there is a lack of time to receive sufficient professional development or explore new technologies. The majority of participants believed opportunities to speak with colleagues about technology are important moments throughout a school year when teachers pass along knowledge and experiences to their more veteran and newer peers. Participant I shared, "I'm the first one to admit I'm still learning and growing in technology used in my classroom, so I'm not an expert by any means. I rely on a lot

of the teachers and ask them questions.*"* Whether it be a lesson or an application, sharing gives teachers an opportunity, either casual or formal, of hearing and engaging new technologies throughout a school year and a career. Participant P indicated,

> A lot of what I use for the first time in new stuff I will find through informal conversations in the hallways between classes. I'll say I found something new, 'hey this is cool,' try it for a while, and the next day I'm using it. A lot of the ideas that spread, spread that way.

Sharing not only comes from other teachers, but the students are also able to provide new ideas with their teachers. Several participants explained this type of sharing is a good model for students and provides a strong example of a major component of 21st Century Skills. Participant L related an experience,

> A lot of times, I'm learning as I'm going, and I'll even put stuff out there to the kids. They'll teach me how to do it. I'll say, 'I want to do this, what do you think?' They'll help me. I think the skills are as important as just being open and patient.

Sharing ideas also provides an opportunity to reflect on experiences that could improve instruction and enhance technology integration. Participant R said, "I might show somebody something new or someone might come to me and show me something new. There's collaboration there that helps push and drive and make changes." Many participants conveyed that an extreme amount of available information demands that teachers take advantage of every moment in a day to develop and increase their skills and knowledge. Sharing ideas can motivate teachers to learn and enhance their practice.

Motivation to Learn. Teaching can isolate professionals from one another and create voids of collaboration and learning (Sindberg, 2014). In order to stay up-to-date, teachers need

to stay motivated and feel excited about activities and means of connecting with students. The majority of participants shared that motivation to learn is a key component of a successful teacher. Participant D said, "I am not tech savvy in any way, shape, or form. It's just a matter of actually being motivated to do it." The participants described opportunities to collaborate and expressed that it was a great motivator that provided teachers chances to learn through the experiences of their colleagues.

Collaboration is not always easy when trying to assist peers. A number of participants indicated that teachers need to be comfortable enough with themselves to reach out and get other teachers excited or passionate about learning new methods. Participant K shared,

> I feel very comfortable to the point that I'm comfortable teaching other people how to use it, not just using it for myself. I'm comfortable, if I don't know what I'm doing, which is pretty often, because things so rapidly evolve. You have to keep up with it. I'm confident that I can figure it out.

Several members of the sample described that when teachers collaborate, they realize new ideas and techniques that excite them and promote learning in fresh ways. Teachers will perform better for their students when their level of motivation stays high. Participant Q explained,

> Just the excitement from the staff, being able to jump in and say 'let's hook this up to this or that and we can make that work.' I wish that, I feel like I'm isolated on an island, I feel as though there are a lot of people around me who are also making progress and are willing to share.

Many participants expressed that teachers don't just want to teach children. They are motivated to learn so they can turn that knowledge around and share it with other teachers,

thereby reaching more students with technology integration. Motivating peers can be challenging, but important, as described by Participant C, "I work next door to a woman who is very reluctant, but I try to encourage her to use technology as much as possible, and give her victory dances when she does something that involves a tablet." Participant B shared,

> Many times, we have another teacher in our department that, for a week, she would say, 'would you please come here and help me with this.' I love it because she wants to learn. I don't mind. We're all connected. Even during study, I can help her with whatever she needs. She has been feeling a lot more comfortable with the whole technology portion of the teaching.

Collaboration and connections with other teachers motivates learning and keeping up with new ideas.

Real-Time Learning. Opportunities to learn during professional development time are limited. Students are savvier and teachers must teach and be ready to interact in real-time to maintain their connections with students. Several participants relayed that information gathering and sharing is much different than the days of library time designed to explore texts and pull out information in the late 20th century. Google and similar search engines are capable of taking a question and providing thousands of potential answers within seconds. The participants all described the overwhelming nature of information management, but also recognized its presence and the fact that they must now include the teaching of information management into their courses. Teachers must keep current and prepared to work in real-time. Collaborating about technology tools and applications that provide students real-time experiences will promote constant learning, engaged students, and relatable teachers.

Participant R shared, "Kids can use data that way in science real-time approaches to real-time data collection. I try to incorporate that as much as possible. That's what we use in the field more often than not. It's a little more applicable…" Students are changing and teachers must change as well. Many participants recognized that teachers are responsible for maintaining and connecting students to current information and practices. Participant J explained how she is motivated by new methods while collaborating with peers in real-time.

> I don't like doing the same thing over and over again. I find it boring, just to teach the same lesson every year the same exact way. I'm always looking for ways to change it up. I'm always taking classes that are technology based. I have a good friend who is an instructional technology director at the J School District. We're always bouncing ideas off of each other as well.

The sample group alluded that collaborating in real-time is also how teachers like to learn. As teachers realize how they learn in the 21st century, the more they will translate those skills for their students and create a successful system of integrating technology. Participant F described how she learned in real-time as she experienced technology integration for herself as a learner.

> I got my Master's Degree through MSU [university], but it was distance learning; it was not sitting in a classroom. You have to be very disciplined to go through the computer. All my classes were all online with the exception of the last two and a half weeks which was done in the field.

She clearly understood how to use the Internet in real-time to expand her knowledge and bring those ideas back to her students. This teacher has experienced and conveyed what online

learning can do for her, and will be more capable of sharing with her peers and motivate them to learn and teach in real-time.

The participants expressed that technology integration can provide students with opportunities to develop their collaboration skills through real-time projects. Participant K explained a project that incorporated video which relates to many 21st Century Skills that are currently used outside of school for a variety of purposes.

> Some of the projects that the kids have done, it's so cool and rewarding to be able to see them do that. I think, if I didn't do this cool project with a tablet and make a little video. We did a 'Back to the Future' video this year. Would you rather go back in time or would you rather go to the future and why? Simple things. 30 second video explaining why. I would have never, I don't know if you ever could have gotten that through traditional methods, like if you had them write it on a worksheet in the beginning of the year as an icebreaker as you can when you have the inflection and the emotion in the video as well as them speaking. You see people all the time when you get a text message, 'What does that mean? How is he saying that?' You can't get all that from just words on a paper or on a phone. It's opened up that whole avenue.

Real-time events also shape instruction. However, we need access to real-time information to then develop the skills necessary to learn, process, and create collaborative presentations about the new knowledge. Participant G explained,

> I tend to find that where I've learned the most has been, in my slightly a bit of nerd like, in my daily life. Like when I'm trying to make lessons or perusing the Internet, just in general. I'll read an article in the New York Times and say I need to use this in this unit and my brain automatically goes to work. Or I watch a video clip or something that has

nothing to do with school and I say, 'Wait a minute. I can make a connection to class.' So it's kind of taking real-world stuff and using it.

Knowledge Building. The participants shared a variety of thoughts about how they gained knowledge and the need to build upon that knowledge so they could stay current with modern technology and the needs of their students, which became the second theme. Trilling and Fadel (2009) wrote, "The Knowledge Age demands a steady supply of well-trained workers – workers using brainpower and digital tools to apply well-honed knowledge skills to their daily work" (p. 24). In the case of technology integration, the teachers reported that, in order to present their curricular concepts, they were constantly tasked with learning new presentation methods that hooked students and provided meaningful knowledge. This theme is closely tied to collaboration because in the 21st century, problems are solved in group settings. Trilling and Fadel (2009) explained, "The ability to work effectively and creatively with team members and classmates regardless of difference in culture and style is an essential 21st century life skill (p. 80). The following subthemes are discussed in this section: (a) sharing knowledge, (b) skill development, (c) positive attitude, (d) independent learning, and (e) lesson planning. The experiences and perceptions shared by interviewees based on questions one, three, four, five, seven, eight, eleven, and twelve produced a large amount of supporting data.

The participants recognized that knowledge building in the 21st century never ends. Participant D conveyed, "Trying to learn all those new things has been interesting. It's a constant work in progress." Teachers must constantly seek out new knowledge and incorporate both the knowledge and the passion to continue learning so their students may develop similar skills. John Kotter (2012) stated, "As the rate of change increases, the willingness and ability to keep developing becomes central to career success for individuals and to economic success for

organizations" (p. 186). Teachers must help future generations by staying current with ever changing knowledge acquisition skills and methods to integrate technology to advance their causes.

Sharing Knowledge. Teachers do not always have to be the presenter of knowledge. Skype, Google Hangouts, and video conferencing are all 21st century Internet applications that provide free or inexpensive ways of holding synchronous meetings without the need to have everyone in a single room or location. These applications have all provided teachers with the ability to present knowledge directly from experts in the field and practitioners around the world. The sample group indicated when they received or shared out knowledge, their own practices were positively changed. Participant C said, "It's usually online, Pinterest or a teacher telling me to use something and I'll try it out, clicking and playing." Participant E conveyed a story about a professional development designer who,

> …had a guest speaker come in via Skype. The guy was an expert in some field of education…. He started talking about sharing like an expert's view. I remember asking, 'you can have experts come in your classroom?' I started thinking about that. It kind of changed the way I looked at it. That was one of my turning points.

This experience led him to connect with experts from around the world. He has developed a large network of virtual field trips too.

Participants explained that knowledge sharing over the Internet has changed their practices greatly. Web sites like YouTube have made information sharing accessible at any time, at multiple levels of depth and length. Participant K explained,

> …if I went to a 3-day conference [and] laid out all the things I learned at that conference, which are great things, no doubt; how much time would it have taken me if I had just

looked it up myself on YouTube? We have that ability now. Whereas we really didn't have it before.

Sharing knowledge has become so important, that teachers are not only networking with colleagues in their schools, but through web sites designed to educate and inspire new knowledge around the world. Participant Q shared, "YouTube. YouTube is huge… We see what's possible. That's huge. The teacher next door being part of the learning networks in our building and also Edmoto and Teacher Cube. I think that's made a big difference." Teachers are reaching out into the Internet and offering what they know to create knowledge and sharing their ideas freely.

Skill Development. Teachers' skill development is crucial to building knowledge. Participants indicated that skills specific to technology usage were important. For example, the teachers felt that basic knowledge of devices and hardware like laptops and tablets is very important and should grow as technology advances. Participant B said, "You should have at least that basic knowledge, to be able to save you time," while Participant F shared, "I think they should definitely have some really fine skills on the computer." Teachers must continuously develop their hardware skills to integrate the technology smoothly.

The sample group also spoke about Internet and software knowledge (programs like Microsoft Office Word and Excel) which they described as necessary for building knowledge in students. The teachers shared that regular opportunities to learn and engage new Web 2.0 or software would help develop skills and pass on knowledge to students. Participant J explained, "I think you need to have a basic understanding of what technology can do for you in the classroom and how it can help be used as a tool." Participant R said, "Things like Microsoft

Office; I don't know that you necessarily need skills, but you do need to know what you're using in an appropriate way." Participant G explained,

> …they'll [students] come to you and ask questions. And if you can't help them technology wise, they can become a little difficult in the classroom. It will slow you down. I don't know if it's 100% a positive thing, but for a teacher, especially for those who are thinking about the profession, I think you need to have the skills of basic if not intermediate knowledge of the computer and using things like Google or being able to have the kids digitally work in some sort of platform, whether it be School G or some of the other Google Classrooms that are being used. I think it's being pushed from the top down. So, if you're not so savvy in it, you might find it difficult to keep up.

Digital presentation skills were mentioned often by the sample group. The participants recognized that digital technology, in all its forms, include visual and audio methods of communicating ideas and knowledge. Teachers must learn how to guide students and instill good usage habits and knowledge of the technology so they are responsible. Digital presentations are also convenient methods of promoting collaboration and creativity in students, both important 21st Century Skills (Partnership for 21st Century Learning, 2015c). Participant P said, "In terms of specific technological skills, I think a lot has to do with media these days. Any teacher needs to be basically, generally, comfortable with basic video and audio editing and embedding."

The participants went beyond hardware and software skills during the interviews. The respondents listed interpersonal skills that need to exist and be developed in teachers that will increase the integration of technology. Examples of skills the participants shared were *comfort level, patience, risk taking, problem-solving, effective communicator, life-long learner, a*

willingness to manage challenges, an adventurous attitude, a willingness to try, organization, and a motivation to learn. Knowing how a computer turns on and what buttons to push is not enough to be an effective conveyor of knowledge. The participants all shared that these interpersonal skills can be taught as teachers increase their practices and efforts to share knowledge through technology. Participant I shared, "I think you have to be willing to try. We're in a world where everything is evolving so fast and they're always coming out with new apps and new ideas and new ways of integrating technology with the kids." Participant E conveyed,

> Willingness to take a risk. Try new things. There's really not only one skill involved with technology because it's really hard to be an expert in it. We have to be willing to try something new and not be afraid of failing. Willing to learn from what works, what didn't work. I think that's the biggest skill.

Positive Attitude. Given the incredible task of building knowledge while utilizing changing technologies, it is vital that teachers maintain a positive attitude. The participants explained that positive attitudes allow teachers to learn more effectively and convey knowledge with more fidelity. To acquire and or maintain a positive attitude, the interviewees discussed collaboration techniques to support one another, administrative supports, and teacher level supports that can continue the efforts that teachers put forth to integrate the technology.

Teachers are constantly asked to learn new methods and present curriculum while applying new techniques of knowledge sharing. Tablets and Google technologies are changing the classroom in numerous ways that require regular learning opportunities for teachers. The participants explained that positive supports while experiencing knowledge building activities

will translate into positive attitudes. Participant D referred to a building level technology support person who was

> …very positive saying, 'Let's try this!' She's a big motivating force for me as far as the tablets go. She says, 'Don't worry. You'll get it.' She doesn't make you feel like an idiot because you do feel like that most of the time.

Positive attitudes are increasing according to the participants during professional development opportunities. As professional development designers recognize approaches to educating adult learners at their level of knowledge, more knowledge can be built in a comfortable and positive manner. Teachers are staying positive because they are learning things that can be used right away, at their level, of interest to them, in the classroom. For example, Participant L said,

> I have to tell you, until last year, I never really liked PD [professional development]. Then, D [building technology support teacher] started doing this thing that, like, ok, if you want to know how to do this app, or integrate Google Classroom, whatever it is, you could just sign up and drop in. You would think a lot of people were hiding in their rooms and they're not; they're there. That is awesome. Having the freedom to learn what you want to learn and learning things that you can instantly apply in the classroom, not theory stuff, like this is something you can take and run back and do it tomorrow. That's the stuff we've been doing in our workshop days. That's really making a difference.

As people join these type of knowledge building opportunities, they are also working near and with colleagues which in turn increases the collaboration among the teachers.

Maintaining positive attitudes about peers was also recorded during interviews. Collaborative teachers attempting to help their colleagues build knowledge about technology

integration kept open minds and open doors for their fellow teachers to explore and find success in some aspect of their efforts. Participant K reported,

> There's also the ones [teachers] you never would have expected coming to you saying, 'Check out my Smores [newsletter produced on a Web 2.0 application]; I sent a Smore home every week telling the kids' parents what I'm doing in my Science class. Wow!'

This positive attitude was also mentioned by Participant F, when she shared, "I'm very comfortable. As a matter of fact, I have other teachers who will contact me and ask for help with this."

Teachers feel good about building knowledge within their peer groups which carries over into the classroom, enhancing student experiences as evidenced by Participant M. He said,

> You know they [students] are [excited] when I have them make a website as the assignment. They get really into it. That creates the feedback for me as a teacher. You're much more satisfied and happier about what you're doing when the kids are actively involved and getting into what they're doing. As you do that, it creates an incentive to do more of it. Their responses over the years, they're increasingly engaged when they're doing stuff involving technology. That's a payoff. That payoff makes you want to do it more, put more into it.

This type of experience was common among the participants of this research study. As the students got more engaged, the teachers were more positive and regularly seeking more ways to integrate technology in the knowledge building process.

Independent Learning. Group collaborations are not always possible, and thus, it is imperative that teachers be independent learners when it is not possible to bring colleagues together to build knowledge. The teachers interviewed for this study conveyed that there were

both times to learn new technology during organized professional development opportunities and on their own. Professional development opportunities will be discussed later in this chapter. Focusing on independent learning, Participant Q explained,

> I think teachers now are more expected to be independent learners and not necessarily say, 'Well, if you want me to launch that product or that software, send me to a training session on it.' I think today, teachers want to be independent and figure it out on your own, trial and error at some point in order to be able to integrate it into the classroom.

Independent knowledge building also prepares teachers to collaborate when opportunities arise to build a colleague's knowledge base.

Some shared trepidation, but all indicated that this is the how teachers must learn to stay current with technology. Participant D said, "…the more I tried and the more I learned, the more excited I get about it because the kids really respond to it." Many participants recognized a need to stay close to their students' level of technology knowledge. Participant F explained,

> I don't want my students to know more than I do about computers. So I have to stay up with them. That's important for me because I want them to be able to say, 'I don't know how to do this,' and I can say, 'Well, I know how to do it this way.' Do I learn from the kids? I absolutely do. Sometimes we learn together. But, have I been forced to do it? No, because I like doing it. I like learning about technology; any kind of technology.

Positive attitudes and a willingness to take risks in learning also play roles in independent learning and building knowledge. As mentioned in a previous subtheme, Participant K indicated comfort with quickly changing technology. He went on to share,

> I'm constantly doing something or trying to do something different with how I'm using it [technology]. Sometimes, you fall flat on your face; sometimes it's cool. You never will get to the cool part if you didn't try and fail on the other one.

These interpersonal skills of willingness, adventurous spirit, and risk taking were described and mentioned throughout the interview process. Participant M explained,

> You have to have that skill of being able to learn and figure it out. You also have to have the willingness to take a chance that something might not work. Be able to think on your feet, deal with it, adapt to it, and react to it.

Participant L shared,

> I didn't know anything about them [tablets], but they [the school district] gave them to us early so we could play with them. I think that's the way to go. Just be brave and realize you can learn from the kids too. That's more than the skills.

Lesson Planning. The lesson planning process is where teachers employ their established knowledge and convey information to their students in a positive manner. The participants all focused on their objectives and found ways to engage their students through lesson designs that integrated technology in a meaningful way. Participant D said, "I look at the objective and then sit there and say, "Okay, is there any way I can incorporate technology into this?" The majority of the sample agreed that integrating the technology increased the time to plan at first, but when they were aware of the technology, the planning time decreased. Participant M said,

> It's time consuming, I think, to add it [technology]. You have to learn to use these technologies in order to bring them in. But, I think there's a big payoff when you do it as

> far as lesson planning goes. In terms of getting the kids more engaged and getting them to learn more, so I think it's time well spent when you use it.

In some cases, the teachers were able to save time by utilizing technology applications that provided a variety of options with a single data set of knowledge. Participant Q shared,

> See what they've got or is there an easier way to do it with the apps, especially with vocabulary work the kids can have access to online today. It's so much easier to know, 'I need them to work with these words for the next two or three weeks.' It's easier to put it into an app for the kids to work from. There are more options.

Participant L described,

> As technology progresses, I like it more. I can do it from anywhere. We're big on Google Drive and stuff like that. That means that all my files, everything, is on my phone, it's on the tablet, it's on my home computer, if I want to go to the library, it's anywhere I can go. That makes it much easier to lesson plan.

As the participants shared their lesson planning experiences and connected them to their lessons prior to the current level of technology, they discussed the positive difference integrating presentation technology has made on student learning. Several participants said they used web sites like Kahoot, a quiz show site that presents the class questions and the opportunity to respond for accuracy and speed. Videography was discussed as a medium that allowed teachers to see constructed knowledge from students in a unique and interactive manner. Some teachers described real-world projects that they planned to build knowledge in both the technologies and the world around the students. Participant K shared,

> They [the students] research using this web site [Kiva.org] a person they believe is most deserving of the actual loan. They write proposals and then they construct an iMovie and

> presentations to share with the class as well as their proposals, basically, trying to convince their classmates why their person is most deserving.

Through lesson planning, these teachers integrating technology are finding ways to present the 21st Century Skills to their students and relate it to their curriculums and the world.

Lesson planning is where the sample group indicated some challenges in their practices. They shared that their technology integration efforts were hampered by weak Internet services and overuse of broadband, causing prolonged search times and interactive opportunities which could not be integrated. Some participants explained that they were forced to plan a technology integrated lesson along with a pencil, paper, and book activity for students without their devices or in a situation when the Internet was not functioning at a particular time. Participant J explained,

> I will say that [lesson planning] has been a challenge because I'm at the point where I have to plan for both technology and paper. Not all of the students have their tablet with them on a daily basis, ready, charged, and ready to go. So I do have to adjust my lesson plans accordingly to make sure I have a backup in case the technology doesn't work.

Positive Support. The sample group conveyed their experiences with technology integration supports in their schools and districts, and indicated that the better the supports, the better their attitudes, which evolved as the next theme. Teachers have been asked to prepare generations of students for an industrial age leading up to the 21st century. The Knowledge Age is now here, and teachers are scrambling to effectively learn about the new world in which we live and ready their students to build knowledge collaboratively and creatively (Gorder, 2008). Supports were described in terms of amount of or quickness of responses to needs, leadership supports, and support from the community to make the changes necessary for the generations of

students to come that will no longer be entering a primarily industrial world. The following subthemes were developed within the theme of positive support: (a) availability of support, (b) leadership, and (c) community support. The responses from interview questions two, six, nine, and ten prompted perceptions about positive support.

Kale and Goh (2012) reported that teachers are willing to integrate the technology, but their sample indicated the lack of technology integration support impacted their desire. This researcher found that the teachers interviewed all received a variety of supports to integrate technology, which in turn maintained their positive and willing attitudes to make changes to their teaching approaches in the Knowledge Age. Jones and Dexter (2014) explained that teachers integrated technology more with regular opportunities to support one another collaboratively. The participants in this researcher's study concurred with this concept and described many examples of feeling supported by a variety of sources, thereby improving their attitudes and increasing the level of technology integration in their classrooms.

Availability of Support. The participants who had support personnel specifically tasked with technology concerns reported more positively than the participants who had technical support that was only tasked to manage hardware or Internet issues. The teachers in schools with limited teacher technology assistance commented that they had access to each other as supports during professional learning communities (PLC) time or professional development time. The more opportunities that teachers had to explore and ask questions of support personnel or supportive colleagues, the more engaged they described their students and lessons.

Participant L described the building level technology support person in her school. She said,

> I have support of people in my building. We have the person whom you know, D. She's very supportive. She's the one to give me ideas. She'll have the kids figure stuff out for you if you need it. Having that support and the workshops that have the specifics, that's really the way to go.

Participant D worked in the same school as Participant L and shared, "She's [D] the one who really brings new things to the forefront." Participant J also worked in the same building and shared, "We do have DM who is the head of our T [mascot name] Tech group, so a lot of my questions will go to her…I feel like there's a lot of support around; if you want to integrate technology, support is there."

Some participants shared that their school districts used professional development opportunities to support teachers. Participant M explained,

> There's a ton of support with the school. They do the staff development; more and more they are including time to put it in practice. When they do that, very often the person who is presenting in an area will help you work through it when you're trying to work with this…And then at the district level, we have people. They have technology experts that you can ask to come in to help you with stuff. If you're doing video conferencing or something like that, there are people who are experts on that who will come in and help make sure that you have it set up and it's working properly that you can schedule with. There's a lot of that in place as far as support goes.

Participant K shared that professional development made her feel very supported and she valued the chances to learn new ideas. Participant H described professional development as very supportive when the 1:1 tablet program was started. He said, "Over the last two years, there's

been a big push for professional development with the 1:1 roll out, each school has worked out a way to have a media specialist free to handle issues related to technology."

Leadership. Administrators, both within the school and at the district level, are able to motivate teachers and increase technology integration. The sample group shared that leadership who organized regular professional development, celebrated the efforts of teachers to integrate rather than criticize failure, and provided collaboration opportunities also enjoyed positive school environments where teachers felt safe and willing to explore technology integration. Participant B said,

> Thanks to our previous administration that was great in pushing us and allowing us to take advantage of anything out there…Once you have, you succeed in something, you have a taste of it, then you want to go to the next level and to the next level.

The participants recognized and appreciated the efforts of their administrations who worked hard to create an environment of success. Participant H explained,

> I think something that can't be overlooked is the support I've gotten from my administration on trying new things and not being scared to say that if an administrator were to walk into my room at any particular point and it seemed like kids were struggling to figure out a new tool, the web site I planned was down, [or] we're scrambling to figure out what else to do; not being scared to try new things and getting caught essentially; that wasn't necessarily something I was familiar with.

Positive and supportive leadership can create a safe environment to learn new ideas and try them in a classroom. Participant J explained,

> I've never had a problem where I've done something and things have gone poorly. I know how to adjust to those situations and they are very much…if something doesn't go

> right then it doesn't go right. It has happened during observations. They're like, 'Ok, it didn't work.' And we've moved on because it does happen. I think they are very supportive in that sense.

Participant H shared a conversation he had with another teacher in a school where administrative support was not positive. He conveyed,

> When I went to other schools and talked to other teachers who maybe didn't feel as supported and felt like administrators were looking to catch them without an objective on the board or catch them doing this or that, people were afraid to try new things.

Participant G described her district's recent effort to bring on a 1:1 tablet program. She explained that the administration was unrelenting in their efforts to push the program, but at the same time, supportive in the process, including teachers in many ways and backing them up whenever necessary. She said,

> When I use technology personally and there's an administrator, any time I've been evaluated, they have been overly supportive. In fact, a lot of the good feedback I get is everything is being integrated, and being on the computer, and making it accessible for the kids, and using different forms of media to teach them a concept or a term or something. I've had a lot of support with administrators about that.

Some participants described their administrators as positive parts of building knowledge. Participant N explained, "I'm in a district fortunate enough where if a principal hears about something really cool, he'll shoot us an email or he'll have them present that in front of the whole school. It's awesome." Participant O shared experiences about the evolution of administrators in his district. He said,

> It's definitely evolving. The expectation was always high. It's evolving in terms of their ability to let us go at our own pace regarding it. I think that's been the best thing. They've been having an evolving perspective on how do you get teachers to have better use of technology and I think that's benefitted us a lot.

Participant R described,

> A lot of the time it's feedback. I might see my principal or assistant principal or even my district supervisor…And they come in and they give me feedback, constructive criticism which helps me and guides me and see from their perspective what they see. I might see something, but it might be slightly different from what an observer in the back of the classroom might see. It's always nice to get the constructive feedback from others. At the same time, a lot of it is that positive support, like 'I found this cool…', 'Keep doing this' which gives you that motivation that what you're doing is meaningful and on the right track.

Community Support. The participants described mixed community support from the surrounding towns (taxpayers) and families sending students to the schools. Each teacher commented that the communities in which they taught recognized the importance of 21st Century Skills. Some communities were supportive with equipment and patience to understand and learn the new technologies along with their students. However, other communities indifferent about technology integration, but they did not fight the integration process. Finally, some participants shared that their community were not interested in the financial costs of 21st century educations and were satisfied with pencil and paper approaches they enjoyed during their educations in the 20th century.

The participants who taught in schools with support felt positive and energized to continue their efforts to integrate technology. Participant K said, "…overall I think it's been a hugely beneficial program, both for our community relations as well as the education. The way it's being delivered to the students is more in sync with the lives they live." Participant B conveyed, "…all in all, parents have been extremely supportive and grateful when we try to incorporate that [technology] in our teaching and their [students] learning." Participant D said, "I think for the most part, parents are happy with it and they were excited about it." Participant R summarized positive community support by saying,

> I'm lucky; the vast majority of my students are lucky. They come from supportive families. Parents love to see the technology and things being used, especially science. There's a lot of connections of what they see them using and what some of them might be using in their own profession or things they might have around the house...So, I generally feel very supported by the community and students of what we're doing and how we're doing it.

Some participants shared that their communities wanted the technology integration, however, they were not always willing or interested in paying for the necessary equipment or training opportunities. Participant I shared,

> We actually live in a very affluent community. It's mind boggling, the elementary schools have SMART Boards, and all that. We don't have SMART Boards at the middle school. The parents, I think, feel they pay high enough taxes, so from their perspective, it is a balance of what does the school need, what can we afford, and not have taxes go up.

Some parents struggle with the new technology. Participant I explained, "…from the parents' perspective though, they have a harder time dealing with the content as kids and teachers do

because they can't track it as easily." Participant I also described the experience of bringing Google Classroom into her district. She said,

> When we first brought it in, we thought the parents would come unglued, it was like control was taken away. The same thing with the online grade books. We'd post our grades so students no longer [had report cards], they had a code, they could check it. As teachers, we tended to send emails to parents and use those types of ways of communicating. Parents had a hard time all of a sudden, 'Oh, I have to go on and get my kid's grades?'

While these negative situations existed, they were limited in the sample group.

Engaging Students. Middle school students desire affiliation and independent access to information in the 21st century. This next theme developed because the purpose of all teacher preparation and effort is to educate their students. Downes and Bishop (2012) explained that middle school students expect more from their teachers than ever before. They reported that the students expected answers within seconds of the questions given their experiences with Google's quick response time. The students were also reported to expect greater visual activities by teachers to engage them to match their experience with technology and media outside of school. Teachers have responded to this call for reformed engagement of students. However, there has been an expectation that teachers already know how to engage students with technology without the preparation (Downes & Barnes, 2012). The participants described experiences that painted a vivid picture of student engagement and how they were able to present lessons that kept 21st century middle school students' attention. Participant E shared,

> I look at it [technology integration] as part of the classroom. It's not the biggest thing in my classroom. I think relating to the students is number one. It's a big part of allowing

> the kids to have a voice, to share things. In the world today, we're not just writing for our class. It's for everyone to see. I'm very transparent with sharing things with parents. I think that's one of the biggest uses of technology.

The following subthemes were created to support the theme of engaging students: (a) teacher's responsibility, (b) student participation in teaching and learning, and (c) teacher connections with students. Questions two, six, nine, and ten provided perceptions on the subject of student engagement.

Teacher's Responsibility. Each participant in the study stated that the students are their first consideration when learning new technologies, preparing lessons, and engaging their classes. They shared experiences of independent efforts to learn and build their skills and increase their level of positivity when integrating technology to their work. Participant E shared how quickly he and his school met the students where they were on the Internet.

> We have a hashtag for our school district; we finally got one going for our building. I had one for my team last year. We use it a lot. We have an Instagram account for each classroom. We talked a lot about digital students this year. It's today's world. My own kids, in the basketball team, the coach lost two kids because they were tweeting about the coach. It's the real world. The kids need to understand how to use this stuff. I think it's every teacher's responsibility.

Participant P indicated that his district was removing computer classes from the schedule and using core subject courses (English, Math, Science, and Social Studies) to provide technology integration and education into the curriculum. He said, "Students are getting more technology integration in their regular content classes, but they're getting fewer courses, if any, directly geared towards computer literacy." He went on to point out that the students are coming to him

with limited skills now because the core subject teachers are still learning how to utilize the technology and integrate it with fidelity.

Other participants echoed the previous sentiments. The responsibility to prepare students is falling away from technology specific courses and finding its place among curricula already available. Participant Q shared,

> Once again, it's risk taking, learning the education on our own. I'm feeling that it's part of our job, not something that's completely separate from our job. Using the technology and trying to get the kids to be able to be more comfortable is all part of the teaching process.

Teachers like Participant R said,

> I'm very fine; I'm motivated from it [technology integration]. They [students] want to see; they want to know; they want to get hands on. It's a positive push and from parents it's always a positive push. It can be hard. They have technology in their hands all the time. They know more of it than I do sometimes. It's cool to keep up with them and show them things they've never seen before. Give me that little push.

As teachers strived to engage their students, they accepted the challenge and responsibility to acquire, practice, and present technology to their students. Participant O summarized the idea nicely when he shared,

> I think technology serves teachers in the sense that it makes instruction, notes, the transfer of ideas very clear, colorful. You're talking about putting notes on a chalkboard, opposed to showing those notes on a nice, crisp PowerPoint slide with an image with different colored font. I feel like the effectiveness in transferring ideas is much greater using that technology than if I was just to say it or put it on a chalkboard. It loses its style

> in a lot of ways. A new teacher has to understand how to use it with the idea that it doesn't do your job for you, but it makes your job so much more efficient and dynamic, if you use it correctly.

Participant N conveyed, "I know teaching is not all about excitement and fun, but I think their [students] brains are always going. They always want to be engaged in one way, shape or form."

Student Participation in Teaching and Learning. In the 21st century, collaboration and critical thinking is paramount. Teachers are engaging students by including them in the teaching and learning process. The skill of flexibility and humility becomes important as teachers attempt to push the limits of their knowledge base related to technology integration for the sake of engaging their students. The participants of the study indicated a level of comfort handing over control to the students as they explored and solved technology issues that may have arose. Students are coming to classes with a wealth of knowledge and the sample group recognized that engaging their students sometimes meant allowing them to lead. Participant Q described how students gravitated to the technology as a means of communication. She explained,

> It grabs the kids' attention. It's their world. They're the digital natives. They don't know anything different. It may sound a lot easier in many ways. I know that. I can be at a soccer game and I can check my school email and answer questions like that for kids. I know when in the past they always had to wait for the next day, or the kids are so…they're expecting that, they're ready for that and I think it's made school easier for a lot of us who are willing to accept technology and integrate it.

Students are staying engaged in their work because they can get direction and support more readily in the 21st century. Participant E said, "If there's a way the kids can incorporate technology to create…I'm very open where a kid will say 'Can I try this app to use or this

program or this website.'" Participant L shared, "If we're in class and they have a question, instead of asking me, they Google it. They bring that knowledge to the whole group. It expands their knowledge a lot. They're not dependent on just what I know."

Teacher Connections with Students. Students are seeking a connection with their teachers which technology can instill and motivate. Participants indicated that students were comfortable with teachers when they were honest about technology questions. The students also appreciated that they had an opportunity to teach the teacher. Barriers between teachers and students suddenly faded away because teachers allowed themselves to be taught and make a positive connection with their students.

The 21st century teacher is no longer the "sage on the stage", leading lessons and handing out knowledge to their attentive students. The interviewees described moments when students increased their confidence and standing in class because the teacher needed assistance or support. Participant E shared, "A kid came with an error message in a program we were using for vocabulary. I said, 'I have no ideas. Let's look it up and figure it out.'" Participant G explained, "…the other day I asked the students, 'Can you show me how to do this on the computer?' I find that I'm thoroughly confident [to accept student help] …"

Participant H described situations while collaborating with students to solve a problem. He said,

> A problem may arise that you don't necessarily know the answers to. You and the student and their peers may need to problem solve to push it forward. With or without technology, unexpected things will happen and you may not always know the answers. You need to be comfortable with that. And comfortable with asking the students, 'Hey, Suzie got stuck on the third step here. Does anyone know how to fix it?'

Participant I explained, "I think they like it when the teacher says, 'Well, let's give it a try. It might not be, well, we can re-evaluate it next time.'…I think especially middle school, it makes that connection between you and the kids stronger."

Participants felt their teaching practices improved when positive connections with students and technology integration occurred. Participant L explained,

> Like I said, it has to do with that adventurous part. A lot of times, I'm learning as I'm going and I'll even put stuff out there to the kids. They'll teach me how to do it. I'll say, 'I want to do this, what do you think?' They'll help me. I think the skills [technology] are as important as just being open and patient.

Participant Q summarized the point well when she said, "The other thing is letting the kids be able to help you. They know so much. They often look at it from a whole different perspective and are able to jump right in."

Engaging Teachers. The participants in the study indicated that they were more successful users of technology when they were engaged and properly prepared to utilize it, which became the final theme. Cummings (2011) pointed out that teachers are adults, and as such, they should receive training based on adult learner characteristics. Jones and Dexter (2014) found that teachers should be trained at their level along with sessions led by a strong presenter of skills. They also reported that professional learning communities that reflect and collaborate on technology integration techniques were useful and effective. The findings of this study were consistent with Shaunessy's (2007) study, as she explained how strong training programs increased positive attitudes and progressive uses of technology integration. The following subthemes were developed in support of the engaging teachers theme: (a) professional development, (b) time, (c) flexible approaches, and (d) autonomy. Questions five, eight, eleven

and twelve elicited responses that connected to these references and the construction of this theme.

Professional Development. The interviewees discussed the need for engaging professional development that would provide them with ideas and build upon their knowledge so they could continue to engage their students. Some participants indicated negative experiences with one-size-fits-all professional development opportunities. In other words, their skill level made the professional development over-simplified or too challenging to learn. Participant A shared,

> Sometimes they [the district administration] expect…they'll present something in an hour and expect you to know it. I think we need professional development and we need the 'A' class and the 'B' class and the 'C class. They have to continue to follow-up and help us, even if they do it via email or something.

Participant G explained it this way, "I know it's going to cost more money, but have tiers. If you're a newbie, this is what you should be doing. If you're somewhat intermediate or advanced, this is what you should be doing." The sample group's perceptions generally indicated that teachers are more comfortable learning new technology with peers who shared similar experiences of knowledge and comfort.

Professional development must also include concepts and knowledge building that can be used immediately. Some members of the sample shared discontent with long professional development sessions introducing an excessive number of applications or hardware. Another issue interviewees described dealt with infrastructure (broadband systems or devices) issues that delayed the implementation of the training, and decreasing the desire to focus based on limited access. Participant J conveyed,

> Part of the problem with some of the professional development we've had is we have the new ideas, but then, the technology wasn't in place for us to use the ideas immediately. So, for me, with professional development, I need to be able to almost try it out immediately to see if it's going to work. Because there is so much going on, I will tend to put something on the back burner and forget about it. I'd rather be able to use something immediately.

Professional development should be inclusive of available support to respond to issues and discuss questions as they arise during practice and application times. Participant Q said, "I would love for people to come into our building and help, but I know that we all need different things. So, I'm not sure how we would be able to meet everyone's needs as a staff." Participant M shared,

> There's a ton of support with the school. They do the staff development; more and more they are including time to put it in practice. When they do that, very often, the person who is presenting in an area will help you work through it when you're trying to work with it.

Participant J described, "I think very small groups, people who have done the flipped classroom [teaching method], that they can walk you through pros and cons of it, and how it can best be utilized in a history classroom. How would it work best for them?" The group's perceptions led to the idea that regular support during and after professional development is vital to successful technology integration.

Some members of the sample discussed the idea of professional development being presented by the in-house teaching staff. This model saves money, but also allows colleagues to interact and collaborate while learning new ideas that are working in classrooms throughout their

buildings. This format provides guidance and leadership in technology, but also allows the presenter to reflect and better understand their efforts which may improve moving forward. Participant C explained

> I try to take away at least one thing from every professional development session that we've had. Some are more beneficial to me personally in my room than others, of course. Sometimes, because I tend to be the one who fixes things or trouble-shoots things for other teachers, it's like sometimes I feel like I'm one step ahead of all the other teachers. I'm trying to catch them up in professional development sessions. They're like, 'What are we talking about? What are we doing?' I'm like, 'Okay, this is where you're looking.' I'm almost like a mini teacher. It takes a while, but then there is something for me to take away usually from a session.

Participant H shared, "…being given the opportunity to present professional development as opposed to some districts have a model where they bring in outside people, people from Nearpod; that helps me grow." Participant M described,

> We go to these things and people present different things that they do and you come across ideas that maybe you didn't think of; you come across technologies and you think of ways you could use so many in class. That definitely has an influence, because it's a lot simpler to go to staff development, learn about two or three different technologies that you can use and then pick one that you really think works for something you want to do than to independently go out there and research all that stuff on your own.

Time. Every participant shared comments about time effecting their ability to engage new technologies and integrate them into regular use. The teachers believed that they learned and integrated more technology when given the time to explore and connect the new knowledge

to their specific content areas. The group described opportunities to hear about a certain topic or application and then go off either independently or collaboratively with colleagues and figure out how to make the new ideas work in their grade levels and content areas. Participant C explained,

> I was more into it [professional development] because it was new to me. It was something I hadn't played around with and clicked with. She was giving us time to search for ourselves and [see] what prompts might be good for the kids to write about.

Participant M said, "As far as staff development goes, increasingly, staff development is included time. Here's how this technology works; here's some time to work on it and use it."

Time is also an important factor when considering professional educators are trying to incorporate a lot of changing information with constantly changing methods of presentation. There is a delicate balance of respecting how much a teacher can fit into their professional day and what needs their students present in class. There is also a need to respect the knowledge levels of each participant so they can learn at their level in the given time. Participant K spoke about professional development opportunities not directly related to his work, but that is how the district expected him to spend his time. He said,

> …how am I going to use this in my class? I think that's a common complaint among most of my colleagues. All right, this is really cool, but how does this help me? I would want…I don't know, education, how it's set up now. I don't know that it's necessarily the best way. We compartmentalize things where you learn science in this class, and you learn math in that class, as if you're two different bowls. You learn as if they're two separate concepts or ideas, when they're really intertwined.

Participant G described time well spent as,

> I would want somebody who is really advanced, not just this is how you use Google Drive and here's the procedure. But, did you know there's also this part of Google that you can use that it's like hidden or secret or something that's above and beyond what is typically being shown. It's just not of value when it's the beginning stuff.

Participants described their districts as being more willing to allow autonomous use of time to find and participate in engaging professional learning. Participant H explained, "I think autonomy is the next step beyond choice, right? It is great and our district the last year or two has been good about reaching out to people and saying, 'Here are the sessions that are available, but if you want to do some kind of self-guided activity during this time, maybe you just need more time with Nearpod…"

Flexible Approaches. The participants shared a variety of flexible approaches that either positively impacted their professional development experiences or could have been successful if attempted. Participants described ideas like connecting with educators through Twitter communities or Google Hangout communities. They described experiences where they located YouTube videos that provided descriptions and had the ability to pause and repeat the knowledge until it was understood. Some participants described organizing professional developments according to ability level as previously discussed above. Every teacher learns in their own way, so it is important that they are provided engaging professional development and knowledge building opportunities that ultimately support student growth.

Creative approaches to engaging teachers is important at the middle school level because there are so many different subject area teachers who may provide trainings. Participant H shared,

> I've been in other ones [professional development] where the PE teachers are forced to be there and they don't have an application for their classroom, or it would be a stretch. Helping people to have a choice… [for] what they're learning about and also I think providing different choices at different levels of skill and involve them with something they can learn as well.

As budgets get tighter, participants found themselves going out on their own to build new knowledge. Participant I shared, "I tend to look for things online that I can do and take advantage of. I go to NCTM [National Council of Teachers of Math Conference] every year…A lot of times I learn new ways of teaching different things that I teach there, using technology." Some districts focused on differentiating training to engage teachers. Participant P explained, "If you want to learn this skill, we want to play with this topic, then we'll sign up for this workshop. That has been helpful because we seem more aware of what's out there, what's available." Participant K suggested, "…instead of professional development within our district or within our school, put the music teachers involved within the six districts [in the area] get together and do their professional development…"

Many participants described positive, engaging experiences with Google trainings. Participant Q indicated, "the Google Summit was awesome." Google Plus communities were also mentioned by participants as engaging opportunities to learn more about technology and share lesson ideas. Participant G explained,

> There are a lot of times you can Google 'I want a video teaching kids how to use a comma.' You try a million hits and a million of them could be bad. You have to find the diamond in the rough of what's going to work for your kids. I find that with so much on the Internet, you need to weed through the junk sometimes to find what you want. But, I

also think that comes with time and effort to know exactly how to, what you should be searching for.

Summary

Eighteen middle school teachers were interviewed in a semi-structured format using a grounded theory approach to inquire as to the skill levels, attitudes, and experiences with collaboration and professional development related to integrating technology. Demographic and descriptive statistics were reported for the questionnaire results, which indicated some emergent themes as they related to interview data. Word frequencies and coding patterns were discussed as well. The interview data were transcribed and coded using Initial Coding and Axial Coding techniques. The analysis of the data revealed five major themes including collaboration, knowledge building, positive support, engaging students, and engaging teachers. Fourteen subthemes were identified and described in detail to support conclusions for all of the three major research questions. The findings for each research question will be discussed in detail in chapter five, including implications and recommendations.

Chapter 5

Conclusion

This grounded theory study explored perceptions of middle school teachers related to their skills, attitude, experiences collaborating and professional development opportunities associated with integrating technology. Eighteen middle school teachers representing multiple disciplines (English, Math, Music, Science, Social Studies, etc.) were interviewed from January 2016 to February 2016, about their experiences integrating technology given the criteria that their students had regular access to devices and Internet. Interview data were analyzed to identify common experiences, characteristics, and skills that made these teachers successful at integrating technology.

This study was guided by the following research questions:

1) How does a teacher's comfort level with technology skills affect the amount of technology integration in classrooms?
2) How do teacher attitudes about technology integration impact usage in a classroom?
3) How do professional development and peer collaboration affect technology integration?

This systematic, qualitative research study utilized emergent grounded theory design to generate a theory "grounded" in participants' language (Creswell, 2013, p. 86). The study used a conceptual framework for social interactions that impact outcomes in social interactions known as Cultural Historical Activity Theory (CHAT) (Engeström, 2000). Finally, this study examined how leadership techniques impacted technology integration and how transformative leadership may provide positive educational reforms.

The core method used in this study involved semi-structured interviews to investigate perceptions and experiences of middle school teachers. Demographic data were gathered prior to

the interviews. All interviews were recorded, ranging in time from 18 minutes to 51 minutes. The interviews were informal conversations guided by open-ended questions that elicited experiences and perceptions in a comfortable manner.

The interview data were transcribed and imported into NVivo for Mac for content analyses. Initial coding was performed to develop nodes (codes or categories) from phrases, sentences, and paragraphs which identified a unique perception about the questions being posed (Saldaña, 2013, p. 100). First cycle coding began immediately after the first two interviews' data became available, and emergent themes were discovered right away. Over 90 codes were generated from all of the data in NVivo for Mac. Word frequency tests and content analyses were performed to narrow and group the codes into five themes, inclusive of 14 subthemes. Axial Coding was the second cycle coding process used to *reassemble* the 90 codes into themes and subthemes (Saldaña, 2013, p. 218).

Interpretation of Findings

After coding and analyzing the data, five emerging themes were identified: collaboration, knowledge building, positive support, engaging students, and engaging teachers. Seventeen subthemes were developed and described in support of the emergent themes. This analysis guided this researcher to draw conclusions based on the three research questions.

Research Question 1: How does a teacher's comfort level with technology skills affect the amount of technology integration in classrooms? A wide variety of skills were shared throughout the data collection process. Some instructors focused on skills specific to hardware such as a tablet or iPad. Those teachers also mentioned skills related to Web 2.0 applications like Google Classroom, Kahoot!, and Edmoto. Thirteen out of 18 participants made comments about non-technical skills such as comfort level, patience, risk taking, problem-

solving, effective communicator, life-long learner, a willingness to manage challenges, an adventurous attitude, a willingness to try, organization, and a motivation to learn as they related to technology integration. For example, one teacher said, "I think just basic technology skills and an adventurous attitude." Another teacher commented, "The biggest thing is being open and continue to try to educate themselves, have that curiosity factor that you want the kids to have where they're looking for something new, something different, because there's always something new." A third educator conveyed, "In terms of specific ones [skills], teachers need a self-problem solving type of drive." The following categories directly responded to the effects of skill knowledge and technology integration into a classroom:

1) Teacher's Responsibility
2) Student Participation in Teaching and Learning
3) Teacher Connections with Students

Teacher's responsibility. There appeared a need for educators to be self-learners and passionate students to regularly increase their knowledge about technology opportunities. The more veteran teachers recalled a time when school districts provided in-service training for all new knowledge teachers were expected to know. The newer teachers, along with the more tenured interviewees, commented that it was their responsibility to stay current and knowledgeable about technology without school district support. It was noted that the teachers appreciated any district support, however, the amount of time and speed required for the district to help educators stay current was too challenging. Thus, the teachers have evolved their skill acquisition set to stay attuned to appropriate technology skills that may enhance or support their teaching in the classroom. The researcher observed that teachers cannot wait for skills to be taught. Rather, they must learn the skills regularly and in their own time. This additional

requirement appeared to be an unwritten rule that each teacher indicated as vital to maintain student engagement. Increased student engagement is a product of integrating technology into the classroom (Downes & Bishop, 2012). It was observed that many teachers recognized the need to model modern technologies while moving away from older, 20th century techniques of presenting knowledge to their students.

Student participation in teaching and learning. Another piece of skill acquisition and comfort for teachers was their willingness to allow their students the opportunity to share and mentor skills with the participants. It was noted that many teachers expressed an awareness that their students, digital natives, came to school with a wealth of technology skills and experiences that could enhance and educate not only other students, but the instructors themselves. The teachers who described the characteristics of willingness and patience to learn also conveyed a need to allow students opportunities to lead and share their skills. This effort not only built teachers' skills for future use, but also built appropriate and necessary relationships with students who will one day need these skills outside of school. It was observed that the teachers who discussed students who they allowed to lead and support the class, also indicated that their schools or districts utilized them for professional development and coaching opportunities related to technology integration. Teachers who did not make comments about student leadership did not make mention of leading professional development opportunities.

Teacher connections with students. Learning skills is an appropriate and positive way that teachers are able to make valuable connections with their students. These connections create positive learning environments for teachers and students alike. It was observed that unique and technologically engaging activities were discussed by teachers who allowed students the opportunities to take a leadership role in skill development within classrooms. As previously

mentioned, teachers must be effective communicators and life-long learners. This study identified students as the teachers' instructors in many cases, which provided important lessons to the students about allowing skill knowledge to come from a variety of sources, not just teacher led opportunities. Teachers who integrate technology successfully appeared to manage the challenges of learning and teaching new skills in a productive manner along side their students.

Research Question 2: How do teacher attitudes about technology integration impact usage in a classroom? Several conclusions were identified with regards to teachers' attitudes and how those attitudes effected integrating technology. It was concluded that teachers integrate technology more often and in a positive manner when they receive specific supports and opportunities. Six categories of supports and opportunities were determined as follows:

1) Availability of Support
2) Leadership
3) Community Support
4) Professional Development
5) Time
6) Flexible Approaches

Availability of Support. The data showed that teachers' attitudes were generally positive when they felt resources were made available or people were willing to assist them with integrating technology. The study showed that regular opportunities to learn and work with colleagues on topics surrounding technology boosted confidence and were met with appreciation. It is interesting to note that many subjects conveyed that they did not receive regular professional development, but still appreciated individuals or administrators that supported their desire to build technology integration knowledge. The availability of support is intertwined with the other

key points as the amount of time, the approach to support and the leadership providing the support all played a part as teachers' attitudes developed over time. For instance, some data reported negative impacts on teacher attitudes when leadership did not supply effective assistance. Respectful and effective supports were noted as creating and maintaining positive attitudes.

Leadership. Many teachers described administrators who positively impacted their attitudes with regards to integrating technology. They conveyed situations where administration that created safe environments to try new ideas or methods enjoyed positive staff attitudes. Howard (2011) explained that teachers willing to problem-solve were able to overcome perceived risks more easily. This study concurred with her study as teachers who were led by flexible and supportive leadership described a great deal of positive attitudes and comfort levels with exploring and integrating more technology into their classrooms. Responsive leadership also positively impacted technology integration as it appeared teachers were more willing and interested in trying new methods while administrators constantly discussed or observed their efforts.

Community Support. It was evident that teachers in the study were more positive when the communities in which they taught supported their efforts. Communications from stakeholders in the various schools directly impacted the teachers and their desire to pursue more technology integration. For example, one participant discussed how the community expected technology to be integrated so their students can better understand the world outside of school, both for career purposes and social opportunities. Data indicated that subjects who felt the community was supportive were more positive than their peers who discussed negative situations within their communities. While it was reported that community impact was not critical, it is of interest to

note that some participants did share that their attitudes were generally impacted by the comments and actions of the community in which they taught. For instance, a group of teachers from one particular district discussed a vocal member of the community who spoke out against integrating technology as it would impact the budget and taxes. The teachers from that district indicated a desire to pursue technology integration and shared positive experiences. However, they all mentioned the community member in their interviews and were acutely aware that the district was behind in their efforts to integrate technology as compared to neighboring districts due to financial considerations based on the minority voice in the community.

Professional Development. The teachers in this study explained that professional development was a place they could either learn or share their knowledge and feel positive about the experience. The data pointed to the desire to have professional development that was appropriate for their individual skill levels as evidenced by participant comments discussed in Chapter 4. It was noticed that teachers who grew up with technology were more willing to lead professional development than their colleagues who were just starting to integrate technology into their classrooms. Many teachers discussed their desire to have the opportunity during professional development to try the material they were learning with the support of the professional development leader. It was suggested that teachers would be more positive if professional development met their needs in a tiered structure where novice teachers could work together while teachers with advanced knowledge could work with peers of like understanding. It was noted that some teachers had experienced and appreciated the opportunity to work with colleagues of similar ability.

Time. It was evident after interviewing teachers during the study that they appreciated and responded positively to any and all time to learn and prepare technology integration

opportunities for their colleagues or their students. Some teachers described situations when they were expected to perform immediately after receiving new technology. They conveyed a negative response to these expectations. The data indicated positive attitudes developed over the time teachers received to learn and collaborate with their colleagues. Even independent time to explore and apply new knowledge created positive outlooks on the integration of technology.

Flexible Approaches. It was noted that teachers who received flexibility in their efforts to learn new methods of integrating technology held positive attitudes. The teachers who used online communities like Google Hangouts, Twitter, and YouTube reported positive attitudes and were motivated to continue learning. As previously mentioned, teachers appreciated tiered professional development as they worked at their levels. It was also concluded that positive attitudes were commonly found in teachers who were provided guidance when needed rather than specific professional development that may or may not have been required by an administrator. It was noted that teachers who were not prescribed a particular form of learning appeared to have a more positive attitude as they were trusted to take advantage of various learning methods to enhance their knowledge.

Research Question 3: How do professional development and peer collaboration affect technology integration? There were several conclusions drawn related to professional development and peer collaboration associated with technology integration in middle schools. Seven categories of qualities middle school teachers should have to enhance effective technology integration are as follows:

1) Sharing Ideas
2) Motivation to Learn
3) Real-Time Learning

4) Sharing Knowledge
5) Skill Development
6) Positive Attitude
7) Independent Learning
8) Lesson Planning

Sharing ideas. It was noted that technology integration moved throughout middle schools after opportunities to share information occurred. Sharing may have happened in team meetings, at professional development opportunities, or simply in the hallways between classes or after the teaching day ended. The teachers described trust from their colleagues that motivated and supported regular transference of information throughout departments and entire middle schools. There are simply not enough professional development opportunities to share information, so informal sharing through peer collaboration appeared to be a vital key in the professional learning experience. Jones and Dexter (2014) found that middle school teachers who informally discussed technology experiences appreciated and learned from those opportunities because they were not restricted by specific sharing times or sessions. The findings in this study concur with those findings.

Motivation to learn. The participants in this study all provided data that indicated teachers in the 21st century must be self-motivated and creative in their approaches to learn engaging technology integration methods. Technology designed to present information to students has and continues to change constantly which requires teachers to regularly review and update their knowledge levels. New applications for Web 2.0 products that engage students are created and made available every month. It is imperative that teachers stay motivated to locate, evaluate, and

learn new technology integration methods. Self-motivation to collaborate and learn during professional development opportunities is a key quality of middle school teachers.

Real-Time Learning. Teachers who located and implemented real-time learning opportunities for their students reported positive professional reflections. Many teachers indicated that they learned about resources and methods of real-time learning from colleagues who had already tested the tools or found success with their own classes. Some participants conveyed the importance of real-time learning techniques because the devices and Internet should not be used as a simple notebook and pencil replacement. Learning to integrate real-time technology tools should be considered as a means to increasing knowledge. Teachers who collaborated about and utilized real-time learning were found to be successful middle school technology integrators.

Sharing knowledge. The sharing of knowledge happened organically throughout the study. Participants described opportunities to informally engage with their colleagues to increase their level of understanding. Whether it was during team meetings or discussions in the hallways after classes, teachers in this study discussed technology integration regularly to support one another and build knowledge. This process appeared to be unintended by the participants. They believed they were being supportive of colleagues with less knowledge or confidence related to the integration of technology. It was observed that the teachers' efforts to communicate are the foundation of knowledge sharing. Teachers are no longer waiting for formal faculty meetings or professional development opportunities. Reforming education needs to include informal opportunities for professionals to learn new knowledge in informal ways that effectively improve teaching techniques (Jones & Dexter, 2014). Teachers today are sharing knowledge over the Internet through Twitter and YouTube to help peers enhance their practice, and would do more if

they were given the chance to research and view materials independently or with colleagues more often. The act of knowledge sharing must remain informal, but the time to actually pass information between colleagues should be formalized.

Skill development. Another aspect of positive technology integration for teachers includes basic hardware and software understanding. This is challenging because their skill levels vary greatly throughout the middle schools according to the teachers. The teachers indicated successful opportunities to develop skills are flexible and well supported in small groups or on individual levels. Interpersonal skill development is also important to effective technology integration. It was noted that teachers must be comfortable with their abilities and be patient while learning new skills. It was also observed that teachers must be risk-takers to continuously try new technologies, effective communicators, life-long learners, willing to manage challenges, embody an adventurous attitude, organize their knowledge, and motivate their colleagues and students to learn through ever-changing technologies. Instructors who embodied these interpersonal skills conveyed success when discussing experiences about learning new technology concepts.

Positive attitude. The teachers all expressed the vast number of challenges posed throughout their teaching careers. It was observed that they maintained a positive attitude and did not fear failure when integrating technology. This positive attitude allowed them to work through issues and actively seek new knowledge by collaborating with their peers throughout their schools and local areas. Positive attitudes were affected by administrators' supportive efforts to motivate constant knowledge building and new practices. It was noted that well structured, supportive professional development built communities of positive teachers who felt

like they had learned important information and were then provided a person or people ready to provide support as needed.

Independent learning. Integrating technology requires a constant willingness of teachers to seek out and learn new methods of introducing and engaging students through presentations and interactive activities. It was observed that teachers who spent time actively researching activities and information on the Internet engaged their students more often. Further, it was noted that learning independently improved teacher attitudes because they felt productive and supportive of their students 21st century needs of collaboration and creativity in current mediums of information sharing. It was determined that teachers who spent independent time improved their own outlook on teaching methods with technology.

Lesson planning. It was evident that the teachers in this study focused on student outcomes first and foremost in their lesson planning. Technology was often integrated because the teachers recognized the increased level of participation and engagement of students. It was observed that lessons discussed by the teachers included a great deal of current information because the Internet provided real-time information and real-world situations that could be intertwined with the skills being taught. Lesson planning was noted to be time consuming as teachers moved away from scripted lessons and into interactive activities developed with Internet and technology based tools. It was noted that the time to plan decreased as understanding and comfort levels with technology increased. It is worth mentioning that lesson planning would be improved if schools were kept current with Internet speeds and hardware supports. It was observed that a great deal of planning time was spent preparing non-technology options in the case where the class was unable to access the Internet or if hardware failed to function during the class time.

Conclusions

There were many conclusions that could be derived by the analysis of these data. Research question one asks, how does a teacher's comfort level with technology skills affect the amount of technology integration in classrooms? The data indicated that teachers need to come to the job with the skills that allow them to continue to learn new things. Education has a vast array of information and content that teachers are expected to utilize. As evidenced by the data, and mentioned previously, a majority of participants discussed that risk-taking, problem-solving, life-long learning, a willingness to manage challenges, an adventurous attitude, and a motivation to learn are necessary traits of effective practitioners utilizing technology integration in middle schools. Teachers must be prepared to increase their skill set and integrate technology more as they build upon their knowledge base. It was also notable that each teacher that identified themselves in the younger two age ranges integrated technology into their lessons daily. These teachers had less than 20 years of experience teaching and maintained that technology is something the students will experience and need in their everyday lives inside and outside of their school days. These two groups of teachers strongly supported the idea of taking risks and managing challenges.

It is also important to include students in the process of learning new technology skills so they can share their knowledge. As previously mentioned, teachers today must accept that they will need to learn new technology skills to remain effective. Students possess some of that knowledge and observably enjoyed participating in the sharing of that knowledge. Collaboration is a key theme in 21st Century Skill sets. Allowing students the opportunity to present their knowledge and support teacher learning builds strong learning communities. This was

evidenced by several participants when they discussed learning new skills from their students during class activities.

Finally, teachers must develop their skills to connect with students in a technological world. The participants mentioned how easy it was to send their students to devices to engage in learning, but it diminished the teachers' ability to know their students on a personal level. Teachers should learn and model appropriate technology integration skills for their students while collaborating and getting to know their students utilizing technology as a medium of communication. The participants indicated that awareness of student ability and a willingness to allow those students to lead classroom activities through technology increased student engagement and growth. Appropriate technology integration also generates opportunities for students to improve their connections with teachers and peers alike.

Research question two asks, how do teacher attitudes about technology integration impact usage in a classroom? It was noted often that positive attitudes increased technology integration in classrooms. The availability of support was the most commonly mentioned source of positive attitudes in the various middle schools. As teachers felt support from colleagues, administrators, and professional development opportunities, their attitudes about technology integration improved. This was evidenced by the participants' discussions about their attitudes related to conversations and knowledge building opportunities previously discussed in Chapter 4.

A second observation indicated that time to locate, practice, and develop technology integration improved attitudes. This was evidenced by several teachers who mentioned that time gave them the opportunity to find comfort and confidence in the use of new technologies which then led to positive attitudes. The educators who were given or found the time to develop their

programming and felt good about it throughout the process indicated higher levels of success compared to their peers who did not integrate technology in similar manners.

Finally, flexibility in training was referenced as positively influencing attitudes. Teachers appreciated the respect shown by administration and professional development leaders who recognized the various levels of current knowledge before presenting new knowledge. This was evidenced by comments made by several participants who conveyed their experiences as discussed in Chapter 4. These experiences allowed the teachers flexible opportunities to learn that differed from professional development in previous years. For example, some respondents identified tiered professional development opportunities positively impacted teacher attitudes.

Research question three asks, how do professional development and peer collaboration affect technology integration? The most common response to this question was the opportunity to participate in informal collaboration to build knowledge and skills throughout the school year. This was evidenced by the 73 references compiled from the 18 interviews that indicated collaboration time increased and or enhanced technology integration. It was also mentioned that professional development was useful, but the amount of material to learn required more time than traditional professional development sessions provided. The participants indicated that they needed to speak with colleagues more to develop their skills and support their efforts outside of the provided sessions.

Another popular response related to professional development was the idea that direct instruction should be only a portion of the session. The participants conveyed that the remaining time should be opportunities to work on knowledge building at one's individual pace and with immediate supports to drive learning. The supports are important to maintain a positive experience. It was clear that teachers need time to work on relevant classroom needs and to

discuss experiences and develop ideas from those experiences rather than just focusing on the nuts and bolts of the hardware or software being presented.

Implications

Transformative leaders are constantly interacting with their organization and the people working within to enhance communication and productivity through subtle changes that respond to the group's needs (Collins & Halverson, 2009, p. 140). The results of this study indicate that subtle interactions between middle school teachers have major impacts on their ability and willingness to integrate technology. The teachers in this study were found to work collaboratively with one of their colleagues and were motivated to learn new methods of integrating technology. Their efforts were then shared through conversations and supportive interactions with school and district members attempting to improve their skills as well. Some of the participants rose to leadership positions as professional development presenters and team level supports providing information and ideas for fellow middle school teachers.

The interactions that teachers shared with this researcher about their skills impacted their attitudes about technology integration. Professional development opportunities were described as major opportunities to improve and support positive attitudes in middle schools. This study reported that strong, engaging knowledge building opportunities had positive effects on the interviewed educators and their perceptions of their colleagues. Nicoll (2014) indicated that positive social connections are important vessels to support and improve academic outcomes. In other words, teachers with positive attitudes will improve the chances of their students learning more information and performing better in their work.

Transformative educational leaders should get to know the teachers with whom they work to better understand their needs and develop methods of supporting those needs through

professional development and peer collaborations (Shields, 2010). As evidenced by this study, teachers are already speaking to one another between classes and after the school day. They are sharing ideas and methods related to the integration of technology throughout their courses and passing that knowledge along informally. Leadership should develop appropriate and regular opportunities during professional development time or throughout the school year, for teachers to interact and motivate one another to learn new skills, improve their attitudes about the constant influx of new technologies, and support one another on the journey to educating students in the 21st century. Professional development designers should consider methods of time management that efficiently convey information, but also allow teachers to explore the new knowledge in groups based on content, ability level, or independently as needed.

Recommendations for Action

Following careful analysis of these data, the following recommendations for action have been developed:

Professional development designers should establish learning opportunities that not only teach skills, but afford time to work with the new knowledge while receiving support. Teachers need opportunities to learn in whole group situations that provide opportunities to make direct connections with their curriculum and lesson planning as evidenced by the perceptions of the participants of this study. Educators then need support to apply the newly acquired content and skills immediately in order to integrate it into their classroom practices. There can be no assumptions by professional development leaders and administrators that once information is disseminated to the instructors that they are now experts. Time to practice with new hardware and software with direction and supports will enhance educational programing and instill a positive response by teachers. Every participant in this study indicated they utilize technology

regularly and facilitate student learning through technology. Both female and male participants explained that learning at their own speed with supports made integrating technology happen more efficiently and effectively.

Teachers need time to share experiences and disseminate ideas outside of formal professional development sessions. Collaboration in professional learning communities, grade level teams, departments, and even just pairs of teachers in the hallway after school will provide ideas and experiences that could support and motivate fellow teachers to try new methods or integrate more technology into their classrooms. Participants all concurred, no matter their subject area or grade level, that opportunities to explore and develop their technology skills benefit their students. Organized collaboration times would decrease the need for formal professional development and increase connections between teachers and the knowledge they possess (Jones & Dexter, 2014). Schools would be well served if they allocated time into teachers' schedules to meet regularly with the intention of connecting educators with real-life efforts to integrate technology. Engaging the teachers in their learning will transfer to the student population because the instructors' confidence and attitudes will likely be more positive and their willingness to try new things will increase.

Schools should support teacher efforts to learn and apply new ideas into their classrooms. A great deal of learning comes from failing to succeed. Once the teachers have more control and receive needed supports instead of regular evaluations of success, they will be more confident to explore and integrate more technologies (Cummings, 2011; Nicoll, 2014). Administrators and professional development designers should continue to work with their teachers and discuss experiences, emphasizing that all efforts are positive and something good can come from each attempt to integrate 21st Century Skills.

Recommendations for Further Study

This study produced a great deal of data related to skills, attitudes, professional development and collaboration of middle school teachers' experiences integrating technology. The comments collected provided valuable information about the focus of this study, but also indicated directions that future researchers may find useful to support technology integration at the middle school level. The following areas are offered for future research:

1. This study found that technical skills are only part of the necessary skills for effective technology integration in the middle school. Future studies might focus on interpersonal skills that exist in effective middle school technology integrators.
2. This study explored methods of skill acquisition for the integration of technology in middle school classrooms. This researcher found that skills that were supported by peers tended to develop throughout the schools. Future researchers might explore how administrators can structure time to promote collaboration.
3. Several teachers mentioned informal collaboration opportunities as vital to their technology understandings and skill acquisition. Future researchers might study how various methods of collaboration impact technology integration.
4. The teachers in this study described the impact their administrators had on their ability to comfortably integrate technology, whether positively or negatively. Future researchers might design a study that examines administrator actions that positively impact teachers' integration of technology.
5. Professional development was discussed at length throughout the interviews related to this study. Future research might investigate the efficacy of tiered professional development related to technology integration sessions.

Conclusion

This study explored how skills, attitudes, professional development and collaboration opportunities impact middle school teachers integrating technology. The data that emerged from the interviews provided a sketch of what a successful middle school teacher experiences while attempting to instruct their students with 21st Century Skills and modern technologies. This study presented several conclusions that would support increased technology integration, including professional development designers arranging sessions that teach and allow educators to use the technology, building time into instructors' days for collaboration and communication about technology integration, and supporting teachers while they attempt to alter their methods and increase the level of 21st Century Skills being used in their classrooms.

Professional development designers, administrators, and teachers can utilize this study to better understand how middle school teachers' skills can be developed and their attitudes improved and supported when integrating technology. These stakeholders can explore and compare the experiences presented in this study and make connections about the methods of increasing technology knowledge and usage by teachers of varying technological skill and experience. It is this researcher's desire to increase student learning by educating and supporting the teachers tasked with building knowledge in their classrooms when their training ends and the class eagerly waits to learn.

References

21st Century Readiness Act of 2011, S. 1175, 112d Cong. (2011).

21st Century Readiness Act of 2013, H.R. 347, 113d Cong. (2013).

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

American Heritage (2011). Dictionary of the English Language, Fifth Edition. Retrieved from http://www.thefreedictionary.com/in-service

Angell, K., & Tewell, E. (2013). Collaborating for academic success: A tri-institutional information literacy program for high school students. *Public Services Quarterly, 9*(1), 1-19.

Anthony, A. B. (2012). Activity theory as a framework for investigating district-classroom system interactions and their influences on technology integration. *Journal of Research on Technology in Education, 44*(4), 335-356.

Artefact, M. (2015). Two interacting activity systems as minimal model for third generation of activity theory--Engeström 1999. Retrieved from http://www.bath.ac.uk/research/liw/resources/Models%20and%20principles%20of%20Activity%20Theory.pdf

Association for Information and Image Management (2015). What is collaboration? Retrieved from http://www.aiim.org/What-is-Collaboration

Banas, J. R. (2010). Teachers' attitudes toward technology: Considerations for designing preservice and practicing teacher instruction. *Community & Junior College Libraries, 16*(2), 114-127.

Bellanca, J. A. (2010) Leading edge: 21st century skills: Rethinking how students learn. Bloomington, IN: Solution Tree Press.

Bennis, W. & Nanus, B. (2007). Leaders: Strategies for taking charge. New York, NY: Collins Business Essentials.

Berrett, B., Murphy, J., & Sullivan, J. (2012). Administrator insights and reflections: Technology integration in schools. *The Qualitative Report 17*(1), 200-221.

Blocher, J., Armfield, S. W., Sujo-Montes, L., Tucker, G., & Willis, E. (2011). Contextually based professional development. *Computers in the Schools, 28*(2), 158-169.

Bloomberg, L. D. & Volpe, M. (2012). Completing your qualitative dissertation: A road map from beginning to end. Thousand Oaks, CA: Sage.

Bourke, R, Mentis, M., & O'Neill, J. (2013). Using activity theory to evaluate a professional learning and development initiative in the use of narrative assessment. *Cambridge Journal of Education, 43*(1), 35-50.

Brown, R. (2011). Administration of technology: Teaching, learning, and resource management. In Rosemary Papa (Ed), Technology Leadership for School Improvement (chapter 3). Thousand Oakes, CA: Sage.

Bull, G., George, M., Shoffner, M., Bolick, C., Less, J., Anderson, J., Slykuis, D., Garofalo, J., Angotti, R., McKenna, M., West, E., Dexter, S., Herring, M., Hofer, M., & Brown, A. (2012). Editorial: Implementing the teacher education initiative. *Contemporary Issues in Technology and Teacher Education, 12*(2). Retrieved from http://www.citejournal.org/vol12/iss1/editorial/article1.cfm

Calvani, A., Fini, A., Ranieri, M., & Picci, P. (2012). Are young generations in secondary

school digitally competent? A study on Italian teenagers. *Computers & Education, 58*(2), 797-807.

Celano, D., & Neuman, S. B. (2010). Roadblocks on the information highway. *Educational Leadership, 68*(3), 50-53.

Chai, C. S., Koh, J. H. L., & Tsai, C. C. (2013). A review of technological pedagogical content knowledge. *Educational Technology & Society, 16*(2), 31-51.

Chen, C. (2011). Transforming online professional development: The design and implementation of the project-based learning management system (PBLMS) for in-service teachers. *British Journal of Educational Technology, 42*(1), E5-E8.

Chesbro, P., & Boxler, N. (2010). Weaving the fabric of professional development in the 21st century using technology. *Journal of Staff Development, 31*(1), 48-53.

Chow, B. (2015). Preface. In J. A. Bellanca (Ed.), Deeper learning: Beyond 21st century skills. (Preface). Retrieved from Ebrary ProQuest.

Clark, T. (2009). 21st century scholars. *Educational Leadership, 67*(1), 66-70.

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

Corbin, J. & Strauss, A. (2008). Basics of qualitative research (3rd ed.). Thousand Oaks, CA: Sage.

Creswell, J. W. (2013). Qualitative inquiry & research design: Choosing among five approaches. Thousand Oaks, CA: Sage.

Creswell, J. W. (2014). Educational research: Planning, conducting, and evaluating quantitative and qualitative research. Upper Saddle River, NJ: Pearson Education Inc.

Cummings, G. (2011). Investing in teachers to invest in themselves. *Journal of Adult Education,*

40(2), 19-23.

Darling-Hammond, L., & Bransford. J. (2005). Preparing teachers for a changing world; What teachers should learn and be able to do. San Francisco, CA: Jossey-Bass.

Diaz, D. P. & Bontenbal, K. F. (2000). Pedagogy-based technology training. In P. Hoffman & D. Demke (Eds.), Teaching and Learning in a Network World (pp. 50-54). Burke, VA: IOS Press.

Dilworth, P., Donaldson, A., George, M., Knezek, D., Searson, M., Starkweather, K., Strutchens, M., Tillotson, J., & Robinson, S. (2012). A framework for instructional innovation in the preparation of tomorrow's teachers. *Journal of Digital Learning in Teacher Education, 28*(4), 130-132.

Downes, J. M. & Bishop, P. A. (2015). The intersection between 1:1 laptop implementation and the characteristics of effective middle level schools. *Research in Middle Level Education Online, 38*(7), 1-16.

Downes, J. M. & Bishop, P. (2012). Educators engage digital natives and learn from their experiences with technology: Integrating technology engages students in their learning. *Middle School Journal, 43*(5), 6-15.

DuFour, R. (2004). What is a professional learning community? *Educational Leadership, 61*(8), 6-11.

Duran, E., Yaussy, D., & Yaussy, L. (2011). Race to the future: integrating 21st century skills into science instruction. *Science Activities: Classroom Projects and Curriculum Ideas, 48*(3), 98-106.

Engeström, R. (1993). Developmental studies on work as a test bench of activity theory. In

S. Chaiklin and J. Lave (Eds.) Understanding Practice: Perspectives on Activity and Context. New York, NY: Cambridge University Press.

Engeström, Y. (2000). Activity theory as a framework for analyzing and redesigning work. *Ergonomics, 43*(7), 960-974.

Engeström, Y. (2001). Expansive learning at work: Toward an activity theoretical reconceptualization. *Journal of Education and Work, 14*(1), 133-156.

Fadel, C. (2015). 21st century curriculum: A global imperative. In J. A. Bellanca (Ed.), Leading edge: Deeper learning: Beyond 21st century skills (chapter 8). Retrieved from Ebrary ProQuest.

Frost, J., Coomes, J., & Lindeblad, K. (2012). Partnership paves the way to college success: High school and college math teachers collaborate to improve instruction. *Journal Of Staff Development, 33*(5), 24-26.

Fullan, M. (2001). Leading in a culture of change. San Francisco, CA: Jossey-Bass.

Fullan, M. (2007). The new meaning of change (4th Ed.). New York, NY: Teachers College Press.

Gibbs, G. R., Clarke, D., Taylor, C., Silver, C., & Lewins, A. (2011). Introduction to CAQDAS, learning qualitative data analysis on the web. Retrieved from http://onlineqda.hud.ac.uk/Intro_CAQDAS/

Glaser, B. G. & Strauss, A. L. (1967). The discovery of grounded theory: Strategies for qualitative research. Chicago, IL: Aldine Publishing Company.

Gorder, L. M. (2008). A study of teacher perceptions of instruction technology integration in the classroom. *Delta Pi Epsilon, 50*(2), 63-76.

Gray, L., Thomas, L., & Lewis, L. (2010). Teachers' use of educational technology in U.S.

public schools: 2009 (NCES 2010-040). National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education. Washington, DC.

Heo, G. M. & Lee, R. (2012). Blogs and social network sites as activity systems: Exploring adult informal learning process through activity theory framework. *Educational Technology & Society, 16*(4), 133-145.

Hew K. F. & Brush, T. (2007). Integrating technology into K-12 teaching and learning: Current knowledge gaps and recommendations for future research. *Educational Technology Research and Development, 55*(3), pp. 223-252.

Hixon, E. & Buckenmeyer, J. (2009). Revisiting technology integration in schools: Implications for professional development. *Computers in the Schools: Interdisciplinary Journal of Practice, Theory, and Applied Research, 26*(2), 130-146.

Hofer, M., & Swan, K. O. (2006). Technological pedagogical content knowledge in action: A case study of middle school digital documentary project. *Journal of Research on Technology in Education 41*(2), 179-200.

Howard, S. K. (2011). Affect and acceptability: exploring teachers' technology-related risk perceptions. *Educational Media International, 48*(4), 261-272.

ISTE (2015a). ISTE standards. Retrieved from http://www.iste.org/standards

ISTE (2015b). Project reimagined. Retrieved from http://connect.iste.org/communities/community-home?CommunityKey=cab064c9-11bd-4e9f-a89c-1cda5754da9a

ISTE (2015c). Standards for teachers. Retrieved from http://www.iste.org/standards/iste-standards/standards-for-teachers

Jerald, C. D., (2009). Defining a 21st century education. Center for Public Education.

Retrieved from http://www.cfsd16.org/public/_century/pdf/Defininga21stCenturyEducation_Jerald_2009.pdf

Jones, W. M. & Dexter, S. (2014). How teachers learn: the roles of formal, informal, and independent learning. *Educational Technology Research Development, 62*(3), 367-384.

Kale, U. & Goh, D. (2012). Teaching style, ICT experience and teachers' attitudes toward teaching with web 2.0. *Education and Information Technologies 19*(1), 41-60.

Kaptelinin, V. (2015). Activity theory. Retrieved from https://www.interaction-design.org/literature/book/the-encyclopedia-of-human-computer-interaction-2nd-ed/activity-theory

Kay, K. (2009). Middle schools preparing young people for 21st century life and work. *Middle School Journal, 40*(5), 41-45.

Koehler, M.J., & Mishra, P. (2009). What is technological pedagogical content knowledge? *Contemporary Issues in Technology and Teacher Education, 9*(1), 60-70.

Koehler, M. J., & Mishra, P. (2010). What is technological pedagogical content knowledge (tpck)? In M. Herring and P. Mishra (Eds), Handbook of Technological Pedagogical Content Knowledge (TPCK) for Educators (chapter 1). Retrieved from ProQuest Ebrary.

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.

Kotter, J. (2012). Leading change. Boston, MA: Harvard Business Review Press.

Kuyatt, A., Holland, G., & Jones, D. (2015). An analysis of teacher effectiveness related to technology implementation in Texas secondary schools. *Contemporary Issues in*

Education Research, 8(1), 63-70.

Laferrière, T., Hamel, C., & Searon, M. (2013). Barriers to successful implementation of technology integration in educational settings: A case study. *Journal of Computer Assisted Learning, 29*, 463-473. DOI: 10.1111/jcal.12034

Larson, L. C., & Miller, T. (2011). 21st century skills: Prepare students for the future. *Kappa Delta Pi Record, 47*(3), 121-123.

Levin, T. & Wadmany, R. (2008). Teachers' views on factors affecting effective integration of information technology in the classroom: Developmental scenery. *Journal of Technology and Teacher Education, 12*(2), 233-263.

Lim, C. P. (2002). A theoretical framework for the study of ICT in schools: A proposal. *British Journal of Educational Technology, 33*(4), 411-421.

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

Merriam-Webster (2015). Integration. Retrieved from http://www.merriam-webster.com/dictionary/integration

McLeod, S. A. (2014). Lev Vygotsky. Retrieved from www.simplypsychology.org/vygotsky.html

Minshew, L. & Anderson, J. (2015). Teacher self-efficacy in 1:1 iPad integration in middle school science and math classrooms. *Contemporary Issues in Technology and Teacher Education, 15*(3). Retrieved from http://www.citejournal.org/vol15/iss3/science/article1.cfm

Mouza, C. (2011). Promoting urban teachers' understanding of technology, content, and pedagogy in the context of case development. *Journal of Research on Technology in*

Education, *44*(1), 1-29.

National Technology Leadership Coalition (2015). NTLC home page. Retrieved from http://ntlcoalition.org/index.html

Nicoll, W. G. (2014). Developing transformative schools: A resilience-focused paradigm for education. *The International Journal of Emotional Education*, *6*(1), 47-65.

Ottenbreit-Leftwich, A. T., Brush, T. A., 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 prating teachers align in their use of technology to support teaching and learning? *Computes & Education, 59*(2), 399-411.

Partnership for 21st Century Skills (2015a). 21st century readiness act. Retrieved from http://www.p21.org/our-work/advocacy/21st-century-readiness-act

Partnership for 21st Century Learning (2015b). Assessment of 21st century skills. Retrieved from http://www.p21.org/storage/documents/Assessment092806.pdf

Partnership for 21st Century Learning (2015c). Educators. Retrieved from http://www.p21.org/our-work/resources/for-educators

Partnership for 21st Century Learning (2015d). Framework for 21st century learning. Retrieved from http://www.p21.org/storage/documents/P21_framework_0515.pdf

Partnership for 21st Century Learning (2015e). P21 framework definitions. Retrieved from http://www.p21.org/storage/documents/docs/P21_Framework_Definitions_New_Logo_2015.pdf

Riordan, R., Caillier, S., & Daley, B. (2015). In J. A. Bellanca (Ed.), Leading edge: Deeper learning: Beyond 21st century skills (chapter 5). Retrieved from Ebrary ProQuest.

Rotherham, A. J., & Willingham, D. (2009). 21st century skills: The challenges ahead. *Educational Leadership, 67*(1), 16-21.

Saldaña, J. (2013). The coding manual for qualitative researchers. Thousand Oakes, CA: Sage.

Sardone, N. B., & Devlin-Scherer, R. (2010). Teacher candidate responses to digital games: 21st-century skills development. *Journal of Research on Technology in Education, 42*(4), 409-425.

Schrock, K. (2015). SAMR and Bloom's. Retrieved from http://schrockguide.net/samr.html

Schrum, L. & Levin, B. B. (2013). Teachers' technology professional development: Lessons learned from exemplary schools. *TechTrends, 57*(1), 38-42.

Shaunessy, E. (2007). Attitudes toward information technology of teachers of the gifted: Implications for gifted education. *The Gifted Child Quarterly, 51*(2), 119-135.

Sherman, T. M., Sanders, M., & Kwon, H. (2009). Teaching in middle school technology education: A review of recent practices. *International Journal of Technology and Design Education, 20,* 367-379. DOI: 10.1007/s10798-009-9090-z

Shiftingthinking (2015). The knowledge age. Retrieved from http://www.shiftingthinking.org/?page_id=58

Shields, C. M. (2010). Transformative leadership: Working for equity in diverse contexts. *Educational Administration Quarterly, 46*(4), 558-589.

Shulman, L. S. (1986). Those who understand: Knowledge growth in teaching. *Educational Researcher, 15*(2), 4-14.

Sindberg, L. K. (2014). Perceptions and perspectives of music teachers in urban settings: isolation, conversation and collaboration. *Music Education Research, 16*(4), 387-403.

Snoek, M. (2013). From splendid isolation to crossed boundaries? The future of teacher education in the light of activity theory. *Teacher Development, 17*(3), 307-321.

Stickney, J. (2006). Deconstructing discourses about 'new paradigms of teaching': A foucaultian and wittgensteinian perspective. *Educational Philosophy and Theory, 38*(3), 327-371.

Storz, M. G., & Hoffman, A. R. (2013). Examining responses to a one-to-one computer initiative: Student and teacher voices. *Association for Middle Level Education, 36*(6), 1-16.

Techopedia (2015a). Digital immigrant. Retrieved from https://www.techopedia.com/definition/28139/digital-immigrant

Techopedia (2015b). Digital native. Retrieved from https://www.techopedia.com/definition/28094/digital-native

Terhart, E. (2013). Teacher resistance against school reform: Reflecting an inconvenient truth. *School Leadership & Management, 33*(5), 486-500.

The Glossary of Education Reform (2013). Professional development. Retrieved from http://edglossary.org/professional-development/

Thomas, T., Herring, M., Redmond, P., & Smaldino, S. (2013). Leading change and innovation in teacher preparation: A blueprint for developing TPACK ready teacher candidates. *TechTrends, 57*(5), 55-63.

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

U.S. Department of Education, Office of Educational Technology (2014). The future ready district: Professional Learning through online communities of practice and social

networks to drive continuous improvement, Washington, D.C.

U.S. Department of Education, Office of Educational Technology (2010). Transforming American education: Learning powered by technology, Washington, D.C.

Vocabulary.com (2015). Interaction. Retrieved from http://www.vocabulary.com/dictionary/interaction

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

Westberry, N. & Franken, M. (2015). Pedagogical distance: Explaining misalignment in student-driven online learning activities using activity theory. *Teaching in Higher Education, 20*(3), 300-312.

Wetzel, K., Wilhelm, L., & Williams, M. (2004). The introductory technology course: A tool for technology integration. *Contemporary Issues in Technology and Teacher Education, 3*(4), 453-465.

Wright, V. H. & Wilson, E. K. (2011). Teachers' use of technology: Lessons learned from the teacher education program to the classroom. *Southeastern Regional Association of Teacher Educators Journal, 20*(2), 48-60.

Appendix A – Phone Interview Protocol

Phone Interview Protocol

The following questions guided this study:

Research Question #1 -

How do skill sets affect the amount of technology integration in a classroom?

Research Question #2 -

How do attitudes about technology integration impact usage in a classroom?

Research Question #3 -

How do professional development and peer collaboration affect technology integration?

Warm-up question:

Please tell me about your experiences with technology in your classroom.

Research Questions

1. What skills do you believe a teacher should have to integrate technology into their classrooms? (for example: email, data collection and organization, Internet access, cloud computing, mobile technology, web development, spreadsheet development) Q1
2. Describe your attitude about integrating technology into your classroom. Q2
3. Describe your comfort level with your current skills related to educational technology (for example: Chromebooks, Internet apps, Skype, Hangouts). Q1
4. How do your technology skills affect your integration into curriculum? Q1
5. Please describe how lesson planning for technology integration impacts your instruction. Q3

6. Explain experiences in your career as a teacher that may have influenced your attitude(s) about integrating technology into your curriculum. Q2
7. Describe how you learn new skills to use in your classroom with or for students. Q1
8. Focusing on professional development opportunities, describe how they have impacted your technology integration. Q3
9. Please describe professional development that would take you to the next level. Q1, Q2, Q3
10. Please describe how your attitude about technology integration has changed or developed over the course of your middle school teaching experience? Q2
11. How has your attitude been affected by the student population or community? Q2
12. Please explain how discussions with your colleagues impact your technology integration? Q3
13. What supports do you receive to integrate current or new technology into your lessons? Q3
14. Describe the level of administrative support you have received in your organization. Q2, Q3

Wrap-Up Questions:

Do you have anything else you would like to add?

Appendix B – Demographic Questionnaire

Demographic Questionnaire

Select your gender.

- Female
- Male

What is your age range?

- 22-33
- 34-45
- 46-57
- 57 or older

How many years have you been teaching?

- 1-10
- 11-20
- 21-30
- 31 or more

How many years have you been teaching middle school?

- 1-10
- 11-20
- 21-30
- 31 or more

What is the grade configuration of your middle school?

- 5-8
- 6-8
- 7-8
- Other

What grade(s) do you teach?
Click all that apply.

- 5
- 6
- 7
- 8
- Other

What subject(s) do you teach?

- Art
- English
- Foreign Language
- Health/PE
- Industrial Arts
- Math
- Music (Instrumental or General)
- Science
- Social Studies
- Other

How often do you integrate technology into your classroom lessons?
Integration might be student directed work, teacher prepared visuals utilizing a computer and or video projector, Web 2.0 applications, or any other type of presentation or learning activity that utilizes technology.

- Daily
- Weekly
- Infrequently
- Never

What best describes your current practice of using technology in instruction?

- I seldom use technology to deliver instruction.
- I almost exclusively use whole group presentation style either using an interactive whiteboard, PowerPoint or other instructional software to explain or demonstrate concepts or instructions.
- I often use whole group presentation style, but sometimes facilitate students in their use of a variety of information resources and hands-on activities.
- I almost exclusively facilitate student learning by encouraging students to use information resources and hands-on activities.

How often do your students utilize technology in your classes?

- Daily
- Weekly
- Infrequently
- Never

How much technology does your school supply the students?

- 1 to 3 labs for the school
- 1 to 3 labs per grade level
- Every student has a device
- Students provide their own devices

This survey includes questions from the Minnesota Department of Education's Technology - Instructional Practices Survey and the State Educational Technology Directors Association Teacher Survey with permission.

Appendix C – Adult Consent Form

UNIVERSITY OF NEW ENGLAND
CONSENT FOR PARTICIPATION IN RESEARCH

Project Title: Middle School Teachers and Technology Integration Barriers
Principal Investigator(s):

Yona Andrew Rose, Doctoral Student,
University of New England,
Contact Information - yrose@une.edu, 215-489-2899,
Faculty Advisory – Steven Moskowitz
Contact Information – smoskowitz@une.edu, 860-631-7838

Introduction:

- Please read this form. You may also request that the form is read to you. The purpose of this form is to provide you with information about this research study, and if you choose to participate, document your decision.

- You are encouraged to ask any questions that you may have about this study, now, during or after the project is complete. You can take as much time as you need to decide whether or not you want to participate. Your participation is voluntary.

Why is this study being done?

- The purpose of this study is to identify the causes or lack of barriers that middle school teachers experience as they integrate technology into their classrooms. Data collected will be used to develop a theory about professional development techniques that will support technology integration and minimize issues experienced by teachers attempting to learn and execute technology usage in their classrooms.

Who will be in this study?

- You have been identified as an acceptable participant in this study because you are a classroom teacher with access to computers or laptops for each student during your instruction. You have access to the Internet for information and tools to include in your instruction. You are also a member of a middle school staff with a grade configuration including or between grades 5th to 8th.
    - You must be at least 18 years of age to participate.
    - There will be approximately 15 participants involved.

What will I be asked to do?

- You will be asked to complete a brief questionnaire including demographic data and technology integration experience. Participants will be contacted via telephone and asked to answer questions about their teaching practices and experiences related to technology integration. Interviews will last for approximately 15 to 30 minutes. During the interview, participants will be asked to answer questions honestly. There will be no compensation for participation in this project.

What are the possible risks of taking part in this study?

- There are no foreseeable risks associated with participation in this study. If you become uncomfortable with interview questions, please bring this to the investigator's attention and every effort will be made to ease the discomfort. Should you wish to end your participation in this study, your request will be granted immediately.

What are the possible benefits of taking part in this study?

- There are no direct or immediate benefits to you for participating in this study. You may enjoy the benefit of reflection during or after the interview process. The reflection process may provide you a sense of pride or motivation to utilize good techniques of technology integration. There may be benefits to professional development designers attempting to help teachers learn new technologies and incorporate those technologies into classrooms. This research may also help administrators better understand teacher experiences with technology and provide them a chance to reflect on their expectations and interactions with teachers with regards to technology integration.

What will it cost me?

- There are no costs to participants in this study.

How will my privacy be protected?

- You and your information will be coded so that no names will appear in the final report. All information collected will be stored on secure servers and disks with passwords and locked in a file drawer for the duration of the study.

- You may fill out the questionnaire anywhere you wish to control your privacy.

- Phone interviews will take place at a mutually convenient time. You should choose a time and place that makes you comfortable.

How will my data be kept confidential?

- This study is designed to be anonymous; this means that no one, can link the data you provide to you, or identify you as a participant.

- Please note that the Institutional Review Board may review the research records.

- A copy of your signed consent form will be maintained by the principal investigator for at least 3 years after the project is complete before it is destroyed. The consent forms will be stored in a secure location that only members of the research team will have access to and will not be affiliated with any data obtained during the project.

What are my rights as a research participant?

- Your participation is voluntary. Your decision to participate will have no impact on your current or future relations with the University of New England as a student or employee.

- You may skip or refuse to answer any question for any reason.

- If you choose not to participate, there is no penalty to you and you will not lose any benefits that you are otherwise entitled to receive. You are free to withdraw from this research study at any time, for any reason. If you choose to withdraw from the research, there will be no penalty to you and you will not lose any benefits that you are otherwise entitled to receive.

What other options do I have?

- You may choose not to participate.

Whom may I contact with questions?

- The researcher conducting this study is Yona Andrew Rose. For questions or more information concerning this research you may contact him at 215-489-2899 or yrose@une.edu. His faculty mentor is Steven Moskowitz, Ed. D. and he can be reached at 860-631-7838 or smoskowitz@une.edu.

- If you choose to participate in this research study and believe you may have suffered a research related injury, please contact Steven Moskowitz, Ed. D. at 860-631-7838 or smoskowitz@une.edu.

- If you have any questions or concerns about your rights as a research subject, you may call Olgun Guvench, M.D. Ph.D., Chair of the UNE Institutional Review Board at (207) 221-4171 or irb@une.edu.

Will I receive a copy of this consent form?

- You will be given a copy of this consent form.

Participant's Statement

I understand the above description of this research and the risks and benefits associated with my participation as a research subject. I agree to take part in the research and do so voluntarily.

Participant's signature or Legally authorized representative — Date

Printed name

Researcher's Statement

The participant named above had sufficient time to consider the information, had an opportunity to ask questions, and voluntarily agreed to be in this study.

Researcher's signature — Date

Printed name

Appendix D – Invitation to Participate in the Study

Study Title: Middle School Teachers and Technology Integration Barriers

Dear _____,

I would like to introduce myself to you. My name is Yona Andrew Rose. I am a doctoral candidate in the Education Department at the University of New England. I am conducting a research study as part of the requirements of my degree in Educational Leadership, and I would like to invite you to participate. _____ gave me your name as a potential participant.

I am studying barriers that may exist for middle school teachers when they integrate technology into their classrooms. Participation is confidential. Study information will be kept in a secure location. Participation is anonymous, which means that no one will know what your answers are.

If you decide to participate, you will be asked to complete a brief questionnaire and participate in a phone interview. In particular, you will be asked questions about your skills and attitudes related to technology integration. We will also discuss your perceptions of how your colleagues or administrators have impacted your use of technology within your classroom. The phone interview will take place at a mutually agreed upon time, and should last about 15 to 20 minutes. The interview will be audio taped so that I can accurately reflect on what is discussed. The tapes will be professionally transcribed and then only reviewed by me as I analyze them. They will then be destroyed.

You may feel uncomfortable answering some of the questions. You do not have to answer any questions that you do not wish to answer. You may terminate your participation in the study at any time or decide not to answer any question you are not comfortable answering. Although you probably will not benefit directly from participating in this study, I hope that others in the educational community in general will benefit by the creation of

professional development that helps teachers overcome potential barriers to effectively integrating technology.

I will be happy to answer any questions you have about the study. You may contact me at 267-261-4591 or yrose@une.edu or my faculty advisor, Steven Moskowitz, 860-631-7838, smoskowitz@une.edu, if you have study related questions or problems. If you have any questions about your rights as a research participant, you may contact the UNE Institutional Review Board at 207-221-4171.

Thank you for your consideration. If you would like to participate, please reply to this email with some times you are available to speak on the phone after 3:15 pm and the school building in which you teach. Please read the attached consent form, print the last page, and sign it. When you receive a self-addressed, stamped envelope from me, please place the signed signature page of the consent form inside and mail it back to me as soon as possible. You may complete the questionnaire at your convenience. Please find a link to the survey below my signature. I will contact you within a week of your email to set up a specific phone interview time. Please do not hesitate to ask any questions.

With kind regards,

Yona Andrew Rose

4073 Holly Way
Doylestown, PA 18902
267-261-4591
yrose@une.edu

Questionnaire - http://goo.gl/forms/I1GeiFL24g

Appendix E – IRB Approval

Institutional Review
Board Olgun
Guvench, Chair

Biddeford Campus
11 Hills Beach Road
Biddeford, ME 04005
(207)602-2244 T
(207)602-5905 F

Portland Campus
716 Stevens Avenue
Portland, ME 04103

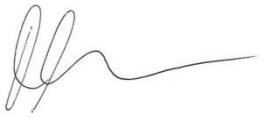
To:	Yona Andrew Rose
Cc:	Steven Moscowitz
From:	Olgun Guvench
Date:	December 17, 2015
Project # &Title:	121415-012, Middle School Teachers & Technology Integration Barriers (Initial)

The Institutional Review Board (IRB) for the Protection of Human Subjects has reviewed the above captioned project, and has determined that the proposed work is exempt from IRB review and oversight as defined by 45 CFR 46.101(b)(2) & (b)(4).

Additional IRB review and approval is not required for this protocol as submitted. If you wish to change your protocol at any time, you must first submit the changes for review.

Please contact Olgun Guvench at (207) 221-4171 or oguvench@une.edu with any questions.

Sincerely,



Olgun Guvench, M.D., Ph.D.
IRB Chair

IRB#: 121415-012

Submission Date: 12/12/15
Status: Exempt, 45 CFR 46.101 (b)(2) & (b)(4)
Status Date: 12/17/15