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Dr. Paula Dawidowicz, Committee Member, Education Faculty
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Chief Academic Officer
Eric Riedel, Ph.D.

Walden University
2017

Abstract

Overcoming Pedagogical, Social/Cultural, and Attitudinal Barriers to Technology

Integration in K-5 Schools

by

Lisa Durff

MA, Shippensburg University, 2002

BS, Wilson College, 1993

Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Educational Technology

Walden University

May 2017

Abstract

Technology engages and increases academic achievement for K-5 students, but teachers face attitudinal, social/cultural, and pedagogical barriers when they integrate technology for student learning. Although some teachers overcome these barriers, it remains unclear how they do so. The purpose of this qualitative multiple case study was to analyze the attitudes and behaviors of 3 groups to determine how some teachers successfully overcame barriers to technology integration. The conceptual framework included Bandura's social cognitive theory and Ertmer's theory on second order barriers to technology integration. Participants were drawn from each of 3 schools in the northeastern United States. Data included interviews from 3 groups of 2-3 classroom teachers, 1 administrator, and 1 technology integration person. Data were analyzed using open coding to identify rich themes and patterns. The findings showed that a triadic force of administrators, technology support, and teachers worked together to positively influence technology integration. Strategies included providing appropriate professional development, building collegial support and sharing among teachers, training teachers to locate relevant technological resources, and establishing value and support for the use of technology for learning. The present study may contribute to positive social change by increasing the knowledge of barriers preventing integration of technology into K-5 classrooms, and by providing information that will allow teachers, administrators, and technology integration personnel to implement strategies that reduce and overcome these barriers.

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Dedication

I dedicate this dissertation to my friend, mentor, and chair, Dr. MaryFriend Carter, to Nik, and to Danielle. These people have continually supported me during this academic adventure, listened to my ranting, and encouraged me to keep going.

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I would like to thank Walden faculty and my friends who have helped me throughout my doctoral journey. This list includes Dr. MaryFriend Carter, Dr. Paula Dawidowicz, Dr. Gary Lacy, Danielle Dabrowski, Victoria Davis, as well as many other faculty and friends too numerous to mention.

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Chapter 1: Introduction to the Study

This study addressed overcoming barriers to technology integration in the classroom and examined three categories of barriers: attitudinal barriers, social/cultural barriers, and pedagogical barriers that have obstructed successful integration into elementary classrooms in rural northeastern schools.   Researchers have shown that teachers do not integrate technology (Ertmer et al. 2012; Guzey & Roehrig, 2012; Jimoyiannis, Tsiotakis, Roussinos, & Siorenta, 2013; Morgan, Humphries, & Goette, 2015; Perkmen, Antonenko, & Caracuel, 2016). Researchers have also shown that student achievement improved when technology was integrated into instruction (Cifuentes, Maxwell, & Bulu, 2011; Eliot & Mikulas, 2012; Shapley, Sheehan, Maloney & Caranikas-Walker, 2010; Sheehan & Nillas, 2010). Research was therefore needed to find out how teachers can successfully overcome barriers to technology integration.

Although first-order barriers were largely overcome in the United States, many teachers failed to integrate technology into the classroom (Elliot & Mikulas, 2012; Ertmer & Ottenbreit-Leftwich, 2013; Parker, Bonney, Schamberg, Stylinski, & McAuliffe, 2013). Because researchers concluded that integrating technology can raise student achievement, lowering barriers to integration became an important topic for school administrators. The connection between technology integration and increased student achievement suggested a need to lower the barriers to technology integration faced by classroom teachers. Because second-order barriers intertwined to affect how and when technology was used in the classroom for student instruction (Holden & Rada,

2011), this study focused on those teachers who successfully overcame barriers to technology integration.

Chapter 1 includes a synthesis of current research on barriers to technological integration, the problem statement, and the purpose of the study. A discussion of Bandura's social cognitive theory and Ertmer's groundwork in establishing first order and second order barriers follows. Chapter 1 includes a rationale for the nature of the study. Definitions of pertinent terms are listed and assumptions necessary to the context of the study are described. The scope of the study was defined, along with limitations of the study design. The chapter ends with a discussion of the significance of the study and the implications for social change.

Background

First-order barriers to technology integration were lowered in the United States, but second-order barriers have persisted (Ertmer, 1999). These second-order barriers included attitudes, social environments, and cultural landscapes, as well as pedagogical methods (Ertmer, 1999). While access to technological tools increased, many teachers continued to not integrate technology tools into their classroom teaching. Second-order barriers continued to be obstacles to technology integration in classrooms across the United States (Ertmer et al., 2012; Ottenbreit-Leftwich et al., 2010).

Personal attitudes held by teachers about learning and teaching influenced technology integration (A-zaidiyeen & Mei, 2010; Ertmer et al., 2012; Howley, Wood, & Hough, 2011). Decuir (2012) and Alharbi (2013) found personal attitudes did not influence technology integration. The Horizon Report stated 8% of teachers integrated

technology in 2010. Elliot and Mikulas (2012) researched 1000 middle school students in the Midwest United States and noted that student achievement was higher when teachers integrated technology into the classroom.

The surrounding social environment and the local culture influenced the integration of technology (Ames, 2017; Ertmer & Ottenbreit-Leftwich, 2010; Kaba & Osei-Bryson, 2013; Richardson & McLeod, 2011). Researchers concluded that administrative support for technology integration and the school's technology policy affected teacher confidence and subsequent technology use (Al-Mashaqbeh, 2012; Aldunate & Nussbaum, 2013; Blackwell, Lauricella, & Wartella, 2014; Kopcha, 2012; Orlando, 2014). Aldunate and Nussbaum (2013) remarked that teachers are less likely to adopt technology in the absence of early adopters of technology and Kaba and Osei-Bryson (2013) noted in their study of 740 cell phone users in Guinea and Quebec that the acceptance and use of a technology was culturally dependent.

Technology integration was influenced by pedagogical methods in many studies (An & Reigeluth, 2011; Aslan & Zhou, 2016; Ball & Dias, 2014; Chai, 2010; Guzey & Roehrig, 2012; Koehler, Mishra, Kereluik, Shin, & Graham, 2014).   How Technological Pedagogical Content Knowledge (TPCK) affected the pedagogy of teacher candidates was the topic of several studies and is discussed in greater length in Chapter 2 (Abbitt, 2011; Anderson & Groulx, 2013; Haley-Mize, 2011; Hsu, 2013). A teacher's pedagogical methods are influenced by their TPCK (Ball & Dias, 2014; Efilt & Çoklar, 2013; Mouza & Karchmer-Klein, 2013). Professional Development workshops offered to in-service teachers increased the amount of technology integration in many studies

(Ertmer et al., 2014; Pan & Franklin, 2011; Liu, 2011; Rienties, Brouwer, & Lygo-Baker, 2013; Skoretz & Childress, 2012). Alignment of teacher beliefs about teaching and learning changed pedagogical styles and subsequently technology integration in studies, moving from teacher-centered strategies to learner-centered strategies (Chai, 2010; Chien, Wu, & Hsu, 2014; Sadaf, Newby, & Ertmer, 2012).

Researchers have found that technology integration is influenced by attitudes, social contexts and the surrounding cultural environment, as well as pedagogical styles. A connection between technology integration and increased student achievement has been shown (Eyyam & Yaratan, 2014; Glassett & Schrum, 2009; Styron & Styron, 2011). The majority of teachers continued not to integrate technology even though first-order barriers have been overcome (Elliot & Mikulas, 2012; Ertmer & Ottenbreit-Leftwich, 2013; Parker et al., 2013). My study will contribute to filling the identified gap by providing knowledge about how teachers overcame barriers to technology integration. By identifying how teachers overcame second order barriers, results better equip administrators in K-5 rural schools to provide appropriate supports which include professional development activities targeted at lowering these second-order barriers and helping more teachers successfully overcome barriers to technology integration.

Purpose Statement

The purpose of this qualitative multiple case study was to identify how elementary school teachers in one rural northeastern district overcome attitudinal, social/cultural, and pedagogical barriers that prevented them from integrating technology into their classrooms for student learning.

Research Question

How do K-5 teachers overcome barriers to technology integration in one rural

northeastern district?

Subquestions

1. How do K-5 teachers overcome attitudinal barriers to technology integration in

   one rural northeastern district?

2. How do K-5 teachers overcome social/cultural barriers to technology integration

   in one rural northeastern district?

3. How do K-5 teachers overcome pedagogical barriers to technology integration in

   one rural northeastern district?

Conceptual Framework

The conceptual framework for this research study included the social cognitive

theory of Bandura and groundwork by Ertmer (1999) on barriers to technology

integration. According to social cognitive theory, there is an interrelationship between

internal and external factors that work together to influence behavior. Bandura's (1986)

theory can be visualized as a triangular model with personal, behavioral, environmental

factors interacting to determine a person's actions. No one factor influences behavior, but

three influences interact with each other to produce visible behavior. These three factors

are behavioral influences, social/environmental impacts, and personal factors. The

barriers to technology integration perceived by educators are influenced by these same

factors Bandura delineated in his social cognitive theory. Bandura's theory is explored in

greater depth in Chapter 2 through a review of current literature. Bandura's theory

further explained the attitudinal, social/cultural, and pedagogical barriers to technology

integration through an explanation of the reciprocal influences on behavior.

Ertmer (1999) defined first order barriers as involving those external to educators.

This included access to technology, Internet connections, and training to use the

technology. Ertmer claimed these first order barriers were overcome in the United States.

Second order barriers continued to obstruct integration of technology into classrooms

across the country. These second order barriers were internal to educators and involved

attitudes, surrounding social connections, cultural attitudes about teaching and learning,

and pedagogical methods used in classrooms. A more detailed explanation of Ertmer's

ideas is explored through a review of current literature in Chapter 2. Her work on

barriers to technology integration clarified the attitudinal, social/cultural, and pedagogical

barriers to technology integration as second-order barriers impeding technology

integration in the United States.

Nature of the Study

The multiple case study design was chosen to increase analytic conclusions drawn

from each of the three cases. Yin (2013) suggested cases in a multiple case study be

chosen to replicate or contrast results and to increase analytic conclusions drawn from the

results. Analytic generalizations drawn from results may be applicable to other situations

where teachers grapple with how to overcome barriers to technology integration.

This study investigated how teachers overcame barriers to technology integration

in one rural northeastern district. Data collected during the interviews focused on the

three research questions of the study, namely the attitudinal barriers, social and cultural

barriers, and pedagogical barriers to technology integration faced by K-5 teachers in one rural northeastern district. In order to study the research questions, a smaller sample size of five people in each of three cases provided in-depth insights and reflections. Yin (2013) suggested that analytical generalizations can be drawn from qualitative data, and linking the data to the study's conceptual framework clarifies the themes, concepts, and patterns in the data.

This qualitative multiple case study research focused on three schools or cases. Within each school, three teachers, one technology support person (titles vary between schools), and one administrator were interviewed to triangulate the data. Each case contained five people located in each of the three schools studied. The multiple-case sampling of similar cases of K-5 teachers in one rural northeastern district enhanced the confidence of the study results (Miles, Huberman, & Saldaña, 2013)

Definitions

Attitudinal barriers: Teachers' values about using technology for student instruction (Ottenbreit-Leftwich, Glazewski, Newby, & Ertmer, 2010).

First order barriers: External factors that include access to the Internet, technology, and training to use it (Ertmer, 1999).

Second order barriers: Internal factors that include educators' attitudes surrounding the use of technology in the classroom, the surrounding social atmosphere and cultural traditions, and the pedagogical practices of educators (Ertmer, 2012).

Social/Cultural barriers: The surrounding social context and the culture of the school which impedes technology use in the classroom for student learning (Ertmer & Ottenbreit-Leftwich, 2010).

Pedagogical barriers: Beliefs about learning, teaching, and teaching methods, either teacher-centered or student-centered, that impede the use of technology in the classroom for student learning (Liu, 2011).

Technology integration: "Sustainable and persistent change in the social system of K-12 schools caused by the adoption of technology to help students construct knowledge" (Belland, 2009, p. 354).

Assumptions

It was assumed that participants answered interview questions honestly and that they were not coerced to participant in the study. It was further assumed that participants could accurately describe the barriers to technology integration which they perceived in their teaching situations and how they overcame those barriers.

Scope and Delimitations

The study was bounded by the rural population of educators who have taught in one rural northeastern district. This group was chosen because this geographical area contained very few teachers who successfully integrated technology. Those few teachers who overcame barriers were chosen for participation in this study. Administrators nominated elementary teachers who successfully integrated technology. Results may be transferable to similar populations and may inform further research on barriers to technology integration. The intent of this qualitative study was to identify attitudinal,

social/cultural, and pedagogical barriers that prevent K-5 teachers in one rural northeastern district from integrating technology into their classrooms for student learning. This study did not intend to offer solutions for overcoming barriers to technology integration, but to elucidate those barriers which rural educators face.

Limitations

This study was framed by the K-5 educational environment and took place in a one rural northeastern school district. Each of the three cases included an administrator, an integration specialist, and two to three classroom teachers. The K-5 education profession in the Northeast is mostly female. The small sample size drawn from one profession in one region of the country limited the statistical generalizations that can be made. The participants were drawn from one rural northeastern school, and this may limit the transferability to schools in other contexts, countries, or urban and/or suburban locations.

The aim of this study was to discover how K-5 educators overcame second-order barriers to technology integration in their classrooms. The study sought to discover analytical generalizations using social cognitive theory. Yin (2013) supported the use of analytical generalizations in case study research and the analytical generalizations drawn in this study may be useful in the identification of second-order barriers that K-5 educators might perceive in other locations.

Significance

This study contributed to filling the identified gap by providing knowledge about how elementary teachers overcame barriers to technology integration. By identifying

how a sample of this population was able to overcome barriers, administrators in K-5 rural schools are better equipped to provide professional development activities targeted at overcoming those barriers for all educators. While other studies used samples from urban schools, this study investigated how barriers were overcome by rural K-5 classroom teachers. The first-order barriers identified by Ertmer (1999), involving access, support, and user skills, have been lowered in most urban schools in the northeastern portion of the United States (Ertmer et al., 2012).   Barriers to technology integration that remain are second-order barriers.

This study advanced the profession by increasing the knowledge about how end-users overcame barriers to technology integration. To lower those barriers for all teachers, educational technologists need to know how teachers who have overcome those barriers have done so. In 1998, the US Department of Education stated that only 5% of teachers in the United States integrated technology into their classrooms. Fourteen years later, Kopcha (2012) found few teachers integrating technology into their classrooms. By focusing on the perceptions of rural K-12 classroom teachers, the study uncovered how educators overcame attitudinal, cultural, and pedagogical barriers that prevented these teachers from integrating technology into their classrooms.

Summary

Overcoming first-order barriers has not increased integration of technology in K-5 classrooms. Second order barriers according to Ertmer et al. (2012), continue to obstruct teachers from integrating technology. With the removal of external barriers, examination of remaining barriers has been made clearer. This study questioned how teachers

overcame barriers that hindered them from integrating technology into their classrooms. Because studies focusing on K-5 classrooms in rural districts in the northeastern portion of the United States have been sparsely reported in the literature, the findings from this study help to fill that gap and point to interventions that may lower barriers in these classrooms and subsequently raise student achievement.

Chapter 2: Literature Review

The National Center for Education Statistics reported that 97% of rural public K-12 teachers had at least one computer in their classroom. They reported that only 8% of students used technology during a lesson to contribute to a blog or wiki, and only 23% used technology during a lesson to create artistic, musical, or video artifacts (Gray, Thomas, Lewis, Tice, & National Center for Education Statistics, 2010). Hao and Lee (2015) found in their survey of 200 Taiwanese middle school teachers, that most teachers had little knowledge of Web 2.0 integration for student learning. First-order barriers, according to Ertmer (1999), are those external to the educator or the existence of the technology in the school. The above statistic suggests this barrier has been removed in the United States. Ertmer suggested there were a second-level of barriers to technology integration. Therefore, this study looks at those barriers as defined by Ertmer of attitudinal, social and cultural, and pedagogical obstacles. Specifically, this study looks at impediments to integrating technology into K-12 classrooms in rural northeast United States.

Ertmer (1999) distinguished first-order barriers from second-order barriers, defining first-order barriers as those external to teachers and second-order barriers as those internal to teachers. Ertmer (2012) claimed it is these second-order beliefs about learning and teaching that determine how and how often teachers use technology for student instruction. As Howley, Wood, and Hough (2011) pointed out, research into technology integration in rural schools has focused on middle schools and high schools.

The one exception they discovered is the 2007 study by Knezek and Christensen (2007) of first and second grade classrooms in rural Texas.

It is known that technological barriers obstruct K-12 teachers, both urban and rural, from integrating technology into their classroom instruction (An & Reigeluth, 2011; Brenner, A. M., Brill, J. M., & Tech, V., 2013; Challoo, Green, & Maxwell, 2010; Ertmer et al., 2012; Holden & Rada, 2011; Kopcha, 2012). Several studies used samples of middle school or high school teachers (DeCuir, 2012; Holloway, 2012; Frick, 2012). Other studies focused on other regional areas in the United States (Brenner et al., 2013; Challoo et al., 2010; Daily, Cotten, Gibson, Howell-Moroney, & O'Neal, 2013; Dartt, 2011; Holden & Rada, 2011; Kim, Kim, Lee, Spector, & DeMeester, 2013; Lewis, 2010). While Frick (2012) used a sample drawn from southern Pennsylvania, he studied participants from a secondary school.

Ertmer et al. (2012) used a sample of technology using teachers rather than those teachers who have not integrated technology into their classrooms despite removal of first-order barriers in this country. DeCuir (2012) found a connection between higher-order thinking skills and technology integration. Eliot and Mikulas (2012) found that teachers who integrated technology into their classrooms increased student achievement for the students in their classrooms. The purpose of this study is to increase understanding of perceived barriers to technology integration and possible interventions to lower those barriers for teachers in northeastern school districts.

Literature Search Strategy

A search of the academic databases at the Walden University's Library was conducted to identify resources on the topic of technology integration in K-12 rural schools from 2010 through 2013. Specifically, those databases included ProQuest, ScienceDirect, ERIC, Education Research Complete, SAGE, EdiTLib, the Dissertations and Theses Database, and Expanded Academic. In addition, several Google Alerts using the Boolean search strings were set up as well as ProQuest/EBSCO alerts within the Walden University Library Databases. Boolean searches also uncovered pertinent studies in Google Scholar, Mendeley, and Research Gate.

The initial searches used two search terms: *teacher attitudes* and *technology* returned over 3000 studies. Terms were added to limit the results, namely *K-12* and *rural*. This Boolean search string identified several studies done outside of the United States. The search term *NOT USA* is added. Further limiting the search to those studies published in the last four years returned results to no more than 106 per database. Substituting *social* or *cultural* and *pedagogical* for *attitudes* in the search string for the other two research questions is used in those searches.

Articles in peer-reviewed journals have established credibility within a field of experts. Reviewers have checked the research validity and reliability, as well agreement with experts in the field. Whether a journal used a peer-review process is checked using the Walden Library's Verify Peer Review tool, which connected to Ulrich's Periodical Directory. This tool enabled evaluation of research studies by peer reviewers, whether the studies were quantitative, qualitative, or mixed methods. The quantitative research

reviewed focused on measurable features while qualitative research reviewed focused on experiential facets. All three research traditions grew out of differing philosophical roots and all three required the reader to trust the researcher. The key terms in searches included: *teacher attitudes, technology, k-12, rural, third order barriers, K-12 rural teachers, USA, technology integration,* and *barriers.* The following terms were paired with *teacher attitudes*: *technology, K-12, rural, barriers, third order barriers, attitudinal barriers, pedagogical barriers, social barriers, cultural barriers, technology integration,* and *second-order barriers.*

Conceptual Framework

The conceptual framework which informs this study includes the social cognitive theory of Bandura (1977) as well as groundwork laid by Ertmer (1999) on the barriers to technology integration.   Bandura's theory suggested a relationship exists between internal and external factors that work together to influence behavior. Ertmer examined the barriers to technology integration over the past two decades and identified first and second order barriers to technology integration that inform my study.

Bandura's Social Cognitive Theory

Looking through the framework of social cognitive theory clarifies this study's three research questions and makes sense of the data gathered in this study. According to Bandura's (1989) social cognitive theory, people develop mental maps which guide their behavior. He envisioned three forces, or points on the map, which interact to influence behavior: behavioral influences, social/environmental influences, and personal factors. Bandura claimed people can determine and change their own behaviors. He also stated

that people do not act solely because of external or internal forces, but that there is a reciprocal interaction of forces that together result in behavior. Bandura thought because people can determine their own behaviors, they can accept these behavior changes and incorporate them into who they are as human beings.

Bandura's (1977) theory explained the causation of behavior as a reciprocal model involving the environment, personal factors, and past behavior. Other theorists explained the causation of behavior using a linear model, as in Skinner's Behaviorism where behavior was attributed to the environment, or Freud's Psychoanalytic theory that attributed behavior to the individual subconscious, or Piaget's Cognitivism that attributed behavior to the intellect. Unlike these one way linear models, Bandura used a threefold reciprocal model. All points in the model acted upon each other simultaneously resulting in behavior. Bandura did not view this interaction as one or the other proposition but considered that all influences worked on behavior at the same time in triadic reciprocal causation of behavior.

Bandura (1999) admitted the influence that past behaviors exert upon present behaviors. He included those behaviors that are observed in others as influencing our present behavior and noted certain behaviors had positive results and were readily adopted while others had negative or undesirable results and were ignored. Bandura claimed, "People do things that give them satisfaction and a sense of self-worth, and refrain from actions that evoke self-censure" (1999, p. 27). Bandura noted that modern digital technologies provided opportunities for observations of modeled behaviors on a global scale. Observation of behavior was not limited to the immediate vicinity, but

included a global community. The viewed behaviors often were manipulated to produce

desired behaviors in populations as in family planning, the status of women, or increased

knowledge of diseases (Bandura, 2002).

Not only are people influenced by forces around them, but they themselves

influence these forces (Bandura, 1977). The influence of the environment upon behavior

was not unidirectional noted Bandura, as in previous theories of behavior, but

bidirectional where the experiences generated by behavior influenced how a person

behaved and how a person behaved influenced their future behavior. This reciprocal

influencing was also true for social/cultural influences and for personal factors. The

influence of the social context and the cultural landscape around a person influenced their

behavior while at the same time their behavior influenced the social context and the

cultural landscape.

Bandura's (2002) article discussed cultural influences, and here he drilled down

further to define three cultural influencers of behavior: individual, acting on the behalf of

others, and acting together to influence the future. None of these influences are

unidirectional, but all are bidirectional and include Bandura's thoughts about self-

efficacy. Bandura (1977) felt humans can determine their behavior and life courses and

the measurement of how humans perceived this ability he coined self-efficacy. Bandura

(2002) extended efficacy beyond personal agency to proxy agency and collective agency.

The way in which humans believe they can affect their futures, the futures of

others, and the course of their culture were included in Bandura's (2002) thoughts about

efficacy. Collective beliefs influenced the futures people sought, how they used both

man-made and natural resources, and their cultural landscape. These ideas led into

Bandura's thoughts on observational learning, by which humans learned behaviors from

others who model cultural learning. Bandura stated that observational learning was the

process of social learning theory used to transmit behavioral, attitudinal, and

social/cultural learning. He emphasized the transmission of culture by means of

observational learning. The influences were considered reciprocal, operating

interdependently and not independently.   Because of this interplay of influences, social

cognitive theory elucidates my second research question concerning social and cultural

barriers to technology integration.

In 2005, Ertmer claimed that little research had been done on the topic of

pedagogy and technology integration. Many teachers are taught through observational

learning (Bandura, 1977) the perspectives of learning their instructors hold. These

paradigms of learning span a continuum from Behaviorism to Constructivism, in each

case educators are enculturated into a paradigm through their methods courses during

undergraduate work. Ertmer's views, as well as Bandura's, frame the research questions

in this study.

Ertmer's Second-order Barriers to Technology Integration

Ertmer (1999) claimed that first-order barriers, including access to technology,

connections to the Internet, and relevant professional development, were overcome in the

United States. Second-order barriers still exist and involve attitudes about teaching and

learning, the culture surrounding the educational environment and within the school

itself, and the pedagogical practices of the teacher. She noted that overcoming these

second-order barriers often involved change and with it discomfort of challenging one's

attitudes, society, culture, and pedagogy.

By using Bandura's social cognitive theory to examine second-order barriers to

technology integration, it is acknowledged (Bandura, 1989) that educators' behavior is a

result of the interaction of past behaviors, societal influences, and personal factors.

Behavior is not solely determined by the environment surrounding a person, as in

Behaviorism, where one's actions are a response to external stimuli. Nor is behavior

exclusively determined by the inner man as in Cognitivism, where behavior is steered

solely by thought and the mind. Bandura recognized the influences of the surrounding

environment, the mind, and one's own behavior on subsequent behavior. These three

influences interact to create subsequent behavior in a cyclical model, rather than a linear

model.

My central research question examines the perceptions of K-12 teachers in one

rural northeastern district concerning the barriers to technology integration from three

interacting factors: attitudinal factors, social and cultural factors, and pedagogical

factors. Those three factors formed the research questions of this study. The first

question looks at personal attitudes or beliefs about teaching and learning which act as

obstacles to technology integration (Alharbi, 2013; Ertmer, 2005; Celik & Yesilyurt,

2013). The second research question considers the beliefs of the surrounding society

which presented challenges to integrating technology (Aldunate & Nussbaum, 2013;

Ertmer & Ottenbreit-Leftwich, 2010; Miles, 2012). The third question considered

pedagogical practices, often entrenched into educators during undergraduate work, which

presented barriers to successful technology integration (Abbitt, 2011; Anderson & Groulx, 2013; Ertmer, 2005; Teo, 2009; Teo & Zhou, 2016; Tondeur, Pareja, Roblin, van Braak, Voogt, & Prestridge, 2016).

The first research question concerns how attitudinal barriers influence technology integration. Dartt (2011) discovered in a study of math teachers in a suburban school that attitudes did affect the use of technology but a positive attitude towards technology was not the sole factor in whether a technology was used in the classroom. Ertmer et al. (2012) in their study of 12 teachers who integrated technology found the attitudes of surrounding teachers affected both those teachers integrating technology and those resistant to integrating technology. Holden and Rada (2011) found that attitude influenced how teachers used technologies in the classroom in their study of 99 K-12 teachers from rural schools in Virginia. They concluded technology integration was affected by several factors, among them ease of use, perceived benefits of use, and intention to use. Although several studies in the literature used Ajzen and Fishbein's theory of reasoned action, this framework connects the attitudes of users with their technology usage, thereby exhibiting a relationship between internal attitudes and external technology usage. Challoo et al. (2010) in their quantitative survey of 70 teachers in rural south Texas confirmed attitudes do affect adoption of technology. Aldunate and Nussbaum (2013) in their quantitative survey of rural teachers in Chile linked Ajzen and Fishbein's theory with the Technology Acceptance Model (TAM3), both of which link attitudes with behaviors. Several researchers used the Technology

Acceptance Model (Cheung & Vogel, 2013; Gu, Zhu, & Guo, 2013; Mosley, 2013; Teo, 2009).

The second research question asks what social or cultural barriers to technology integration do K-5 teachers experience in one rural northeastern district. This question looks at the influence the surrounding social environment and local culture has on the technology integration of the classroom teacher. As Ertmer and Ottenbreit-Leftwich (2010) pointed out, it is school culture which has not changed to keep pace with information technologies. Peer pressure from surrounding teachers, traditional administrators, and everyone within the social context of the school influenced the individual teacher's decision to integrate technology for student learning.

Cultural beliefs are connected to surroundings, society, and learned pedagogical styles and are difficult to measure. Brodie (2009) wrote on the memes of culture as determining what beliefs became popular and which were short-lived. His contention was that strong memes determined culture and were difficult to oppose. Several researchers mentioned the strong pressure to conform to the cultural norms and the effect school culture had on individual teachers (Aldunate & Nussbaum, 2013; Ertmer & Ottenbreit-Leftwich, 2010; Hennessy, Ruthven, & Brindley, 2007; Miles, 2012). Miles (2012) went on to add that technology integration required a cultural paradigm shift away from the present lecture based lesson delivery system common in the schools of the United States to student based learning system. Mundy and Kupczynski (2013) claimed this culture of school needed to shift before technology could be successfully integrated in their study of schools in Mississippi. Richardson and Mcleod (2011) agreed with this

premise in their study of Native American Schools, extending the culture outside the school walls to include the surrounding society, in their case Native American tribes from across the United States.

The societal and cultural influences in part create the mental maps which guide behavior, as envisioned by the social cognitive theory of Bandura. Educators work within a strong culture that determines how they teach and learn, and surrounding that is the culture in which they live. These forces influence behaviors, and influence whether teachers integrate technology for student learning. How they were initially taught to teach students is another determinant of behavior.

The third research question examines pedagogical barriers to technology integration. Pedagogy is concerned with how to teach learners. Covered in an educator's undergraduate experience, many methods courses teach one pedagogical style. Researchers suggested that pedagogical barriers impeded technology integration into classrooms for student learning (Ertmer, 2005; Ertmer et al., 2012; Prestridge, 2012; Tsai & Chai, 2012).

Tsai and Chai (2012) noted that developing technological pedagogical content knowledge (TPACK) in preservice or in-service teachers might overcome this second-order barrier to technology integration. In Bandura's social cognitive theory, an individual's beliefs about their own abilities to integrate technology, the influences of teachers surrounding the individual, the culture in which the individual lives, and the pedagogical practices the individual has learned all interact to determine how often and how effectively that educator integrates technology.

Bandura (2002) described behavior as the result of three influencers: individual factors, influences from surrounding people, and the influence of the collective. Bandura's triangular model for behavior corresponds to the three influencers resulting in barriers investigated in this study: attitudinal barriers, social and cultural barriers, and pedagogical barriers. Bandura (2002) stated a blend of influences resulted in behavior, as Ertmer (1999) described a blend of influences which result in second-order barriers to technology integration. Ottenbreit-Leftwich et al. (2010) reiterated that teacher beliefs determine their uses of technology and that those beliefs are interactively determined by social connections, cultural landscapes, and pedagogical beliefs about teaching and learning. Previous researchers have also considered the threefold influence of personal cognitive factors, the surrounding environment, and subsequent behavior upon each other (Compeau & Higgins, 1995; Ertmer, 2005; Miles, 2012; Ottenbreit-Leftwich et al., 2010). Bandura (1986) claimed the three areas interactively influenced each other, and this is the basis of his social cognitive theory. According to the U.S. Department of Education in the Project Tomorrow report, 61% of elementary teachers overwhelmingly believe using technology increases the motivation of their students to learn content. Yet less than one-half of elementary teachers actually used technology to engage students in learning and 53% of students in grades K-12 report being engaged in learning. Ertmer (1999) reported that first-order barriers are largely overcome; this study will examine other influencing factors of teacher behavior – second-order barriers by addressing three research questions stemming from the central question: which barriers to technology integration impede K-5 teachers in one rural northeastern district. Identifying and

overcoming these barriers is important to increase student achievement in the United States.

Ravitch and Riggan in their book entitled *Reason and Rigor,* viewed a conceptual framework as "a critical lens" (2012, p.14) through which a study is viewed. Much like an art gallery wall, the conceptual framework provides the glue that holds the study together with other research studies of its kind. It is the framework upon which concepts are hung on the art gallery wall providing structure for the artwork hung there. This study will be held together by the social cognitive theory of Bandura and guided by the works of Ertmer.

Barriers to Technology Integration

It is known that technology barriers obstruct K-12 teachers, both urban and rural, from integrating technology into their classroom instruction (An & Reigeluth, 2011; Brenner et al., 2013; Challoo et al., 2010; Ertmer et al., 2012; Holden & Rada, 2011; Kopcha, 2012). In the 2011 Project Tomorrow report, the U.S. Department of Education found 61% of elementary teachers believed using technology increased the motivation of their students to learn content. But less than one-half of elementary teachers used technology in their classrooms to engage students in learning. The present study may contribute to social change by increasing the knowledge of barriers preventing integration of technology into the K-12 classroom. From this knowledge, strategies to lower these barriers may be designed.

This study looked at the problem of integrating technology into K-12 classrooms located in the rural northeast United States. Although first-order barriers have been

overcome in this country, second-order barriers still obstruct integration into classroom instruction (Ertmer & Ottenbreit-Leftwich, 2010; Ertmer et al., 2012; Mosley, 2013; Rogers, 2007). The National Center for Education Statistics reported that 97% of rural public K-12 teachers had at least one computer in their classroom. They reported that only 8% of students used technology during a lesson to contribute to a blog or wiki, and only 23% used technology during a lesson to create artistic, musical, or video artifacts (Gray, Thomas, Lewis, Tice, & National Center for Education Statistics, 2010). The findings may point to interventions that will lower barriers in K-12 classrooms and subsequently raise achievement.

This study will advance the profession by increasing the knowledge about the barriers end-users perceive. In order to lower those barriers, educational technologists need to know what those barriers are for teachers. In 1998, the U.S. Department of Education stated that only 5% of teachers in the United States integrated technology into their classrooms. Fourteen years later, Kopcha (2012) found few teachers integrating technology into their classrooms. By focusing on the perceptions of rural K-12 classroom teachers, this study will uncover the attitudinal, cultural, and pedagogical barriers that prevent these teachers from integrating technology into their classrooms.

Literature Review

A review of the literature found articles mentioning barriers to technology integration in rural K-12 schools. Ertmer (1999) divided barriers into first-order and second-order barriers. First-order barriers were characterized as those external to the teacher and second-order barriers as those internal to the teacher. The National Center

for Education Statistics reported in 2006 that 100% of public schools in the United States had connectivity (Wells, Lewis, & Greene, 2006). Because first-order barriers have been met in this country, Ertmer et al. (2012) turned attention to second-order barriers, claiming these determined how and how often teachers used technology for student instruction. Second–order barriers involved personal attitudes, the social and cultural climate surrounding a teacher, and the pedagogical beliefs held by a teacher.

My study includes three influences that affect technology integration: how attitudes affect technology use, the social connections and cultural landscapes that affect how educators implement technology in their classrooms, and the pedagogical backgrounds educators have learned to implement in their classrooms. These three factors influence integration behavior of any educator (Holden & Rada, 2011). Therefore, this review of literature surrounded these three areas: the attitudinal barriers, the social and cultural barriers, and the pedagogical barriers for rural K-12 teachers.

Attitudinal Barriers

Attitudes affect technology adoption (Celik & Yesilyurt, 2013; Challoo et al., 2010; Ertmer et al., 2012; Frick 2012; Kim, Kim, Lee, Spector, & DeMeester, 2013; Zehra & Bilwani,2016). Celik and Yesilyurt (2013), Teo (2009), and Tondeur et al. (2016) all studied the relationship between how preservice teachers felt about technology and how that affected their technology use. Celik and Yesilyurt (2013) included 471 Turkish preservice teachers in their quantitative study to determine the relationship between attitudes about technology and attitudes towards computer assisted instruction. In keeping with Bandura's (1986) theory of self-efficacy, they found the attitudes of the

preservice teachers determined their technology competence. While they did not

discover whether the attitudes of in-service teachers affected their self-efficacy in using

technology, other studies have looked at this question.

Teo (2009) in his study of 1094 preservice teachers in Singapore discovered that

self-efficacy attitudes affected technology integration. He noted that the literature lacked

connections between self-efficacy and the use of technology in the classroom. Teo

asserted that the intention to use technology is affected by one's pedagogical style and

one's comfort level with using a particular technology that affects what pedagogy is

chosen. As Bandura (1986) noted there is an interrelationship between internal factors

(self-efficacy) and external factors (pedagogical styles teachers were taught).

Challo, Green, and Maxwell (2010) studied in-service teachers in three rural

South Texan districts. They surveyed 70 teachers from three rural south Texan school

districts and found attitudes affected adoption of technology. The authors called for

further research to repeat the connections between attitudes and technology use. Their

study was limited by the rural sample used.   Using a suburban sample, Dartt (2011)

studied a school in southwestern United States and found that attitudes did affect the use

of technology, but technology was not always used in the same way among those

teachers that shared common attitudes. He determined that a positive attitude towards

technology use was not the sole factor in whether a technology was used in the

classroom.

Similarly, Kim, Kim, Lee, Spector, and DeMeester (2013) pointed out that teacher

beliefs about technology integration were tied to teacher beliefs about learning and

teaching in their study of 22 teachers in southeastern rural K-8 schools. The purpose of

their study was to identify whether pedagogical beliefs and technology integration beliefs

were correlated with each other. These authors found a significant correlation between

teacher beliefs and technology integration. In their discussion of the study, they noted

that teachers' pedagogical beliefs connected to teachers' technology usage but also those

teachers' technology skills (or TPCK) did not necessarily predict teachers' technology

usage.

Alharbi (2013) framed quantitative research in Ajzen's theory of planned

behavior. This theory claims attitudes stem from deep-seated beliefs couched in past

experiences and are therefore difficult to change. In interviews of five teachers in the

Midwest United States and five teachers in Saudi Arabia, Alharbi found the Saudi

Arabian teachers were still struggling with first-order barriers while the teachers in the

United States were grappling with second-order barriers. Despite that although teachers

acknowledged the benefits of integrating technology, they resisted integrating technology

into their own classrooms.

Ertmer et al. (2012) found the same relationship between attitudes and technology

use among 12 award-winning teachers. The beliefs of those surrounding the teachers in

the school and in the community affected whether and how often teachers integrated

technology into their classrooms. However, DeCuir (2012) found the opposite to be true

in his quantitative study of high school teachers when he found no significant relationship

between attitudes and technology integration. The urban teachers in his study

acknowledged a desire to integrate technology when surveyed but failed to follow

through on that integration in their classrooms. Although the low sample size made generalization to other situations difficult, Ertmer et al. wondered whether beliefs enabled or restricted technology integration for teachers who have low or zero technology literacy and what the barrier threshold was over which teachers could not go.

Ottenbreit-Leftwich et al. (2010) examined how teacher beliefs about technology affected technology use. In a study of eight award winning teachers, they noted attitudes did not always predict technology use in the classroom. They did find that teachers who espoused student-centered learning pedagogies did tend to integrate technology. Mama and Hennessy (2013) also found teachers' beliefs about technology affected their use of technology in the classroom. In their quantitative surveys of 11 primary teachers on the Mediterranean island of Cyprus, teachers answered survey questions about their technology integration with answers they expected surveyors wanted to hear. Then in the qualitative classroom observations, teachers inconsistently displayed technology integrations which they indicted in prior portions of the study. Beliefs about technology influence technology use but espoused intentions are not predicative of technology use in the classroom.

Using Bandura's theory on self-efficacy in which he claimed one must believe in one's capabilities to complete a task in order to do the task effectively (Bandura, 1986), Holden and Rada (2011) found that technology integration is affected by several factors, among them ease of use, perceived benefits of use, and the intention to use. Because they studied more than one technology, their study was unable to find whether technology

integration was affected differently when only one technology is studied. They surveyed 77 K-12 teachers from two rural schools in Virginia.

Aldunate and Nussbaum (2013) noted that early adopting teachers integrated new technologies into their classrooms faster than their peers. Their quantitative survey of teachers in Chile showed that more than beliefs about ICT use for teaching influences technology integration. They found a lack of early adopters' negatively affected ICT use and this indicates the influence the social surroundings and the cultural landscape have upon technology integration. Inan and Lowther (2010) found teacher beliefs were positively correlated with technology integration in a study of 1382 public school teachers in Tennessee. Their study echoed the finding in the literature that teacher beliefs do influence technology integration for student learning (Alharbi, 2013; Celik & Yesilyurt, 2013; Dartt, 2011; Ertmer et al., 2012; Kim, Kim, Lee, Spector, & DeMeester, 2013; Teo, 2009).

Not all studies agreed with this finding. Miles (2012) found in her quantitative study of 139 K-12 teachers no significant relationship between how often technology was integrated into classrooms and teachers' perceived ability, years of teaching experience, and type of technology. Dartt (2011) noted that attitudes are not the only influences upon ICT use. The following sections delve into this further with social/cultural influence and pedagogical influence.

Social and Cultural Barriers

Several themes emerged in the area of social contexts and cultural landscapes. The school culture, the administration's leadership, teacher's content area, and the

teacher's sense of self-efficacy were found to be influential in whether technology was integrated for student learning. The school community includes students, teachers, staff, and administrators. As noted by Ertmer and Ottenbreit-Leftwich (2010), school culture influenced classroom use of technology for student learning. Administrative leadership influenced teachers' use of technology (Al-Mashaqbeh, 2012; Augspurger, 2014; Li & Ni, 2010). Not only did school culture affect integration, but subject area influenced the integration of technology. Certain subjects lend themselves easily to the integration of digital technologies and as Reigeluth (2011) noted, some subject area teachers felt digital technologies were incompatible with their subject areas. The final theme to emerge in the literature was self-efficacy. Bandura (1989) claimed those who are confident in their abilities to do a certain task, "persist until they succeed" (p.48).

Ertmer et al. (2012) investigated whether teachers' beliefs affected their use of technology in their classrooms. The authors found that the beliefs of other teachers were the greatest barrier to the use of technology in a teacher's own classroom. In a study of 12 award-winning teachers, it was noted that beliefs about using technology for teaching and learning did align with technology integration practices. The technology using participants did not find their own attitudes to be barriers to technology integration however they did find the attitudes of other teachers in the school to be barriers.

Social influences interact with other forces to influence behavior (Bandura, 1977). The second research question is concerned with social connections and cultural landscapes that surround educators affecting when and how they implement technology into their classrooms. The educational community includes students, other teachers,

administrators and school staff, parents, potential employers, governmental agencies, service organizations, and retired citizens, each contributing influence on an individual teacher's behavior. Ertmer and Ottenbreit-Leftwich (2010) noted that most teachers use technology for personal or administrative tasks, but few integrate technology into their lessons for student learning.

O'Bannon and Thomas (2014) researched 1,095 teachers from the southeastern United States and found that those over the age of 50 perceived more barriers to integration of mobile phones than did their younger counterparts. They cited the National Center for Education Statistics report that stated 20% of teachers in the United States felt comfortable integrating technology for student learning. Ertmer and Ottenbreit-Leftwich (2010) suggested school culture as well as personal efficacy beliefs influenced integration of technology into the classroom for student learning. These authors claimed that teacher belief systems are made up of personal attitudes, surrounding social and cultural values, and pedagogical beliefs.

Mundy and Kupczynski (2013) called for a shift in technology paradigms in order for integration to be effective. They studied two school districts in Mississippi. Teachers and students increased their use of technology by relying on technology interns in each school to assist in integration. After the study, both districts reported 100% integration and the schools noted that faculty assisted each other more readily with integrations. This however did not mean pedagogical paradigms were shifted; only that technology was integrated on a daily basis. While Mundy and Kupczynski studied the effect teacher

interns had on teachers' use of technology for student learning, other researchers studied the effect of teachers' administrators on technology integration.

Augspurger (2013) found no relationship between an administrator's 21st leadership style including the use of technology and teachers' use of 21st century instructional skills. Augspurger used the national standards set by The International Society for Technology in Education (ISTE) against which to measure 21st century leadership styles and 21st century instructional styles. Although a positive relationship between administrator's leadership styles and teachers' instructional styles was anticipated, no such relationship was found in the study.

Al-Mashaqbeh (2012) on the other hand, found that administrative support was important in whether teachers incorporated technology into classroom instruction.   In a study of 203 Jordanian teachers, administrators who rewarded teachers for using technology influenced whether teachers continued to integrate and a lack of administrative recognition discouraged teachers from continued integration. These social connections influence teachers to use or discourage them from using technology in their classrooms. His conclusions were backed by the strongest form of evidence that administrative support influences technology integration.

 Iscioglu (2011) also noted the influence of administrators on technology use in the classroom. In a study of 98 teachers in Cyprus, the researcher found that principals had a positive impact on teachers who taught English when they included those teachers in planning. Iscioglu studied teachers who rarely used computers in teaching or lesson planning, contrasted with Ertmer et al. (2012) who studied technology using teachers. In

both cases, administrators influenced whether technology was used by teachers in their schools. Weng and Tang (2014) also noted administrative influence in their quantitative study of 382 administrators in Singapore. They concluded that effective administrators were more likely to encourage their teachers to integrate technology.

Hammonds, Matherson, Wilson, and Wright (2013) pointed out that technology integration initiatives often do not succeed because educators are not shown how to use technology for learning. As Holden and Rada (2011) suggested in their study of teachers in rural Virginia, a teacher's lack of self-efficacy in part determined whether that teacher used that tool. Ertmer et al. (2010) studied whether professional development offered to teachers by their administrators would increase teachers' sense of self-efficacy in a mixed methods study of 21 teachers in rural schools. Grounding the study in Bandura's theory of self-efficacy, they sought to discover whether instruction in project-based learning and STEM content would increase teachers' use of both in the classroom. They found that professional development workshops offered over one summer in both STEM and science content resulted in gains of content knowledge for all teachers, and that in-service teachers had the most gains in content knowledge. Strength of evidence could be increased by larger samples and classroom observations to verify that the instruction in PBL and STEM content was actually used by those teachers who took part in the study. Ertmer (2005) said the highest hurdles to technology integration in the classroom for student learning are teacher attitudes. These attitudes are not only affected by personal attitudes towards technology use in schools, the social environment, or the surrounding culture, but also are affected by the pedagogy educators have been taught to use in

classrooms.

Pedagogical Barriers

Pedagogical beliefs are often formed in undergraduate teacher education programs, by experiences in K-20 classrooms as students, and are interrelated to personal attitudes, the surrounding society including the school culture, and the cultural landscape. Just as Bandura's social cognitive theory contained three interconnecting factors which work together to influence behavior; attitudes, social/cultural influences, and pedagogical beliefs all work together to guide teachers' behavior. Pedagogical barriers are tied into folk beliefs about teaching and learning (Belland, 2009; Bruner, 1996; Markauskaite & Goodyear, 2014) formed through experiences as students, siblings, and parents involved with primary, secondary, and college classrooms. Many teachers teach as they were taught, in teacher-centered classrooms. Liu (2011) contended even teachers who have student-centered classrooms used teacher-centered activities like lectures when integrating technology. This section focuses on Technological Pedagogical Content Knowledge (TPCK), professional development offered to teachers in schools, and teacher values about teaching and learning.

As Bandura connected internal and external factors that combined to produce behavior, Ertmer and Ottenbreit-Leftwich (2010) noted that attitudes and values about teaching and learning are interconnected and therefore difficult to change. Ertmer (2005) considered teacher values to be the highest barrier to technology integration. Ottenbreit-Leftwich et al. (2010) in their qualitative study of eight technology using teachers in Michigan noted that teachers used technology in the classroom with students when they

valued the use of the technology for student instruction. Chai (2010) however found that teachers tended to use traditional knowledge transmission activities despite valuing the integration of technology. The author maintained that teacher values are expressed within the context of educational situations and this affects how technology is integrated. In his qualitative study of seven teachers in Singapore, Chai sought to discover how beliefs about knowledge affected beliefs about pedagogy for this population. Chai found that while teacher epistemic beliefs ranged from knowledge transmission to knowledge construction, all seven practiced knowledge transmission teaching styles. Chai further surmised that administrators and education leaders must become involved in the ICT reform process if teachers are to align epistemic beliefs with teaching practices.

Efilt and Çoklar (2013) studied 342 teacher candidates at Necmettin Erbakan University in Turkey. Using quantitative surveys, they compared the TPCK with teaching styles and found the two were moderately matched. The internal consistency reliability, measured by Cronbach's alpha (α) was .95, indicating adequate internal reliability and the test-retest reliability was .80 also indicating adequate reliability. The author's described teaching styles as an integration of the teachers' beliefs with learning activities in the classroom, concluding that teachers' TPCK influenced teaching styles.

Chien et al. (2014) agreed that teachers' beliefs and values affected their teaching styles. They maintained that teachers' values could dissuade them from integrating technology for student learning. In a qualitative study of 40 secondary science teachers in urban schools, Chien et al. sought to discover how attitudes affected technology use in the classroom. They found teachers' beliefs affected technology use for all the

participants; 85% of participants valued the use of technology and used it while the remaining teachers held negative beliefs and did not use technology. The teachers in the study self-reported their technology use and the authors believed further research using classroom observations could strengthen their findings. The TPCK framework is a theme repeated in the literature that describes the interplay of technological knowledge, pedagogical knowledge, and content knowledge. Teachers use a combination of all three factors to teach students choosing the most effective pedagogical methods, specific content, and most useful technologies. Haley-Mize (2014) sought to develop TPCK in 26 teacher candidates in a college in northeast United States. By embedding TPCK skills into methods courses, the researchers sought to raise TPCK skills for this convenience sample of teacher candidates. They found TPCK skills were enhance for initial cohorts in the study, and sought to replicate results with subsequent cohorts of teacher candidates.

Ling, Koh, Chai, and Tay (2014) investigated the effect of contextual factors on TPCK development in 24 teachers in a Singapore elementary school. By taping the lesson planning sessions of teachers grouped by grade levels, they observed that teachers with high cultural and institutional focus had low TPCK, and concluded that context influenced TPCK. They used two coders to establish interrater reliability. Results from this study indicating that attitudes, social surroundings, and cultural issues influenced the development of TPCK among teachers is also found in other studies (Blackwell, Lauricella, Wartella, Robb, & Schomburg, 2013; Chai, Koh, & Tai, 2013; Ching & Hursh, 2014; Haley-Mize, 2014; Ottenbreit-Leftwich, Ertmer, & Tondeur, 2015).

Mouza and Karchmer-Klein (2013) studied 58 teacher candidates in the mid-

Atlantic region of the United States using the qualitative method of case development.
By studying how preservice teachers created, taught, and reflected upon lessons which
combined content, pedagogy, and technology, they discovered that case development in
preservice coursework builds TPCK. They noted much of the coursework in teacher
education is exclusively content, pedagogy, or technology. Combining all three using
case development through creating lessons, teaching those lessons, and reflecting on
those lessons builds TPCK in preservice teachers. It is the combination of content
knowledge and pedagogical knowledge while using technology they found builds TPCK.
Further research conducted by other researchers at other institutions using case
development may have similar results.

Abbitt (2011) surveyed 45 preservice teachers using an online survey both at the
beginning and at the end of a 16 week course on technology integration. Abbitt found
that TPCK is predictive of self-efficacy for using technology in the classroom. He
concluded using the TPCK framework to design preservice education is a valuable way
to incorporate technology integration and bolster self-efficacy beliefs for this population.
The TPCK framework melds content, pedagogy, and technology into courses for
preservice teachers, instead of separate courses for content, pedagogy, and technology in
preservice education.

In-service teachers also face pedagogical barriers. Blackwell, Lauricella,
Wartellanb, Robb, and Schomburg (2013) studied in-service teachers. Using 1329 names
from a listserv for the National Association for the Education of Young Child (NAEYC),
they studied how access and attitudes affect technology use by preschool teachers (those

teaching children under five years of age). They found 85% of the participants reported

using a technology when they valued its use but noted that, "A teacher may have the

knowledge of how to use a technology, which results from breaking down first-order

barriers, but this does not necessarily lead a teacher to believe in the value of the

technology for her teaching practices" (p.311). The authors stated that teacher attitudes

about the usefulness of technology for student learning predicted actual technology use

but agreed with Ertmer et al. (2012) that attitudes matter less for early childhood

educators than they do for K-12 educators. The internal consistency of the questionnaire

was measured by Cronbach's alpha (α) which was .89, indicating adequate internal

reliability.

Ball and Dias (2014) studied 20 teachers at a private Jewish day school in the

southeastern United States. Using the Beliefs and Attitudes towards Technology survey

developed by Lumpe and Chambers (2001) they found that overcoming first order

barriers is not a guarantee of technology integration for student learning but that teacher

attitudes as well must be considered.

Anderson and Groulx (2013) considered how in-service teachers influenced

preservice teachers. In a survey of 103 preservice educators they found a high correlation

between cooperating teachers' use of technology and student teachers' use of technology.

While they concluded that values, self-efficacy, other's attitudes, all are interrelated

influences on the final behavior of the preservice teachers, it was still not known from

this study whether preservice lessons infused with technology would influence those

teachers' intentions to use technology once they graduated. The study could have been

strengthened by classroom observations in addition to the self-reporting surveys.

Ertmer et al. (2014) studied the effect of professional development on in-teachers' intent to use project-based learning in the classroom. In their study of 21 teachers of sciences in grades six through 12, they suggested that professional development could have a significant impact on teachers' scientific knowledge and pedagogical knowledge of project based learning. That these teachers were impacted by the professional development suggested they may not have been taught this student-centered pedagogical style during undergraduate work. While the authors conducted this study, they also infused technology into the STEM content and PBL approach. They found that there were significant gains in confidence in using PBL approaches, STEM content and using technology for student instruction. Further research may verify that teachers return to use the new content and methods in their own classrooms after the professional development is completed.

Pan and Franklin (2011) studied 559 public school teachers in the United States using a quantitative online survey with an included open ended question at the end (qualitative). They found that a teacher's self-efficacy and administrative support were predictive of technology use in the classroom. Professional development and access to digital technologies were also predictive but to a lesser extent. The authors suggest that an increase in professional development surrounding the use of technology in the classroom would increase the actual use of technology in the classroom.

Liu (2011) studied 1139 teachers in Taiwan using a quantitative survey, finding that most participants surveyed preferred learner-centered classrooms but when

integrating technology they tended to use teacher-centered lecture style activities. This may point to a need for professional development focused on using student-centered pedagogy in classroom instruction.

Summary

Overcoming first-order barriers has not increased integration of technology in K-12 classrooms. Second order barriers identified by Ertmer (1999) continue to obstruct teachers from integrating technology (Ertmer et al., 2012; Ottenbreit-Leftwich et al., 2015). With the removal of external barriers, examination of remaining barriers is made clearer. This study questions which teacher attitudes, social and cultural influences, and pedagogical beliefs are hindering K-12 teachers in one rural northeastern school district from integrating technology into their classrooms. Because studies focusing on K-12 classrooms in rural districts in the northeastern portion of the United States are sparsely reported in the literature, the findings from this study will help to fill that gap and may point to interventions that will lower barriers in these classrooms and subsequently raise student achievement.

Chapter 3: Research Method

The intent of this qualitative study was to identify how educators in one rural northeastern district overcame attitudinal, social/cultural, and pedagogical barriers that prevented them from integrating technology into their classrooms for student learning. This chapter includes descriptions of the research design, the role of the researcher, the methodology, and issues concerning trustworthiness. A discussion of how participants were selected and how data were collected for this study is included in this chapter. Participants serve one of three roles in their schools: teacher, administrator, or technology support personnel. This provided three different perspectives to answer the research questions. Because answers differ, all answers are reported and considered, even discrepant cases.

Research Design and Rationale

The questions that guided this research examined how the barriers to technology integration for student learning were overcome as perceived from the teacher's vantage point.

Research Question

How have K-5 teachers overcome barriers to technology integration in one rural northeastern district?

Subquestions

1. How have K-5 teachers overcome attitudinal barriers to technology integration in one rural northeastern district?

2. How have K-5 teachers overcome social/cultural barriers to technology integration in

one rural northeastern district?

3. How have K-5 teachers overcome pedagogical barriers to technology integration in

one rural northeastern district?

Stake (2006) claimed, "Qualitative case study was developed to study the

experience of real cases operating in real situations" (p. 3). Using this description, a

qualitative case study design was the best choice to investigate the research questions.

This study employed participant interviews in three cases. Each case included

participants from one school with three sources of data (teachers, administrators,

technology support). Yin (2014) recommended using case study research when the

research question(s) asked how or why, when the researcher could not control the events,

or when the research focused on present events. Case study research was suitable for this

study Because the questions surrounded how teachers overcame barriers to technology

integration. The researcher had no control over the barriers to technology integration in

schools, nor how they were overcome. The focus of my research was on overcoming

barriers to integration.

In order to focus on the research questions, interviews with classroom teachers,

integration specialists, and administrators in three schools in the rural Northeast revealed

the attitudinal barriers, social/cultural barriers, and pedagogical barriers that interacted to

determine how teachers overcame barriers to integrating technology into their classrooms

for student learning. The letters of invitation to participate are found in Appendix A; the

interview questions are found in Appendix B. This method focused on the experiences

and attitudes of K-5 classroom teachers and how they overcame the barriers, along with the perceptions of integration specialists or administrators about the most effective ways to overcome barriers to technology integration. By listening to the voices of K-5 classroom teachers, administrators, and technology specialists, their perceptions were validated and further interventions to lower the barriers they perceived were suggested. Interviews with teachers, administrators, and technology specialists at each school supplied three data points for my study and increased the construct validity of the study.

The case study method allowed exploration of the issue of why some K-5 teachers are not integrating technology into their classrooms in one rural northeastern district. Data included interviews collected at three schools from two to three classroom teachers, one administrator, and one technology support personnel in each of those schools. Each case contains four to five people located in each of the three schools studied. The multiple-case sampling of similar cases of K-5 teachers in rural Northeast schools enhanced the confidence of the study results (Huberman & Miles, 2002).

Other Traditions Considered but not Selected

Qualitative research can be characterized as an exploration of a social or educational issue from the viewpoint or perspective of participants. Using this definition, a qualitative research design was the best choice to investigate the research questions because I wanted to learn about the experiences of teachers in terms of their integration of technology. Case study research focuses in depth on the stories of a small number of participants. Concentrating on one person, group, program, organization, or issue, this design can gather data from multiple sources including documents, interviews, and

observations (Marshall & Rossman, 2006). Using a multiple case study, this study increased the confidence of analytic conclusions drawn from the results because personnel in three different locales and schools were used.

Grounded theory design is intended to create a theory grounded in data after interviewing several people. The researcher then identifies patterns in the data in order to formulate a theory. Using a grounded theory design, the purpose would be to clarify a learning theory, and Because I am not seeking to define a theory this method was not appropriate to the research questions. Phenomenology describes how humans experience particular phenomenon like death, or the civil rights era. This method is not appropriate to the research questions, as it seeks to discover the shared experience of people who have lived through an experience. Ethnography includes multiple data sources which are melded together to form a picture of shared experiences, common behaviors, and similar beliefs. Data sources can include artifacts, interviews, and observations. This method was not appropriate to answer the research questions which focus on participant viewpoints and not one the story of a cultural group.

Phenomenology describes how humans experience a particular phenomenon, like death or the civil rights era. Had I conducted a phenomenological study, I would have only selected teachers in my sample. By including the voices of administrators and technology specialists who had observed the success of the teachers integrating technology along with the voices of the teachers I was provided broader insight into the research questions. Phenomenology was not appropriate to the research questions, as it seeks to discover the shared experiences of one group of people who have lived through

an experience. I would have lost the voices of the administrators and technology specialists. By using a case study approach, I sought to answer the research questions which focus on participant viewpoints and not only the story of a cultural group.

A multiple case study design was chosen over a single case design. The single case study would have been bounded by one school with teachers, administrators, and technology specialists but the use of three schools increases the analytic benefits. As Yin asserted, analytic conclusion from a multiple case, "will be more powerful than those coming from a single case" (2014, p. 64). Therefore, I rejected the notion of a single case study and selected a multiple case study.

"Qualitative researchers are interested in understanding people's experiences in context" (Maykut & Morehouse, 1994, p. 41). Using the multiple case study approach, I will gather data from interviews with educators in three schools and look for contextual clues in that data in order to answer the research questions and understand these educators' experiences in overcoming barriers to technology integration. Using a multiple case study, I will gather data from three schools and that increases the transferability of the study to other environments.

Role of the Researcher

The characteristics of qualitative research included the researcher within the setting under study, as the data collector, and the participants' subjective views. The focus of the method was to recognize patterns, categories, and themes in the gathered data as seen through the researcher's conceptual lens or cultural framework. My role was to empower participants to identify how they overcame barriers to technology

integration from the viewpoint of the participants themselves.

As the researcher, I sought permission to conduct my study in three area schools, by writing to the administrator in each school. Then before conducting research, I obtained approval from the Walden University Institutional Review Board. After receipt of approval (# 09-23-15-0246581), I wrote to school administrators to ask them to nominate technology using teachers or teachers who had successfully overcome barriers to integrating technology into their classrooms for student learning.

As the researcher, I interviewed teachers, administrators, and IT personnel in three area schools to determine how teachers overcame the barriers to technology integration they faced as educators in their schools. My role was to listen well, ask good questions, collect data ethically, and interpret the data. I do not work at any of the schools studied, nor am I involved in the classrooms or schools of participants. I am not professionally linked to any of the participants or schools. I selected participants I did not know in order to avoid the possibility of bias. Each interview was transcribed by a professional transcription service after a confidentiality agreement was signed.

At the time of this study, I am a certified K-8 teacher in the state where the study will take place, although I no longer live in the state. I have most recently worked as a teacher in a neighboring state and have not been employed as a teacher in the state where participants work for 10 years. I had no preconceived notions of what I might find in the data. I provide my own circumstances so readers may interpret the results in view of my own teaching background.

Methodology

Participant Selection Logic

The participants for this study were selected from three schools in one rural northeastern district. Within each school, two or three teachers, one technology support person, and one administrator were interviewed. This purposeful sample was drawn from technology using K-5 teachers in one rural Northeast district in order to provide rich descriptions of how these teachers were able to overcome barriers to technology integration in their classrooms. This purposive, criterion based sample was used to collect relevant data for analytic data. As Yin (2009) suggested, the multiple case sampling added confidence to the findings. Three cases, each containing four or five participants, were selected to substantially increase *analytic benefits* (Yin, 2009, p.64). Three types of participants were chosen within each case to increase the triangulation.

After IRB approval, I contacted principals through email to supply me with the names of the teachers who were successfully integrating technology in their school. The first three teachers to respond at each school had interviews scheduled. I also interviewed one administrator and one IT personnel person at each school. All participants choose VOIP video call interviews.

In the region where the study took place, each school typically had one or two administrators (principal and assistant principal) and one technology support personnel. I interviewed the principal and the technology support person at each school, after obtaining their consent to be included in the study

This list of educators (eight teachers, three principal administrators, and three

technology support personnel) received an introductory letter which invited them to participate in the study to discover the difficulties in using technology and engaging their students in using technology. Participants were informed that participation in the study was voluntary. Signed consent forms (Appendix C) were obtained from all participants before interviews took place, and interview questions were made available to all participants in advance. This same procedure was used with all participants including teachers, administrators, and technology support personnel.

This inductive qualitative approach was used to study K-5 teachers in one rural northeastern district who overcame barriers to technology integration and were successfully integrating technology in their classrooms at the time of the study. This was accomplished through interviews with the teachers, their administrator, and their technology support personnel. The goal was to identify analytically significant relationships between overcoming second order barriers and technology integration in the K-5 classroom. The results may be transferrable to other groups of K-5 teachers working in rural areas of the United States.

I engaged each participant in an interview to explore the attitudinal, social/cultural, and pedagogical barriers to technology integration they faced and overcame. A review of the literature sources provided the basis for the development of the interview questions. The proposed questions were reviewed by the committee to confirm that the answers would obtain relevant information from the participants for each of the research questions. By listening to the voices of K-5 educators in one rural northeastern district, their perceptions were validated and interventions to lower barriers

for other educators can be recommended. The tables below contain the questions that guided the interviews for each research question.

Table 1.

Teacher Interview Questions

Research Question 1: How do K-5 teachers overcome attitudinal barriers to technology integration in one rural northeastern district?
Describe your beliefs about effective ways of teaching using technology. Describe how your teaching experiences have affected how you feel about using technology to teach students in your classroom? Describe how you overcame your attitudes/anxieties/misgivings to technology integration?
Research Question 2: How do K-5 teachers overcome social/cultural barriers to technology integration in one rural northeastern district?
How do the beliefs and practices of teachers in the surrounding classrooms affect your use of technology? Please share an example. How do the beliefs of the school community, including administrators, parents, staff, and administrators, affect the integration of technology into instruction for you or other teachers? How would you get other teachers in your school interested in using technology in their classrooms (overcoming barriers)?

Research Question 3: How do K-5 teachers overcome pedagogical barriers to technology integration in one rural northeastern district?
Describe the biggest pedagogical barrier(s) to integrating technology in your school. How might that barrier(s) be overcome in order to encourage teachers to use technology in their teaching? How could teaching methods best support the integration of technology into classrooms at your school?

In addition to the collection of data from teacher interviews, I interviewed one administrator and one technology specialist at each school. The administrators were the principals at their schools who were asked to identify technology using teachers within their schools and then also were interviewed using the following questions. During interviews with administrators, I asked about the social/cultural climate in which technology was or was not integrated within their schools as well as pedagogical hurdles teachers overcame to integrate technology.

Table 2.

Principal Interview Questions

Research Question 1: How do K-5 teachers overcome attitudinal barriers to technology integration in one rural northeastern district?
Describe how your teachers feel about using technology to teach students in their classroom?

Describe effective ways your teachers have overcome barriers to using technology for teaching. Describe how your technology using teachers overcame their attitudes/anxieties/ misgivings to technology integration?
Research Question 2: How do K-5 teachers overcome social/cultural barriers to technology integration in one rural northeastern district?
In current literature, a barrier some teachers were able to overcome was the negative attitudes towards technology integration of surrounding teachers. Did your teachers have to deal with this barrier and how did they overcome this barrier? How do the beliefs of the school community, including teachers, administrators, staff, and parents affect the integration of technology into instruction for teachers? How do you think more teachers in your school could overcome barriers to technology integration?
Research Question 3: How do K-5 teachers overcome pedagogical barriers to technology integration in one rural northeastern district?
Describe the biggest pedagogical barrier(s) your teachers face in integrating technology in your school. How is that barrier(s) best overcome in order to support teachers' beliefs about teaching and learning?

The following questions were asked during interviews with a technology support person in each school. There were various titles that apply to such personnel within each school from Integration Specialist, to Technology Integrator, to Help Desk Personnel. I asked Technology Support Personnel about teachers overcoming barriers to technology integration in their schools.

Table 3.

Technology Support Questions

Research Question 1: How do K-5 teachers overcome attitudinal barriers to technology integration in one rural northeastern district?
1. Describe how you feel about the teachers you support using technology to teach students in their classrooms?
2. Describe your teachers' beliefs about effective ways of teaching using technology.
3. Describe your teachers' beliefs about the importance of technology use in student learning.
4. Describe how your teachers overcame attitudes/anxieties/misgivings to technology integration.
Research Question 2: How do K-5 teachers overcome social/cultural barriers to technology integration in one rural northeastern district?
1. How do the beliefs and practices of teachers in the surrounding classrooms affect a teacher's use of technology?

2. How do the beliefs of the school community, including administrators, parents, staff, and administrators, affect the integration of technology into instruction for those teachers you support?

3. How would you explain the ways your technology using teachers overcame the social and cultural barriers to technology use?

4. How would you get teachers in your school interested in using technology in their classrooms?

Research Question 3: How do K-5 teachers overcome pedagogical barriers to technology integration in one rural northeastern district?

1. Describe the biggest pedagogical barrier(s) to integrating technology in your school.

2. How might that barrier(s) be overcome in order to encourage teachers to use technology in their teaching?

3. How did your technology using teachers overcome barriers to using technology?

Procedures for Recruitment, Participation, and Data Collection

I asked principals at the three schools in the study to provide me with a list of technology using teachers for the study. Potential participants were sent information sheets explaining the purpose of the study and inviting them to participate in the study. Participants replied to my invitation email with the word *accept* or *consent* in the subject

line of a reply email. In cases where too few participants responded, more teachers in

higher grade levels within each school were solicited. This study aimed to focus on K-5,

commonly called the elementary grades in the USA. Middle school teachers, grades 6-8,

were sought next, followed by high school teachers, grades 9-12, when necessary. Each

participant had the option to be interviewed in their school, in a location off school

grounds, or via Skype video. All interviews were scheduled during non-instructional

time.

 The first three teachers at each school responded were solicited as participants in

this study. A total of 14 teachers were solicited for this study. In addition to the teachers,

one administrator and one technology support person at each school were solicited.

I collected data during participant interviews with 14 K-5 educators in one rural

northeastern district. Three administrators and three technology support persons the

schools were interviewed in addition to two to three classroom teachers at each school.

Each interview was recorded with permission of the participant. All participants were

given the option to withdraw from the study at any time. Before scheduled interviews,

participants received a consent form which they signed and returned to me (Appendix C).

After each interview, the audio was transcribed by a professional transcription service

after a confidentiality agreement was signed. Participants were sent a copy of their

transcribed interviews. If they found errors, omissions, or wished to supplement answers

they were invited to do so.

Data Analysis Plan

The conceptual framework used in my research study was the social cognitive

theory of Bandura. According to social cognitive theory, a relationship between internal and external factors influences behavior. As Saldaña (2013) suggested, I placed this framework, my study's purpose, and the research questions in front of me as I coded the interviews. By conducting this study, I examined the internal attitudes, the external social context or cultural landscape, and the pedagogical barriers which teachers overcame when integrating technology into their classrooms.

The participants in this study overcame barriers they faced to integrating technology. An examination of the data revealed patterns in the way teachers overcame barriers, including attitudinal barriers, social/cultural barriers, or pedagogical barriers. Further analysis of the data revealed connections between the collected data and the key ideas and constructs in the conceptual framework. These connections helped to justify the findings.

The data were coded for the themes, patterns, and categories according to the research questions. Data that applied to attitudinal barriers were coded to research question one. Data surrounding the themes of social and cultural barriers were coded to research question two. Finally, data that referred to pedagogical barriers were coded to research question three. Following coding, themes and patterns relating to each research question were identified.

The data were coded by hand and Microsoft Spreadsheets was used to organize the data. Each interview was transcribed by a professional transcription service after a confidentiality agreement was signed. Any discrepant cases were fully acknowledged and reported.

Issues of Trustworthiness

Qualitative research asks the reader to trust that the data are credible, transferable, dependable, and confirmable. In qualitative research, trustworthiness is confidence in the researcher's conclusions. Methods a researcher can use to enhance trustworthiness include using "thick, deep, and rich" descriptions as Patton suggests (2002, p. 331), creating an audit trail, triangulation, prolonged engagement, and peer debriefing (Lincoln & Guba, 1985).

Credibility

Credibility was established by triangulation of data. Each case included three data points to enhance triangulation, namely interviews with teachers, administrators, and technology personnel in each school. I used rich descriptions and maintained an audit trail to enhance the rigor and credibility of the study results. I compared data across interviews and asked interviewees to review their own interview transcripts to enhance credibility.

Transferability

The conclusions of this study were based on an in-depth analysis of the interview data which provided details so others might determine if these findings were transferable to other contexts. The current study used multiple case studies to investigate how teachers overcame barriers to technology integration. I described participants, contexts, and procedures in depth to allow readers to judge the similarity of other cases to this study's population, setting, and research questions. Marshall and Rossman (2006) stated that demonstrating transferability for a study's results "rests more with the researcher

who would make that transfer than the original researcher" (p. 202). The transferability

of this study was enhanced using rich, thick descriptions of participants, contexts, and

procedures as well as reference to the theoretical framework during analysis of the data.

Dependability

Establishing dependability of the results enhanced the trustworthiness of the study

results. I established dependability by creating an audit trail and keeping detailed records

of the interviews and the subsequent analysis of the data. Member checks were used to

ensure that my findings accurately reflected participants' viewpoints. Three data points

within each case triangulated the data: teacher, administrator, and technology support

interviews.

Confirmability

To enhance the confirmability of the findings, and thereby the trustworthiness, I

used an audit trail, a journal, and openly stated any biases I had towards any of the

results. Establishing confirmability involved using study findings that were plausible to

subsequent researchers with detailed description of methods and procedures. Marshall

and Rossman (2006) said that when the results of a study could be confirmed by another

researcher, then the study increased trustworthiness.

Ethical Procedures

No participants were contacted, and no data were collected until approval from

Walden's University Institutional Review Board was received. A Letter of Invitation was

sent to the schools (Appendix D) and a letter of cooperation was obtained from the head

administrator at each school prior to any contact with potential participants. Prior to

interviews, all potential interviewees were asked to return to me a signed letter of consent. Potential interviewees were informed that I intended to record each interview, have transcriptions prepared, and use responses in a research study. They were further informed that their identities would be kept confidential, no identifying information would be used in the study, and that all study data would be removed from my computer and only stored on a removable encrypted hard drive. I was the only person with access to this information, which will be destroyed in five years.

Summary

This chapter included the research design, the role of the researcher, the methodology, and issues concerning trustworthiness for a study concerning how teachers in grades K-5 working in one rural northeastern districts overcame barriers to technology integration. It described how teachers for each case were selected; procedures for obtaining informed consent, recording interviews, and listed the interview questions for each of the research questions. Multiple case studies were used to answer the research questions surrounding the central research question of how teachers overcame barriers to technology integration in one rural northeastern school district. Specifically, the subquestions delved into how teachers overcame attitudinal barriers, social/cultural barriers, and pedagogical barriers to technology integration in one rural northeastern school district. The participants in this study will be selected from three schools in the one rural Northeast. Three administrators at each of the schools were contacted through email to supply me with the names of the teachers who were successfully integrating technology in their school. The first three teachers to respond at each school had

interviews scheduled. At each school, one administrator, one technology support person, and two or three teachers were interviewed. Data were collected through interviews with participants. Interviews were recorded, transcribed, coded for themes and patterns, and the results analyzed. Chapter 4 and Chapter 5 include the analysis of the data and a discussion of the findings.

Chapter 4: Results

The purpose of this qualitative multiple case study was to identify how elementary school teachers in one rural northeastern school district overcame attitudinal, social/cultural, and pedagogical barriers that prevented them from integrating technology into their classrooms for student learning. Three cases included four or five educators in each of three schools: one administrator, one technology specialist, and two to three teachers. The conceptual framework was based on the social cognitive theory of Bandura and groundwork laid by Ertmer (1999) on barriers to technology integration.

Research Question

How do K-5 teachers overcome barriers to technology integration in one rural northeastern district?

Subquestions

1. How do K-5 teachers overcome attitudinal barriers to technology integration in one rural northeastern district?

2. How do K-5 teachers overcome social/cultural barriers to technology integration in one rural northeastern district?

3. How do K-5 teachers overcome pedagogical barriers to technology integration in one rural northeastern district?

This chapter includes sections describing the setting, demographics, data collection, data analysis, trustworthiness, the results, and a summary of the data.

Setting

The three schools included in this study were all located in northeastern school Districts in the United States. Two schools were public schools and one school was a private school. All 14 interviews were conducted using Skype from a private location within my home during non-instructional teacher-time. All interviews took place in quiet locations.

School 1 and School 3 are midsized public schools in one rural area with over 4,000 enrolled students in the district. Thirty-two percent of the county population is middle income families with a yearly income between $50,000 and $74,000. School 2 is a private school in one rural area with 365 enrolled students with similar demographics for the surrounding area, but specific income levels for parents of attending students have not been collected (ProximityOne, 2016).

Demographics

The average household income for families with students attending the three schools was over $50,000 (U.S. Department of Commerce, 2015). Ninety-seven percent of the population in the county is Caucasian. The educators in this study were located at one of three schools in a northeastern school district. Three were administrators, three were IT personnel with varying titles, and eight were teachers. Two administrators were male, while the third was female. One IT personnel was female, while the other two were male. All the classroom teachers were female. The names of participants and schools were coded to prevent identification. Those in the first case were named with gender appropriate names starting with the letter T. Those in the second case were named with

gender appropriate names starting with the letter P. Finally, those from the third case

were named with gender appropriate names starting with the letter R.

Table 4.

Demographics

School 1	Pseudonym	Role	Gender
	Todd	Principal	Male
	Truman	IT Personnel	Male
	Tina	Teacher	Female
	Teresa	Teacher	Female
	Tessa	Teacher	Female
School 2	Patricia	Principal	Female
	Patty	IT Personnel	Female
	Peggy	Teacher	Female
	Pamela	Teacher	Female
	Page	Teacher	Female
School 3	Ralph	Principal	Male
	Raymond	IT Personnel	Male
	Rachel	Teacher	Female
	Ruth	Teacher	Female

Data Collection

Fourteen educators in a northeastern school district were interviewed using Skype calls for one hour interviews. Data were collected during the spring of 2016, and each interview was recorded using Callnote software. The audio recordings were transcribed by Automatic Sync Technologies, a professional transcription service. A Confidentiality Agreement was provided by the service and is included in Appendix E. Each audio recording was then transferred to a password protected external storage device.

Data Analysis

After interview recordings were transcribed, they were coded for relevant concepts, themes, and patterns. Saldana advised coders that, "emergent, data-driven coding choices are legitimate" (2015, p. 75), and I used the words of study participants to formulate general conclusions about overcoming barriers to technology integration. From across the interviews in this multiple case study, I identified excerpts marked with the same code and summarized those codes here. By hand coding each transcript, I identified recurring concepts and topics. By grouping these together, several themes were revealed and patterns of theme reoccurrence were discovered. As the data were analyzed, I read and reread the data searching for themes, and as themes and patterns emerged, they were organized by research question. Several themes were similar to findings in studies included in the literature review.

As Saldaña (2013) suggested, I placed my framework, the purpose of the study, and the research questions in front of me as I coded the interviews. During coding,

several themes began to emerge. The participants discussed ways they overcame their own attitudes, social expectations, cultural norms, and pedagogical topics as well as issues important to them. While the purpose of the study was to discover how educators overcame second order barriers, the reemergence of a first order barrier in one school did present an obstacle at the beginning of data collection. Those barriers were largely overcome by the end of the data collection by the school district installing an additional server exclusively for that school.

Discrepant Cases

In this multiple case study, no discrepant cases were found among the participants in this study. Interviewee responses were consistent with the participants as reported in the findings. The multiple case study format increased confidence in the results (Miles, Huberman, & Saldana, 2014). Patterns and themes identified in this study were seen in each case. The lack of discrepancies may have been due to the targeted population, namely those educators who successfully overcame barriers to technology integration in one rural school district in the northeastern part of the United States.

Evidence of Trustworthiness

Lincoln and Guba (1985) urged qualitative researchers to use terms such as *credibility*, *transferability*, *dependability*, and *confirmability*. Each of these terms, unique to qualitative research, establish the trustworthiness in this method of inquiry. Each section describes how I ensured the accuracy of the findings and quality of the analysis. These terms were defined as they related to my research.

Credibility

Credibility was established by triangulation of the data. Each case included three data points to enhance triangulation, namely interviews with teachers, administrators, and technology personnel in each school. I used rich descriptions and maintained an audit trail to enhance the rigor and credibility of the study results. I compared data across interviews and asked interviewees to review their own interview transcripts to enhance credibility.

Transferability

The conclusions of this study were based on an in-depth analysis of the interview data which provided details so others might determine if these findings were transferable to other contexts. The current study used multiple case studies to investigate how teachers were able to overcome barriers to technology integration. I described participants, contexts, and procedures in depth to allow readers to judge the similarity of other cases to this study's population, setting, and research questions. Marshall and Rossman (2006) stated that demonstrating transferability for a study's results "rests more with the researcher who would make that transfer than the original researcher" (p. 202). The transferability of this study was enhanced by the use of rich, thick descriptions of participants, contexts, and procedures as well as reference to the theoretical framework during analysis of the data.

Dependability

Establishing dependability of the results enhanced the trustworthiness of the study results. I established dependability by creating an audit trail and keeping detailed records

of the interviews and the subsequent analysis of the data. Member checks were used to ensure that my findings accurately reflected participants' viewpoints. Three data points within each case triangulated the data: teacher, administrator, and technology support interviews.

Confirmability

To enhance the confirmability of the findings, and thereby the trustworthiness, I used an audit trail, a journal, and openly stated any biases I had toward any of the results. I created an audit trail by logging the sequence of events, including potential participant contacts when I emailed participants, when I recorded interviews, when I sent interviews to the third-party transcriptionists, and when I coded transcripts. I maintained a daily research journal of my daily experiences, my research activities, and contact information as well my reflections on the interviews. By stating my biases and including discrepant cases, I sought to enhance confirmability of the results.

<div align="center">

Results

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The results of the study are organized by Research Questions and then by themes that emerged from coding the data. The purpose of this study was to identify how elementary teachers in one rural northeastern school district overcame attitudinal, social/cultural, and pedagogical barriers that prevented them from integrating technology into their classrooms for student learning. While listening to educators' responses, the following themes emerged for Research Question 1: *Adaptability, Evolution of Tech Skills, Peer Support,* and *Professional Training.* The following themes emerged for Research Question 2: *Required Software, Status Quo,* and *Unvalued.* The following

themes emerged for Research Question 3: *Continual Change, Appropriate Resources,* and *Preparing Students.* The results of this study may be useful to administrators looking for ways to have teachers in their schools overcome barriers to technology integration as well as to educators seeking to overcome barriers on their own.

Research Question 1

The first research question asked how K-5 teachers overcame attitudinal barriers to technology integration in a northeastern school district. Four themes emerged from the data collected: *Adaptability, Evolution of Technology Skills, Peer Support, and Professional Training*.

Adaptability. Included within Adaptability were issues of time, price, or cost of technology, and having a backup plan. Teachers mentioned lack of time for integrating technology and their need to rearrange schedules or creatively carve out time for planning integrations. Several teachers mentioned the cost of technology and how finding free or low-cost alternatives worked to help them overcome this barrier to integration. Many teachers mentioned lesson adaptability and had back-up plans in case the planned technology integration did not work.

One educator summed up the overcoming attitude when she said, "I see their growth and their love for learning explode whenever they can have technology in their hands" (Rachel). The educators with whom I spoke found that student engagement during lessons was increased when technology was integrated. The teachers' attitudes improved toward taking the extra effort to integrate technology when they saw the motivation of their students. This effort to integrate technology showed the adaptability of the educators

– they adapted their delivery of instruction to better instruct and engage learners. Taylor noted, "If you truly think it will help your students you will find the time for it."

One teacher overcame the time barrier by taking 20 minutes on a Friday afternoon to download an education app, play with it, and decide if it was good for her students. She would then make a list of which apps to download onto all six iPads in her classroom. Instead of looking at time as an insurmountable obstacle, she wrote down a plan to overcome this barrier. Many teachers made the most of a limited number of iPads by scheduling time for reinforcement activities with iPads during center time.

Adaptability was also manifested as having an alternate plan when technology does not work. One educator was adaptable using the technology when a connectivity issue prevented the use of the iPads every day as anticipated. She restructured her lesson plans to include iPad use twice per week to reduce bandwidth usage and avoid the connectivity issues the school was experiencing. This barrier is a first order barrier that reemerged in this district although Ertmer (1999) claimed first-order barriers to technology integration were lowered in the United States and only second-order barriers have persisted. Tina summed up the sentiment well when she said, "if you truly think it will help your students you will find the time for it." The teachers at this school ran into this reemergent first order barrier but could reduce connectivity and bandwidth issues by only using the iPads twice weekly. Because fewer devices were online and using the bandwidth, fewer connectivity issues were encountered. This bandwidth issue would have been a formidable barrier for many teachers, but the teachers in this study were

motivated to overcome this attitudinal barrier by being adaptable in their attitude towards integrating technology.

Pamela, Paige, Teresa, and Tessa felt using technology helped differentiate instruction for students working at different levels. It was interesting to note that despite positive attitudes about technology integration in the classroom, Pamela remarked, "nothing replaces the teacher being in front of the classroom, especially with the lower level of kiddos." Most participants said they felt that technology should be integrated as part of the school day, not an add-on. One teacher said she felt technology should be accessible every day. This educator overcomes her attitudinal barriers by focusing on the easiest method to include the technology first and focusing on her goal of having students use technology to learn. Pamela reported a positive attitude towards integrating technology when she observed student engagement. She used technology in social studies lessons when she incorporated a matching game on the Smart Board about the Spanish conquistadors. Pamela also used the iPads for student groups learning about prepositions. The students took photos of the location words (prepositions) and sent them to the Smart Board for the class to peer review their work.

By recognizing the value of integrating technology, educators were propelled to find ways over any barriers that dissuaded them. The educators with whom I spoke also talked about how technology skills evolve over time, the importance of being adaptable in lesson design, effective professional development, and the importance of peer support.

Peggy used a Smart Board in her class room, which she found to be engaging and interactive. She modified her lessons in phonics and math to include use of the Smart

Board. Her adaptability to use this technology in her classroom allowed her to assess

student learning using the Smart Board. While Peggy and Teresa believed the use of

technology provided more reinforcement activities and held students interest longer than

non-technology lessons, Teresa did express a disadvantage to Smart Board use:

> The downside of it is that you can only have two people come up at a time to do
>
> it. So, it has to be an activity that moves fairly fast so a lot of kids are getting up
>
> and down and kind of going, you know, going to keep it moving. (Teresa, January
>
> 5, 2016).

Tessa made the point that technology should be integrated as part of the daily lesson

plans. She was propelled by the excitement of her students to learn and integrate the

technology which the school provided. She previously taught in a school with more

technology available. She found that centers were the easiest way for her to integrate the

available technology to help her students learn and she was more willing to adapt her

lessons to include technology. Tessa, Teresa, and Rachel all agreed that technology

should be integrated as part of the daily lesson. Tessa felt, "but really it should just be

something that, you know, happens very fluid and that they're able to, you know, utilize

it day to day" (Tessa, March 23, 2016). Both educators discussed their uses of Smart

Boards and iPads for integrating technology into Math and Reading lessons. Tessa and

Teresa both felt that integrating technology helps differentiate instruction to reach all

students and therefore she was willing to be more adaptable to include the technology.

She overcame attitudinal barriers to technology integration by being adaptable and was

motivated to do so because it benefited students.

Teresa discussed the reemergence of a first-order barrier at her school. The educators at this school had issues at the beginning of the school year with connectivity. Per Teresa, "…at the beginning of the school year, we had some IP address issues where we can only do certain things part of the time" (Teresa, March 23, 2016). This educator further explained that she and a colleague had used summer time for planning lessons integrating iPad apps and downloaded these apps and prepared lesson plans. They were disappointed when the first order barrier obstructed their daily integration by exhibited adaptability by quickly preplanning for twice weekly use of the iPads.

Raymond summed up one of the barriers overcome by being adaptable when he mentioned the number of devices available per class. His teachers have larger class sizes than other schools, but the same number of iPads per class. He viewed this as a big barrier and said his teachers overcame this barrier by using the iPads in centers and using learning groups or pairing learners to work on the iPads.

The subtheme of adaptability included issues of time, price or cost of technology and having a backup plan. Educators expressed the need for planning time to integrate technology, the price of educational apps for use of a limited number of devices, and the need, especially at one school with bandwidth issues, for a back-up plan when the Internet went down. These issues discouraged educators. and acted as attitudinal barriers to integrating technology into the classroom

Evolution of technology skills. The view that comfort with technology is a process leads into another theme seen in the data. One teacher noted that she has been raised using technology throughout her schooling and while she is very comfortable using

technology, she continues to grow in her use of technology for student instruction. Patricia said she felt that teacher anxiety about using technology was, "more of a generational thing that a teacher thing." Todd felt that technology skills were age related. He went on to explain, "like I have a first-year teacher this year, you know, she's been trained in college with technology."

He did feel some of his teachers have overcome this attitudinal barrier by 'letting down their guard' and letting go of the anxiety that they would break something. He said he understood the evolution of technology skills is a slow progression and that this limits his expectations by focusing on one thing for teachers to master in lieu of multiple things at once. He cautioned other administrators to not overwhelm teachers with technology because, "then barriers start building up." As Todd said during his interview, his teachers view technology as a one tool to use, not the only way to teach students. He also felt that teachers in his school used technology for purposeful learning activities that reinforce lesson objectives, not busy work or technology use solely for the sack of using technology.

Pamela and Paige both viewed technology in the classroom as a teaching tool to engage students, but not the sole way to teach students. Paige summed up the view well when she said, "we are teachers first and if technology can help us in our teaching, then we should use it." (Paige, April 9, 2016). Teachers are more likely to have a positive attitude about integrating technology when doing so benefits the students. Paige found using a Smart Board during lessons engaged students better than not using the Smart Board.

Pamela also used the Smart Board for Math, but unlike other interviewed educators, she also used the Smart Board for social studies lessons. It was interesting that Pamela expressed her enjoyment of using technology: "I like the challenge of learning new things personally" (Pamela, March 30, 2016). Although she enjoyed integrating technology, she expressed that she was not ready to throw out more traditional teaching methods, but rather to change her lesson plans yearly, incorporating different tools. She especially enjoyed incorporating QR codes into lessons using the cameras on a class set of iPad for a lesson about prepositions. Students took pictures of themselves or objects in locations that corresponded to prepositions, then casted the pictures to the class Smart Board for all to see. Pamela remarked, "I love activities like that, they were all 100% engaged, they don't particularly love language, not as much as I do…as opposed to sitting with a workbook, that was a great activity" (Pamela, March 30, 2016). Pamela liked that her students were all engaged by that grammar lesson and had a positive attitude towards integrating this technology.

Rachel brought up the evolution of technology skills when she said technology itself has evolved over the course of her teaching career. She felt time to explore technology before integrating into a lesson was essential. She valued attending outside professional development as well as time with her colleagues.

Patricia said most of her teachers are excited to use technology in the classroom, and she saw those teachers integrating new technologies soon after learning those technologies. She did express that some teachers were reluctant to integrate when she said, "There are a few that would say that it's not their most comfortable area but the

majority have readily implemented it in their classroom" (Patricia, March 11, 2016). She said some teachers feel they are too old to integrate technology, but she reiterated that skills improve over time as teachers continued to develop lessons integrating technologies like the Smart Board. She felt teachers were motivated to overcome the age barrier by seeing how much time is saved by developing lessons using the Smart Board, which can be retaught yearly with minor tweaks. To add in this, her school provides files on the school server for teachers to store and share lesson files.

Pamela mentioned that her administration helps teachers to be adaptable to using technology, but they do no push educators beyond their comfort zone. At this school, educators could pursue professional development outside of the school, at an online company that provided Smart Board training certificates and conference attendance. Educators at this school were required to obtain the Smart Board certifications as a selling point to increase attendance. Todd, Ralph, and Raymond agreed that teachers at their schools were encouraged to use technology and to reflect on the experience, but were not pushed into using technology.

In summary, interviews revealed the view that comfort with technology is a process that takes time to evolve. Teachers need support to feel more comfortable with technology over time to overcome an attitudinal barrier and to realize they will not break the technology. When teachers observed that the engagement of students increased using technology, they were motivated to overcome their own misgivings and attitudinal anxieties. Teachers who overcame this barrier realized technology skills are not obtainable overnight but are a slow progression if skills that evolve over time.

Peer support. More than one IT person with whom I spoke felt teachers have overcome attitudinal barriers to technology integration through training, talking with peers, and brainstorming with peers. Peer support emerged as a frequent theme in the data. One teacher spoke of the negative impact the lack of support can have when she said she did not have such support for using technology during student teaching, which in the United States is required to obtain a teaching license. Most study participants talked about sharing with peers and the positive impact that the support of one's peers' offers. This peer support helps educators overcome attitudinal barriers to technology integration. Patty said she has informal conversations with other teachers, "about what they're doing and how they're doing it." As her schools' technology coach, she encourages educators at her school to try new technologies, to work together, and share with each other. Patty used these strategies to influence teachers' attitudes and ultimately overcome barriers to technology integration.

An interrelationship between internal and external factors work together to influence behavior (Bandura, 1986) and this is the conceptual framework of this study. The data were viewed considering this interrelationship. Educators shared during the interviews attitudes they overcame which affected their external behavior to integrate technology.

Teachers in one school had formed a group for sharing which they referred to as a PLC. This group seemed to share both during and outside of planned faculty meetings. Teachers shared software they found that was useful, as she emphasized, "It's good to be able to share ideas and have, you know, open discussions about what we're using and

how it's working." Support of one's peers can boost morale and confidence in using technology. The interviewees expressed they were more confident in using technology in their classrooms when they had seen or heard about colleagues using the same technology in their lessons. Truman felt it was helpful to pair new teachers with mentors who showed the new teachers how they are currently using technology. He also noted that sharing is bidirectional, and new teachers sometimes have experience with integrating technology that they share with the experienced teachers at his school.

Rachel explained that teachers, "feel like they're asking a stupid question. And Because they're a competent professional, they don't want to appear stupid." She overcomes this barrier by going into teachers' classrooms after school so they can ask her questions privately as she prompts teachers to converse with her. She finds teachers develop a rapport with her before they feel comfortable seeking technological support. By supporting teachers to succeed, Rachel could convince her teachers they were indeed able to use technology. Although she felt not all the teachers viewed integration of technology as important, she has seen more teachers transitioning to that view and seeking to prepare students for their future lives. She helped teachers change attitudes and overcome attitudinal barriers preventing them from integrating technology into their classrooms by visiting classrooms after school when teachers could confer with her in private.

Another IT coach agreed that she offered her peers a lot of support. She frequently visits teachers in their own classrooms and is available to visit classrooms during the school day when she does not have a class. It is common in northeastern

schools to have IT personnel who also have other responsibilities within their schools. Some are content area coaches, some are librarians, and some are classroom teachers. Raymond summed up that educators, "share and people see them having success, that kind of allows everybody else to get over some of those barriers as well" (Raymond, January 14, 2016). By visiting classrooms and offering support, Patty helped educators overcome attitudinal barriers to technology integration.

Educators did tend to talk about the technology tool they used most often. While many educators talked a lot about iPads, they did have Smart Boards, desktop computers, document cameras, carts with laptops for class use, and computer labs they could sign out. Educators at School 1 and School 3 discussed the iPads most often, while educators at School 2 talked about more about other technology tools. Providing time for teachers to work in groups, to brainstorm, and to share with their colleagues were ways to successfully overcome barriers and fears surrounding the use of technology mentioned by Truman.

Patricia shared that the IT support person at her school supported teachers with integrating technology, especially with the class sets of iPads. She helped teachers locate free educational apps, visited teachers in their classrooms weekly, was on-call to help when needed when she doesn't have a class herself, and conducted technology trainings once a month during afterschool paid teacher time. This support enabled these teachers to overcome attitudinal barriers obstructing them from integrating technology into their classrooms.

In summary, educators overcame attitudinal barriers to technology integration through training, talking with peers, and brainstorming with peers. Teachers who shared technology use, tips, and demonstrations felt empowered to overcome this barrier and integrate technology into their classrooms. Because internal and external factors influenced behavior, the support of peers influenced educators and helped them overcome attitudinal behaviors. While this peer support enabled teachers to overcome attitudinal barriers obstructing them from integrating technology into their classrooms, professional training was another way in which teachers could overcome attitudinal barriers to technology integration.

Professional training. The schools in the study provided professional development opportunities for their educators. They did training during scheduled development days, which are common in northeastern districts when students are scheduled off, have a delayed start, or are dismissed early. Schools also utilized faculty meeting time for technology training and online training programs. Patricia shared that her school purchased a training package for all K-5 teachers to complete, giving the teachers a year to complete and earn the PD certificate. She liked the online delivery because it could be viewed on several devices; the training videos were asynchronous and could be rewound and rewatched as needed. She felt the online delivery of training overcomes the "mental barrier to succeeding in technology." This was one way her administers helped teachers at her school overcome attitudinal barriers to technology integration.

Success in integrating technology is a progressive process, and several participants mentioned how helpful being adaptable, peer support, and professional training were. Many of these educators also expressed that technology skill was age related. One administrator said teachers feel, "that they're too old to do it. They're not smart enough to do it." However, Truman felt teachers valued the integration of technology into teaching, so providing classes for them on how a technology works as well as providing a time for educators to voice their concerns and opinions about integrating technology were valuable ideas to him.

Paige found time for planning the integration of technology to be a hindrance. She also felt that a lack of professional development and peer support in using different technologies did not help her to overcome barriers to integration. At her school, administrators were open to providing needed professional development and a technology integrator to provide peer support. She felt she could overcome barriers to integration with this support of her administration. She claimed that "time and training are keys to overcoming the barriers" (Paige, April 9, 2016).

Patty related that at her school, teachers are required to Smart Board training. This professional development is paid for by the school, offered online, and taken asynchronously. Patty liked that teachers could participate on their own time, pause the learning session, and rewind when necessary. This online course differentiated for all the learning styles and needs of the teachers taking the course. Patty made the point also that not everyone is an auditory learner and not everyone learns at the same speed, so this

asynchronous online course met more teachers where they were than traditional face to face professional development.

Todd organized weekly faculty meetings with his educators and during these meetings technology coaches disseminated information and educators grouped into Professional Learning Communities. Educators were given time to coordinate and plan technology integrations as well as meet the needs of students during these PLCs. By allowing teachers time to plan and coordinate with each other, rather than prescribing the agenda for each meeting, he allowed his teachers time to meet as a group and discuss appropriate technologies to meet student needs. His teachers also coordinated the sharing of class sets of iPads, limited to 5 per class, so teachers could use a class set of 20 for specific lessons. Through PLCs, Todd enabled his teachers to overcome attitudinal barriers to technology integration by allowing a place and time for teachers to plan, to share, and to support each other.

Educators who received professional training in the use of technology successfully overcame attitudinal barriers to technology integration. One school purchased an online training package for teachers on the use of the SMART Board. Other schools instigated weekly faculty meetings for sharing purposes. Providing training increased the integration of technology and lack of such trainings hindered teachers from overcoming this barrier. Teachers not only overcame attitudinal barriers but overcame the impact of social influences and cultural landscapes which influence actions.

Research Question 2

The second research question asked how K-5 teachers overcame social/cultural

barriers to technology integration in a northeastern school district. In looking at these

responses, I was interested in how the surrounding community, both inside and outside of

the school, affected the individual teacher. A foundational concept of the study was

Bandura's social cognitive theory, in which an interrelationship between internal

inclinations and external factors converge to influence behavior. This research question

examined the influence of the surrounding school members, community members, and

society. Three themes emerged from the data collected: *required hardware or software,*

status quo, and unvalued.

Required hardware/software. Included with required hardware/software were

issues of administrators or school boards requiring specific hardware or software use.

Teachers mentioned they were required to use hardware like SmartBoards or iPads, or

software like Renweb, MobyMax, or Wixie. Along with requirements, some educators

spoke about the supports put in place by administrators to help teachers meet the

requirements including training, professional development, and collegial sharing. These

supports helped interviewed teachers overcome barriers to technology integration.

Todd explained that while technology is available and integration of technology

into lessons is encouraged at his school, he does not require teachers to integrate. He said

that the teachers in his building view technology as a tool to use, but not the only tool to

achieving curricular objectives. He shared that, "I have some great teachers that will

incorporate it in a variety of levels. I have some teachers that use like Seesaw where it's a communication back and forth with parents" (Todd, January 8, 2016).

Tina expressed her dismay with the administrative requirement to use a specific piece of software. She felt the requirement set up the barrier while administrative and collegial supports overcame the barrier. In her words, "Like my school recently tried to or is introducing a program called MobyMax and it was just kind of like thrust upon the teachers, like you need to do this this school year, you need to do this and that. And I feel like it's only done halfway now because teachers were told they had to do it and they weren't given much instruction on how or when to teach it" (Tina, December 9, 2015). She shared that teachers found ways to overcome this barrier through supporting each other, through professional development, and through planning short blocks of planning time to investigate technology for lessons. She pulled these thoughts together when she said, "if a teacher wants to do something, they're going to try their best to make it happen" (Tina, December 9, 2015).

Pamela was an early adopter who led the way in using required software in her school. While she observed reluctance in older teachers to use technology, this societal barrier did not affect her; indeed she lowered this barrier for her colleagues. At this school, administration not only required use of an online grading system, but required teachers to load two lessons per week integrating Smart Board use onto a shared drive for the building principal. While she initially felt this was a school barrier over which she could not jump, she has found she can overcome this and sometimes surpasses this requirement. While noting that she does tend to forget to upload the integrated lessons,

she has been able to integrate Smart Board use into several lessons per week. She shared,
"So I'd say, you know, there is some negativity at times, thinking that the expectations
are a little beyond what is possible… One week I might use Smart six times, and another
week I might use it one, you know it just depends on what I'm doing" (Pamela, March 30,
2016).

Rachel suggested ways to help her colleagues overcome barriers although in her
school there is no requirement for technology use. Administrators may not require
technology use, but they expect the teachers to use it. Rachel suggested paid release time
for teachers to observe their colleagues integrating technology into lessons. She felt
teachers in her building were great teachers and more sharing could take place. She said,"
I think like giving teachers time to kind of collaborate amongst each other to find out like
what you're doing in your room and how you're doing it" (Rachel, March 10, 2016).
Another societal barrier to overcome was the traditional way of educating youth.

Administrators raised barriers to technology integration by requiring teachers to
use specific programs or hardware. Interviewees shared that requiring specific software
or hardware without supporting teachers in other ways, raised barriers to technology
integration. Teachers overcame the barriers raised by administration through supporting
each other, through professional development, and through planning short blocks of
planning time to investigate technology for lessons. In overcoming social and cultural
influences, educators faced a reluctance to change the established status quo when
seeking to overcome social/cultural barriers to technology integration.

Status quo. This subtheme included issues of changing the status quo or the way things have always been done in education. Educators talked about negative attitudes towards technology use of older teachers and parental expectations. While one way to overcome these barriers would be to wait until the older teachers retired, educators also talked about using technology as an option for school projects, communicating with parents, and supporting their colleagues as ways over the status quo barrier.

Tina described her student teaching with a status quo teacher who was not supportive of technology use. She shared that, "Well, as a student teacher, my cooperating teacher was very antitechnology" (Tina, December 9, 2015). Despite this obstacle, Tina used technology for learning during most of her education. She is now viewed as an early adopter in her school and is looked to as a technology integrator. She shared that parents of her students were in one of two groups: either they had marvelous technology access and were in a higher socio-economic level or they had no technology access and were in a lower socio-economic level: "my students' demographics is very diverse… I have students anywhere who are completely homeless with living in a campground all the way up to families whose parents work at the..like…private academy right down the street" (Tina, December 9, 2015). Tina felt she had a wide range of socio-economic levels represented in her classroom and that students from lower levels had more social barriers to overcome. In such a situation, parents emphasize day-to-day survival, not technology use.

Although Tina used technology throughout most of her own education, she was not taught how to integrate technology. She noted older teachers were reluctant to change

how they taught yet she overcame this through support of her colleagues. She expressed, "So I had to overcome the barrier of what do I do with technology...I was never taught how to do this. I think I overcame it because I had the support from my colleague...who gave me tips and tricks on how to teach using that technology" (Tina, December 9, 2015).

Todd noted that the school board in his district was tech savvy and he felt that made them more willing to put technology into classrooms. He saw this attitude reflected in the community with taxpayer willingness to fund the technology use within the schools and parents' acceptance of online pages for school announcements. He shared, "I think parents are engaged too, just the Facebook likes we get. That's a window into their kid's world" (Todd, January 8, 2016). He found sharing photos of kids working in classrooms is one way to overcome the paper newsletter status quo. He noted parents get to see what their kids are doing that day before the kids even get off the school bus. Todd also shared that one barrier in society is the fear of breaking the technology. He felt that because people in the community were not tech savvy they were fearful and this was a generational barrier.

Ruth also noted this generational reluctance to integrate technology. She talked about, "when you have someone who doesn't want to use any technology, they want to do it the way they've always done it and because it works" (Ruth, April 7, 2016). She went on to explain that many students come from lower socio-economic families that lack the technologies available at their school. Those families resist change, as they do not have economic resources to obtain Internet access, hardware, software, nor is it a priority for them. Ruth also mentioned that her school was physically separated by

mountainous terrain from nearby universities or local libraries that might share their Internet access with the community.

Pamela shared how parents at her school upheld the status quo. Fifth graders prepared state reports and she observed that parents influenced children to prepare the traditional paper reports and trifold presentation boards. During this school year, she and another teacher piloted a program where students could choose to create an online magazine instead of the trifold presentation board. Pamela said that several parents insisted their students create the traditional trifold presentation boards because that is how the parents had done the report. She said, "I had several mothers tell me they were doing the old-fashioned cut and paste" (Pamela, March 30, 2016). She felt one way to overcome this barrier was to make the online component optional, as she and her colleague did, and to also offer family technology nights to share pertinent resources with parents.

Paige also talked about a different parental view she observed when she stated prospective parents considered technology usage in the schools they chose for their children to attend. She said students need to learn to use technology now for their future lives and her school employs two IT personnel, one focused on assisting the lower grades (Kindergarten through 5th) and one focused on assisting the upper grades (middle and high schools) as well as the technical infrastructure. She also felt her school had a strong filter that made even conservative parents comfortable with their children using technological tools to access the Internet at school.

Paige observed the status quo social barrier in parents much like Pamela did. She felt that some teachers just did not desire to overcome this barrier because they felt they were too old or near retirement age. She told me about one teacher who actually did retire a few years early to avoid using technology in her classroom. In her words, "some of the older teachers, they're like, 'I have been teaching this way for 40 years. Why do I need to change?'" (Paige, April 9, 2016). Paige felt that one could overcome social barriers if motivated to do so by participating in professional development, and being encouraged by colleagues. She then mentioned that those who do not feel motivated would be replaced with younger teachers, because as she pointed out, "there is no opt out of this" (Paige, April 9, 2016).

Change can be unsettling and educators' beliefs about how education ought to be done can be difficult to change. Interviewees mentioned older teachers were supportive of maintaining the status quo in education. Teachers accepted those integrations that aligned with their beliefs about education and fit into established lesson plans. To successfully overcome social/cultural barriers to technology integration, educators were willing to change how they valued the use of technology for academics.

Unvalued. This subtheme included educators who believed technology was only for entertainment, and families who prioritized their values, much like Maslow's Hierarchy of Needs, and were dealing with survival issues. The use of technology was more valued for communication with parents than for education of students. Teachers who overcame this social/cultural barrier supported fellow teachers in their use of

technology, modeled technology integration to fellow teachers, and encouraged technology buddies among their fellow educators.

Ruth was a math coach at her school that co-planned math lessons with K-5 teachers. She noticed that classroom teachers were more apprehensive about incorporating technology when they did not see value for their students. In her role as math coach, she suggested technology for specific lessons, but the decision to integrate technology lay with the classroom teacher.

Todd felt his administration did not value the use of technology for academics and parents preferred to use technologies to communicate with teachers rather than landline phone calls. He felt the use of technology for communication was valued by the surrounding society. He did not mention the use of technology for student learning or whether that was valued by administrators or parents. This educator felt that showing other teachers examples of lessons integrating technology would help them see value in technology use.

Pamela described colleagues who do not value technology for student learning but rather for entertainment during lunch. At this school, students eat in classrooms and several educators show movies during lunchtimes to keep students quiet. Peggy felt that her colleagues did value the use of technology for student learning. She reported colleagues saw positive effects on learning when technology was integrated into lessons. She also felt parents valued the use of technology to engage their children in learning.

Todd felt societal barriers were overcome by supporting fellow teachers in their use of technology, modeling technology integration to fellow teachers, and encouraging

tech buddies among his teachers. He created an environment of learning among his teachers by holding weekly faculty meetings which he renamed personal learning communities or PLCs. He was instrumental in using technology to include a home bound student in classes. The student uses an iPad attached to a mobile device controlled by remote control, as seen on a night time soap opera show. Todd felt some societal barriers are generational and will disappear as older teachers retire. He added that some older teachers have overcome their barriers by allowing themselves to be vulnerable, releasing fear that they will break the hardware, and integrating slowly. Todd felt it was important to allow teachers to integrate at their own speed, offer support, and to not overwhelm teachers.

Tessa felt the school culture in her district included a lot of technology and as a fifth-grade teacher she needed to ensure students were prepared to use technology in middle school (grades 6, 7, and 8) and high school (grades 9, 10, 11, and 12).

The second research question addressed the surrounding society and cultural context in which the school sat and how those forces influenced interviewed educators. Three themes surfaced during the interviews including required use of specific hardware and software, the traditional way of doing education or the status quo, and the use of technology not being valued for student learning. Teachers who successfully overcame barriers of required software, the status quo, and placing value on technology for education were supported by their peers, their administrators, and parents. Administrators who supported teachers in overcoming this social/cultural barrier scheduled trainings in school and outside of the school, promoted and provided time for collegial sharing, while

offering supports to teachers but not requiring compliance. The third research question turned attention to pedagogical issues.

Research Question 3

The third research question focused on how K-5 teachers overcame pedagogical barriers to integrating technology in a northeastern school district. Pedagogy is the method and practice of teaching academic subjects, like reading, mathematics, history, and Spanish. In looking at this theme, how educators were taught to teach and the method they used for teaching were focal points. In examining in what way pedagogical barriers were overcome, three themes emerged: C*ontinual Change, Appropriate Resources,* and *Preparing Students.*

Continual change. This theme focused on the frequent change of hardware devices, the number of available devices, and changes in software. Todd suggested that the perpetual change in platforms, hardware devices, and software products acts as a barrier. Teachers are unwilling to learn how to use a product in teaching when it is in a state of continual flux. In his words, "It will be the people who are best at it who will be the people who can change and adjust with the changing world" (Todd, January 8, 2016). Todd felt his teachers viewed technology as one way to teach, not the main vehicle to instruction. He said his teachers found technology useful for differentiating instruction, communicating with parents, or group work. He expressed that many of his teachers feel frustrated with hardware and software updates. He put it succinctly when he said, "no sooner than you master that app…there's an update and they change something" (Todd, January 8, 2016).

Another challenge Todd noted was changing operating system platforms, when a user goes from a Macintosh computer to a Windows computer. He noted he could overcome that challenge, teachers learning to integrate technology may not be able to do so when he said, "And no sooner than you master that app for that first year for that teacher that's really learning technology there's an update and they change something" (Todd, January 8, 2016). He felt teachers were motivated to overcome these barriers when they observed how using technology made differentiating instruction, communicating with parents, and using group work easier for teachers.

Tina felt there was a pedagogical gap between veteran teachers and beginning teachers. She felt younger teachers had been immersed in technology and were quicker to learn to use new technologies and integrate them into their classrooms. In her view, pedagogical barriers were higher for veteran teachers than they were for beginning teachers. She expressed this when she said being, "comfortable with technology I think is a growing process" (Tina, December 9, 2015). She noted teachers needed to be comfortable using technology to integrate technology into teaching.

One change Tina noted was the increased mobility of technologies in use in classrooms. She lauded this mobility for student learning, saying students could find quiet spots for working with focus on digital journals. She had students take pictures, record themselves reading, and write peer reviews on classmates' work. The increased mobility, a change from immobile desktop computer labs, provided more opportunities for independent student-centered learning over lectured-based and whole group work. The change in hardware devices allowed, she felt, more exposure to the technologies as well

as increased independence in learning. She described this as, "it's a huge difference in how I teach because they're so much more independent "(Tina, December 9, 2015).

Teresa agreed that beginning teachers were more at ease using technology in the classroom. She described negativity of veteran teachers towards the constant changes in technology. She helps willing teachers to overcome pedagogical barriers through pointing out how technology can save time, offering peer support, and cheering colleagues on when they experience successes. Teresa worked closely with a co-worker and this helped them both overcome pedagogical barriers to using technologies for student learning. One example she shared were exit tickets. These used to be paper tickets with questions related to the lesson that students had to answer to use the door. Now she uses an app that alerts her when a student is ready to answer their exit ticket. Even though this was a simple change and didn't necessitate a change in the method of teaching the lesson, it was a small change in the delivery of the lesson closing. She felt demonstrating this small change was helpful in assisting other teachers to adapt to technology use.

Patricia felt while technology made some teachers uncomfortable most teachers at her school enjoyed learning about and using new technologies in the classroom. Teachers at her school work together to encourage one another and exchange information about using technology. The technology integrator is also available to go into classrooms to help teachers overcome barriers impeding their use of technology in the classroom. She described the hurdle of using Smartboards over Starboards. Teachers found the while some lessons transferred easily, some lessons had to be recreated. Teachers were reluctant to adapt to this change in hardware. The tech support person worked with

teachers both individually and in groups to overcome this upgrade in hardware and associated software. This school also provided a professional development course in using the Smartboards. She felt her teachers were happier using the Smartboards once they overcame their initial reluctance to accept the change in hardware.

Raymond observed a reemerging barrier. He described the situation at one school in his district where bandwidth was used up at one building which shared its connectivity with the administration building. At this school, the change to technology use was so fast it presented a first order barrier. He said some teachers emerged as leaders who helped colleagues over the swift change in his district. For this school, it was a bit different, as technology devices were integrated very quickly without much teacher preparation and so this barrier was high for these teachers. The school offered much professional development, one-on-one time with a technology integrator, and peer support. Raymond reiterated that teachers are reluctant to depart from familiar pedagogies to alternate pedagogies, like project-based learning, that are enhanced by the integration of technology and promote student achievement.

Change is unsettling and interviewees noted that technology, both hardware and software, is continually changing. Patricia and Todd felt that change brings improvement in hardware and software, the constant change raises barriers for some educators. Interviews agreed that the continual changes in technology can be annoying, the path to successfully overcoming this barrier starts with realizing how technology use benefits students. To successfully overcome this pedagogical barrier to technology integration, educators need to see how using technology improves efficiency in differentiating

instruction, communicating with parents, and group work. Teachers who successfully overcame these pedagogical barriers were able to adapt to changes in hardware and software.

Appropriate resources. This subtheme included finding grade level and age appropriate materials and specific content area appropriate technologies. Rachel, Tessa, Tina, and Raymond described the difficulty in finding grade level appropriate resources for specific lessons or content areas. This challenge raised pedagogical barriers to integrating technology in teacher classrooms. Participants discussed ways they lowered and overcame these pedagogical barriers to integrate technology into their classrooms.

Rachel described how she used technology to include students below grade level in writing activities. She had students draw stories in picture form and then record the story. She found that this simple way to integrate technology into a writing lesson motivated students to write longer, more in depth stories and she had students return to these stories later during reading lessons to enhance reading fluency. She summed up the reasons for overcoming these pedagogical barriers when she said it is important to expose students to technology so they can be successful in their future lives. Rachel stated:

> I just think that, in this day and age, you know, it's so important that we are
> exposing kids to current technology. Because the ultimate goal is for them to be
> productive citizens. And in this day and age, you have got to know how to use
> technology. So the more experiences that we can give them, the better we are
> preparing them for the real world.

She successfully changed her pedagogical methods to better prepare her students for the *real* world.

Tina integrated the use of six iPads into her classroom of 25 students. She liked to keep students active, rather than quietly seated at their desks. She related how she reviews iPad apps before downloading them for her students and that is the primary way she locates appropriate resources for integration. Tina likes to differentiate for every student and provide independent work. She shared how she integrated digital journals, where students upload pictures, record themselves, and peer review the work of others. She remarked that she used these sorts of activities for independent practice, insinuating that a mini-lesson to teach the concept has already occurred. Tina felt it was important to reiterate that she is preparing students for their futures and for future jobs. She shared concerns that others would perceive her use of technology as the integration of games only and not educational content.

Tessa overcame the availability of appropriate resources by integrating her limited number of iPads into daily Reading Centers' work. She also used the iPads for integrating into vocabulary studies where students created a six-word summary and a visual of each vocabulary word. She used the Smart Board to integrate into math lessons and then integrated iPads for reinforcement activities. Tessa successfully overcame pedagogical barriers to include technology in the subjects she teaches and is one of the technology coaches at her school. She was excited about using technology and loved to share her enthusiasm. In addition to in school experiences, the school leadership enabled Tessa to attend a state technology conference, where she reaped additional ideas for

overcoming pedagogical barriers. She valued using technology on a consistent basis and does not view the integration of technology into her lessons as an add-on. She shared that talking with peers and bouncing ideas off of others influenced her the most to change her pedagogical approaches to integrate technology as well as helping her locate appropriate resources.

Raymond offered professional development sessions to his teachers to help them find apps to enhance their classroom instruction. He admitted some teachers use the technology to occupy learners while they grade papers but he encouraged teachers to be more involved with technology use, to integrate technology into lessons, and to seek out apps they could use for their classrooms. He found that his teachers are able to overcome pedagogical barriers by focusing on the positive impact integrating technology has on student achievement, when they are given the planning time and modeling of apps in action. Not only did Raymond provide professional development sessions for planning and modeling, but he broadcast technology tips on the district Facebook page. He believed that by making the technology tips public, the parents were able to see and influence their children's teachers to integrate technology. Another way Raymond encouraged his teachers to overcome pedagogical barriers was by hosting a 'Technology Lounge" where educators shared with their peers how they were integrating technology and the grade level / content area resources they found. In his school, when he offered a lounge for three consecutive hours, teachers received credentialing credit towards their state teaching licenses. He felt it was important that his teachers answered parents who asked what they were doing to prepare students for their futures.

In summary, educators overcame the pedagogical barrier of locating appropriate resources by integrating technology into the practice section of lessons, where apps existed for artifact creation at multiple grade and age levels, sharing with colleagues, and attending professional development sessions. Raymond mentioned that he provided professional development trainings that included age and grade appropriate resources while Tessa's school sent her to a state technology conference. While Raymond and Tessa talked about formal ways to locate appropriate resources, many educators reported that casual conversations with colleagues were influential. Educators were spurred to overcome this pedagogical barrier by their goal of preparing students for their futures.

Preparing students. This subtheme included preparing students for their futures including careers which will most certainly use technology. Todd summed up this sentiment when he declared that, "we are doing a disservice if we are not preparing them for the future, and the future is technology" (Todd, January 8, 2016). Students will be using technology in their futures. As Tina related, the students she teaches will be entering jobs or college in 10-15 years. They will be using technology to earn money or earn degrees, so she emphasized the need to integrate technology in the primary grades to prepare students for their futures. Todd felt teachers could overcome this barrier by letting go of the past and looking to the future.

Raymond heard parents asking how teachers were preparing their children for the future. As a technology coach in his district, he observed students that were promoted from primary to middle school and then to high school. He found students and their teachers more comfortable using technologies if they had previous experiences using

technology in lower grades. He shared that alumnae of his district said they were better prepared for jobs or higher education by the integration of technology into their classroom learning. He shared these alumnae stories with the school board and the community surrounding the school. He felt it was important to include all stakeholders in integrating technology and ultimately in preparing students for their futures.

Rachel felt it was important to use current technologies with students because her goal was to create productive citizens. She strongly felt citizens needed to use technology and the best way to prepare students for the world was to expose them to many technologies. She felt that whether her students chose to go on to careers or higher education, they needed to be experienced in using technology. Tina shared the sentiment that it was important to her to prepare her students for their future. She said that the students she teaches in primary school today, will be entering the job force or college in the next decade. She felt they will be using technology heavily, no matter their life course. She felt having a class set of iPads was useful in preparing her students, but said she would use a laptop cart, computer lab, or even desktop computers in her classroom to integrate technology if the iPads were not available to her.

Patricia observed that many of the teachers at her school were trying to move away from pedagogical methods where the teacher stands in front of the class lecturing. She felt her teachers were preparing students for their futures by using alternate pedagogical methods that made the integration of technology easier. She felt it was important to be intentional about showing technology integration to teachers. She shared

that prospective families choose their school for how it prepares students for their future lives.

Tina felt that students in this century need teachers who reach out to them with technology. She felt teachers were not relevant or engaging students. Tina shared that using technology in the primary grades helped students use technology effectively in their future lives. While she felt being comfortable using and integrating technology was a growing process for teachers. She felt she was able to quickly manipulate technology and integrate into her lessons. She acknowledged she was never taught how to integrate technology into her teaching but she overcame this pedagogical barrier through the support of her colleagues. She emphasized that she prepared students for future jobs and/or college where they will be working on computers. She felt that to prepare these students, a teacher must be integrating technology.

Interviewees spoke about their focus on preparing students for their future lives beyond primary and secondary school. Todd, Tina, and Rachel talked about preparing students to work with technology in the workforce or in higher education. The educators with whom I spoke felt teachers overcame this barrier by letting go of the past and looking to the future. Those who successfully overcame this pedagogical barrier to technology integration focused on the future lives of their students.

Summary

The data were examined to discover how elementary teachers in one rural northeastern school district overcame barriers that prevent them from integrating technology into their classrooms for student learning. The literature has shown that first-

order barriers are largely overcome in this country (Ertmer, 1999). The focus has turned

to assisting educators in overcoming second-order barriers, such as attitudinal barriers,

social and cultural barriers, and pedagogical barriers. This study revealed a reemergence

of a first-order barrier at one school involving connectivity issues. Chapter 5 will

interpret the data with respect to the purpose of the study, possible interpretations of the

data, and how the results were related to the conceptual framework which informed this

study, namely the social cognitive theory of Bandura and the groundwork laid by Ertmer

on barriers to technology integration.

Chapter 5: Discussion, Conclusions, and Recommendations

The purpose of this qualitative multiple case study was to identify how elementary school teachers in a one rural northeastern district overcome attitudinal, social/cultural, and pedagogical barriers that prevented them from integrating technology into their classrooms for student learning. This multiple case qualitative research study was undertaken to investigate how teachers successfully overcame attitudinal, social/cultural, and pedagogical barriers to technology integration in a northeastern school district. The study included interviews with participants from three schools in one rural northeastern USA.   The purposive sample, including two to three classroom teachers, one administrator, and one technology support personnel in each of three schools, was used to collect relevant data and add confidence to the findings.

The conceptual framework that informed this study included the social cognitive theory of Bandura and the groundwork laid by Ertmer on barriers to technology integration. The research questions examined how teachers overcame attitudinal barriers, social/cultural barriers, and pedagogical barriers to integrating technology into their classrooms for student learning. The findings revealed that teachers who overcame barriers to technology integration did so in three areas namely they overcame attitudinal barriers, social/cultural barriers, and pedagogical barriers. During the interviews the following themes emerged for Research Question 1: *Adaptability, Evolution of Tech Skills, Peer Support,* and *Professional Training.* The following themes emerged for Research Question 2: *Required Software, Status Quo,* and *Unvalued*. The following

themes emerged for Research Question 3: *Continual Change, Appropriate Resources,*

and *Preparing Students.* The results of this study may be useful to administrators looking

for ways to have teachers in their schools overcome barriers to technology integration as

well as to educators seeking to overcome barriers on their own.

My study found that administrators supported and encouraged teachers to

integrate technology. This support helped teachers successfully overcome obstacles to

technology integration. Administrators influenced teachers to integrate technology by

scheduling professional development focused on the use of technology in-house as well

as enabling teachers to attend conferences outside of the school building, and providing

asynchronous online trainings. Administrators were also able to influence overcomers by

encouraging collegial sharing and offering technology support to teachers without the

stigma of requiring software or hardware use. My study also found administrators who

placed value in technology for education, who conveyed their understanding that

technology skills evolve over time, and encouraged teachers to prepare instruction that

did not perpetuate the status quo of traditional, lecture-based lessons were able to propel

their teachers over barriers to successful integration of technology.

Technology integration specialists indicated that talking with teachers privately,

pairing teachers with fellow teachers who successfully integrate technology, and visiting

teachers in their own classrooms were strategies that best helped teachers overcome

barriers to technology integration. Patty and Ruth shared that teachers are often hesitant

to ask questions about technology use because they "feel like they're asking a stupid

question. And Because they're a competent professional, they don't want to appear

stupid" (Patty, March 16, 2016). Both technology integration specialists visit teachers in their own classrooms after the school day to build rapport with teachers and provide a private space in which teachers can ask questions. Truman shared during his interview that it was helpful to pair new teachers with teachers who have successfully integrated technology. My study found that integration specialists helped teachers overcome barriers to technology integration by providing privacy, pairing teachers with technology using teachers, and visiting teachers in their own classrooms where they will use integrated technology during lessons.

In addition to the help of administers and technology integration specialists, teachers found there were ways they could overcome barriers to technology integration whether or not they had the support of administrators or technology support. By focusing on the benefits to students, teachers were propelled to put aside the annoyances of changing hardware and software and difficulties in locating appropriate resources. To successfully overcome barriers to technology integration, educators focused on how the use of technology improved their efficiency in differentiating instruction, communicating with parents, and group work. My study found that teachers who talked with peers, shared ideas, and supported each other could overcome barriers to technology integration on their own.

Interpretation of the Findings

This study examined three influences that affected technology integration. By technology integration this research meant using computer- or digital- tools to support the teaching and learning processes that took place in K-5 grade classrooms in a northeastern school district. Attitudes, social connections and cultural landscapes, as well as pedagogical methods work together to affect how educators implement technology in their classrooms. The social cognitive theory of Bandura and the groundwork laid by Ertmer on barriers to technology integration were used to analyze the results of this qualitative study. Bandura's theory emphasized the connections between internal and external factors that interact to produce behavior. Visualizing this theory as a triangular model with personal, behavioral, environmental factors interacting to determine a person's actions, it is seen that no one factor acts alone to influence behavior. The findings were used to answer the following research questions.

Research Question 1

The first research question asked how K-5 teachers overcame attitudinal barriers to technology integration in a northeastern school district. Four themes emerged from the data collected: *Adaptability, Evolution of Technology Skills, Peer Support, and Professional Training*. Elementary teachers who successfully overcame these attitudinal barriers by being adaptable with lessons and time management realized technology integration skills progress over time, and sought support from their teaching peers. Administrators who supported teachers in overcoming attitudinal barriers to technology integration by highlighting the positive effects of technology integration on student

achievement, encouraging peers to support one another, and providing professional development opportunities for educators.

Researchers have studied how attitudes affect technology adoption (Celik & Yesilyurt, 2013; Challoo et al., 2010; Ertmer et al., 2012; Frick 2012; Kim, Kim, Lee, Spector, & DeMeester, 2013; Mama and Hennessy,2013; Tondeur et al., 2016; Zehra & Bilwani, 2016). Ertmer et al. (2012), whose work was the foundation for this study, found that attitudes of award-winning teachers affected technology integration. Holden and Rada (2011) in their study of two rural schools in Virginia found technology integration was affected by several factors, among them ease of use, perceived benefits of use, and the intention to use. Sadaf, Newby, and Ertmer (2013) found that attitudes about perceived usefulness of a digital tool were the strongest indicator of a preservice teachers' intention to use that tool.

The results are supported by the conceptual framework of Bandura (2002) who stated that a blend of influences resulted in behavior. The results are also supported by the groundwork laid by Ertmer et al. (2012) who noted the attitudes of educators affected their technology use. This study's findings confirmed both the conceptual framework of Bandura and the groundwork laid by Ertmer. Technology use is affected by personal attitudes, social environments, cultural landscapes, and pedagogical methods. Although Aslan and Zhu (2016) made the point that in-service teachers at the beginning of their teaching careers needed more training to relieve technology integration anxiety, there are now teachers entering the profession who are comfortable with using technology. In my study a similar trend was noted. One teacher in my study, Tina, was a young teacher who

was very comfortable using technology and easily overcame barriers to integrate technology into her classroom. Aldunate and Nussbaum (2013) noted that early adopting teachers integrated technologies in their teaching more quickly than their colleagues. The teachers in my sample were all early adopters, chosen by their administrators as teachers who successfully overcame barriers to technology integration. The findings of my study differed from the finding of Aslan and Zhu because beginning teachers did not have technology integration anxiety and reported that their professional training had prepared them to integrate technology successfully. Their findings hold for teachers who have been in the teaching field for several years, and especially for those nearing retirement age, as these mature teachers do have technology integration anxiety.

Brun and Hinostroza (2014), in their study of Chilean educators, found that lack of time was a barrier to integration of technology in teaching and this study's result support that finding. Administrators who wish to assist their teachers in overcoming this barrier can schedule professional development times for teacher planning and technology investigations. Kim, Kim, Lee, Spector, and DeMeester (2013) found a significant correlation between teacher beliefs and technology integration. In my study, educators expressed the need for planning time to integrate technology. They felt time for exploring technologies and planning lessons which integrated technology were needed to assist them in successfully overcoming barriers to technology integration. Participants in my study found the time and did successfully integrate technology. Their administrators supported them by providing in-school professional development days when teachers are released from classes to work on lesson preparations. This study found that

administrators who established set meeting times for professional development and technology demonstrations, provided online or in-person professional development opportunities, and supported collegial sharing during more informal times helped their teachers to overcome these attitudinal barriers.

Research Question 2

The second research question asked how K-5 teachers overcame social/cultural barriers to technology integration in a northeastern school district. The study examined how the surrounding community, both inside and outside of the school building, affected teachers who successfully overcame social/cultural barriers in order to integrate technology into their classrooms.

Teachers in grades kindergarten through 5th grade or ages five through age ten (known as elementary school in the USA) who successfully overcame social/cultural barriers set up by required software, maintaining the status quo, and placing value on technology for education had support of those around them in overcoming these barriers successfully. Participants were supported by their peers, their administrators, and the parents of their students in successfully overcoming barriers. Administrators who supported these teachers scheduled trainings in school and outside of school, promoted and provided time for collegial sharing, while offering supports to teachers but not requiring compliance.

In a review of the literature, it was found that that teachers who successfully integrated technology were supported by their peers and administrators in using technology (Al-Mashaqbeh, 2012; Ames, 2017; Ertmer & Ottenbreit-Leftwich, 2010; and

Wang & Tang, 2014). Research noted that teachers who perceived technology as useful to students were more likely to be successful in integrating that technology. In my study, one interviewee's comment stood out and summed it up when she said, "if you truly think it will help your students you will find the time for it" (Tina, December 9, 2015). My study also found the support of colleagues and administrators was influential in whether technology was integrated for student learning.

Ertmer et al. (2012) reported the beliefs of other teachers in a school were the greatest barrier to the use of technology in a teacher's own classroom. In her study of award winning teachers, it was found that personal beliefs were not the barriers to overcome but the attitudes of other teachers in the school raised barriers to successful technology integration. Kraft and Papay (2014) discovered that teachers who work in supportive environments were better at raising student achievement on standardized tests than teacher who worked in less supportive environments. Research also has shown that student achievement improved when technology was integrated into instruction (Cifuentes et al., 2011; Eliot & Mikulas, 2012; Shapley, Sheehan, Maloney & Caranikas-Walker, 2010; Sheehan and Nillas, 2010).

In my study, I found that administrators could positively influence the integration of technology by supporting teachers to overcome social/cultural barriers to technology integration. Administrators could support teachers by scheduling trainings in the school building as well as enabling teachers to attend conferences outside of the school building. Administrators were also able to influence overcomers by encouraging collegial sharing

and offering technology support to teachers without the stigma of requiring software or hardware use.

Research Question 3

The third research question asked how K-5 teachers successfully overcame pedagogical barriers to technology integration. Three themes emerged during the interviews, *Continual Change, Appropriate Resources,* and *Preparing Students.* Teachers who successfully overcame pedagogical barriers could adapt to changes in hardware and software, were able to locate appropriate resources for their grade/age levels and for content areas, and were focused on preparing students for their futures.

Ertmer and Ottenbreit-Leftwich (2010) found that attitudes and values were difficult to change because they were interconnected. Ertmer (2005) felt teacher values were the highest barrier impeding the successful technology integration. Other studies concluded that attitudes, social surroundings, and cultural issues influenced teachers to integrate or not integrate technology (Blackwell, Lauricella, Wartella, Robb, & Schomburg, 2013; Chai, Koh, & Tai, 2013; Ching & Hursh, 2014; Haley-Mize, 2014; Ottenbreit-Leftwich et al., 2015). In my study, the constant change in hardware, upgrades in software, and bandwidth issues all worked together to raise barriers to technology integration. Participants in my study overcame these barriers by supporting each other in adapting to hardware/software changes, assisting one another in locating appropriate resources, and kept their focus on preparing students for their future lives past the K-12 school environment.

One administrator, Raymond, talked about a reemerging barrier because of one school sharing its IP address with the administration building. Teachers were unable to use technology at the same time during the school day. Ertmer (1999) declared first-order barriers overcome in the USA. In my study of a northeastern school district, connectivity issues raised this barrier for teachers to overcome. Despite barriers raised by the changes in hardware, improvements in software, and the connectivity issues, teachers were able to successfully overcome these barriers by focusing on the benefits to students. By integrating technology, teachers could more efficiently differentiate instruction, communicate with parents, and facilitate group work.

Teachers also talked about finding grade level/age appropriate materials as well as specific content area resources. Pan and Franklin (2011) found administrative support was predictive of technology use in the classroom and suggested that professional development sessions focus on the use of technology. My study found that administrators supported and encouraged teachers to integrate technology, and this support helped teachers overcome obstacles. Teachers shared that professional development included sessions on integrating technologies into teaching, including both hardware available in classrooms and software relevant to teaching in K-5 classrooms.

Ertmer (1999) noted the removal of first-order barriers impeding technology integration in this country. Despite the reemergence of a first-order barrier in my study, difficulty in locating age appropriate or content specific resources, teachers successfully overcame this barrier and focused on preparing their students for their futures in higher education or in the workforce. Participants in my study overcame these barriers by

supporting each other in adapting to hardware/software changes, assisting one another in locating appropriate resources, and kept their focus on preparing students for their future lives past the K-12 school environment.

Limitations of the Study

This study was framed by the K-5 educational environment and took place in one rural northeastern school district. Each of the three cases included an administrator, an integration specialist, and two or three classroom teachers. The teachers in this study were all female, while two thirds of the administrators were male, and two thirds of the IT personnel were also male. The small number of participants drawn from one profession in one region of the country limited the transferability of findings to other situations.

The purpose of this study was to discover how K-5 educators overcame second-order barriers to technology integration in their classrooms. Analytical generalizations were found using social cognitive theory. Yin (2013) supported the use of analytical generalizations in case study research and the analytical generalizations drawn in this study may be useful in the identification of strategies for overcoming second-order barriers that K-5 educators might perceive in other locations. The results of this study are of greatest use to administrators who wish to assist their teachers in successfully overcoming barriers to technology integration.

A limitation of the study may be that participants taught in the rural northeastern area of the United States. Different patterns, categories, and themes may have emerged in the data had the sample population been drawn for urban districts, districts in different

geographical locations, or from international locations. The results of this study are most applicable to administrators and school board members who may choose to transfer findings to their own districts.

Recommendations for Further Research

The current study sought to identify how elementary school teachers in one rural northeastern district successfully overcame attitudinal, social/cultural, and pedagogical barriers that prevented them from integrating technology into their classrooms for student learning. Yin (2014) recommended using case study research when the research question(s) asked how or why, when the researcher could not control the events, or when the research focused on present events. Further research should include research using quantitative as well as qualitative methods to further validate findings. The following recommendations for action were implied by the results of this study. Administrators who wish to increase the number of teachers in their schools who have successfully overcome barriers to technology integration may be especially interested in this section.

1. Further research is needed on the pedagogical beliefs of teachers and how they influence their use of technology for student learning. Teachers who advocate student-centered learning and constructivist methods integrate technology more often that teachers who use traditional teacher-centered methods (Ertmer et al., 2012). A qualitative research study focusing on teachers who successfully integrate technology using these strategies of learning, would provide insight into how pedagogical practices are influenced by the integration of technology and if

those pedagogical practices change as teachers become adept at integrating various technologies.

2. Further research is needed on the reemergence of first-order barriers due to the influx of hardware devices in schools with infrastructures not able to handle the additional load. Ertmer (1999) noted that first-order barriers where overcome in the United States, but in my study a reemergence of a first-order barrier was seen. A quantitative survey instrument could gather information from schools to identify those who are dealing with the reemergence of this barrier. This would be a first step in affecting solutions to overcoming this barrier.

3. Further research is needed on the influence technology integration exerts on reading and writing. Research has shown that student achievement improved when technology was integrated into instruction (Cifuentes et al., 2011; Eliot & Mikulas, 2012; Shapley, Sheehan, Maloney & Caranikas-Walker, 2010; Sheehan and Nillas, 2010). This study's participants expressed motivation to overcome barriers when they observed increased student achievement. A study within the same geographic area linking technology integration with student achievement may propel more educators to overcome attitudinal, social/cultural, and pedagogical barriers to technology integration in their classrooms. A mixed methods study including interviews with successful overcomers coupled with standardized test results showing student progress in reading and math scores could reveal the influence technology integration exerts on reading and math.

4. Further research which gathers participant responses through qualitative interviews triangulated with classroom observations and administrative interviews is needed to confirm or refute this study's findings. Future studies may highlight the connection between teachers' beliefs and technology integration by taking data collection one step further into teachers' classroom to observe technology integration (Challo, Green, & Maxwell, 2010; Dartt, 2011; Ertmer et al.,2012; Kim, Kim, Lee, Spector, & DeMeester ,2013). Classroom observations could strengthen the findings in further research.

5. Further research is needed to discover the most effective ways for administrators to positively influence teachers to overcome attitudinal, social/cultural, and pedagogical barriers to technology integration. Studies using different population samples may produce similar or different study results. Several studies found that administrators influence technology use in the classroom (Al-Mashaqbeh , 2012; Ertmer et al., 2012; Iscioglu ,2011; Weng and Tang ,2014). Further studies could find repeated connections between attitudes and technology use.

Implications for Social Change

In the 2011 Project Tomorrow report, the US Department of Education found 61% of elementary teachers believed using technology increased the motivation of their students to learn content. But less than one-half of elementary teachers used technology in their classrooms to engage students in learning. The findings for the present study contribute to social change by increasing the knowledge of how to successfully overcome

barriers preventing integration of technology into the K-12 classroom. From this knowledge, strategies to lower these barriers may be designed.

Recommendations for Action

The following recommendations for action resulted from this study. Administrators who wish to increase the number of teachers in their schools who successfully overcome barriers to technology integration may be especially interested in this section. As Weng and Tang (2014) noted, effective administrators are influential in whether teachers overcome barriers to integrating technology.

1. During data collection, educators expressed the need for planning time to integrate technology into their lessons. Educators said that a lack of in school planning time set up a barrier to successful technology integration. Brun and Hinostroza (2014) found a lack of planning time to be a barrier to integration of technology and this is supported by the findings of this study.

2. The support of one's peers was a frequent theme found in my data. The literature supports the influence of the surrounding social environment (Ames, 2017; Ertmer & Ottenbreit-Leftwich, 2010; Kaba & Osei-Bryson, 2013; Richardson & McLeod, 2011). Administrators can encourage collegial sharing, both informally and formally. By setting a regular schedule for teachers to share how they are integrating technology into lessons, and giving teachers control over these times, administrators can positively impact the integration of technology.

3. Professional development workshops offered to in-service teachers increased the amount of technology integration in several studies (Ertmer et al., 2014; Pan &

Franklin, 2011; Liu, 2011; Rienties, Brouwer, & Lygo-Baker, 2013; Skoretz & Childress, 2012). Participants in this study were assisted in successfully overcoming barriers to technology integration by attending pertinent professional development activities arranged by their administrators.

4. Assist educators in developing new teaching methods and practices that will supplant teacher-centered lecture based methodologies. Research has suggested it is easier to change practices than beliefs and that by so doing, change in beliefs is affected (Andersson, 2017; Etmer, Ottenbreit-Leftwich, & Tondeur, 2017; Guskey ,1986)

5. Encourage teachers to integrate technology conjointly with professional development and peer supports. The use of technology is a process which can improve efficiency in differentiating instruction, communicating with parents, and group work. A review of the literature and results from this study found that social surroundings and cultural issues influenced this process (Blackwell, Lauricella, Wartella, Robb, & Schomburg, 2013; Chai, Koh, & Tai, 2013; Ching & Hursh, 2014; Haley-Mize, 2014; Ottenbreit-Leftwich et al., 2015).

6. Bandura (2002) noted that the transmission of culture was influenced by observational learning. Administrators can influence the school culture by scheduling teacher observations of peers integrating technology. This would entail scheduling substitutes to cover classes and pairing up teachers with colleagues to observe. This is in line with Hammonds, Matherson, Wilson, and Wright (2013)

who pointed out that teachers need to see how technology is used before they can successfully integrate it in their own classrooms.

Conclusion

This qualitative multiple case study research explored how K-5 teachers in the northeast successfully overcame barriers to technology integration. Foundational concepts were drawn from Bandura's work on social cognitive theory and from Ertmer's groundwork on second order barriers to technology integration. During analysis, themes emerged indicating the importance of peer support among colleagues; professional training, both in-house, online, and at conferences; locating appropriate grade-level/age appropriate resources; and providing supportive training to help teachers use specific programs or hardware. The study also found that educators should be focused on preparing students for their futures beyond the K-5 school, placing value on educational components of technology use, and changing the traditional ways in which K-5 education has been conducted. The results of this study are particularly useful to administrators looking for ways to have teachers in their schools overcome barriers to technology integration, as well as to educators seeking to overcome barriers on their own.

In my study, it was found that administrators who wished to support teachers in successfully overcoming barriers to technology integration supported and encouraged their teachers. This support helped teachers successfully overcome obstacles to technology integration. Administrators exercised influence by scheduling professional development focused on the use of technology in-house, enabling teachers to attend conferences outside of the school building, and by providing asynchronous online

trainings. Administrators were also able to influence overcomers by encouraging

collegial sharing and offering technology support to teachers without the stigma of

requiring software or hardware use.

Administrators had an impact on the successful integration of technology by

scheduling professional development for teachers to share with each other, support each

other, and learn from each other. In my study, administrators scheduled after school

meetings, half-day meetings, whole day meetings, or utilized an hour after school in the

afternoons. Providing time for peer support to happen influenced teachers to successfully

overcome barriers to technology integration. My study also found administrators who

placed value in technology for education, who conveyed their understanding that

technology skills evolve over time, and encouraged teachers to prepare instruction that

did not perpetuate the status quo of traditional, lecture-based lessons were able to propel

their teachers over barriers to successful integration of technology.

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Appendix A: Letter of Invitation for Teachers, Technology Support, and Administrator

Date

Dear Teacher [Teacher's Name goes here],

Because you are a person who successfully uses technology in your teaching, I would like to invite you to participate in a study I am conducting to discover how you overcame barriers to tech integration. Your principal gave me your name as a person who uses technology in your teaching. The name of my study is *Overcoming Barriers to Technology Integration in K-5 Schools* and I would like your insights into this topic.

I would like to have a one-hour interview with you during March 2015. I will coordinate the exact times for an interview with you so it does not disrupt your instructional activities.

If you agree to be part of this research project, please answer a short survey regarding your use of technology in the classroom below. If you prefer not to be involved in this study, that is not a problem.

If circumstance change or if you have any questions, please contact me via email at lisa.durff@waldenu.edu or (215) 644 7982.
 Thank you for your consideration. I will be pleased to share the results of this study with you when it is finished.

Please reply to this email with your responses to the survey below if you are willing to participate in my study.

Sincerely,
Lisa Durff

Printed Name of Teacher
Date

Teacher's Written or Electronic* Signature

Researcher's Written or Electronic* Signature

How do you use technology in the classroom?

☐ I allow students to use technology for creating projects that demonstrate their learning.

☐ I allow students to use technology for projects in the classroom.

☐ I use presentation software for my lessons without students using technology in the classroom.

Electronic signatures are regulated by the Uniform Electronic Transactions Act. Legally, an "electronic signature" can be the person's typed name, their email address, or any other identifying marker. An electronic signature is just as valid as a written signature as long as both parties have agreed to conduct the transaction electronically.

Date

Dear Technology Support [Technology Support Person's Name goes here],

Because you work with teachers who successfully use technology in teaching, I would like to invite you to participate in a study I am conducting to discover how teachers at your school overcame barriers to tech integration. The name of my study is *Overcoming Barriers to Technology Integration in K-5 Schools* and I would like your insights into this topic.

I would like to have a one-hour interview with you during March 2015. I will coordinate the exact times for an interview with you so it does not disrupt your instructional activities.

If you agree to be part of this research project, please answer a short survey regarding your use of technology in the classroom below. If you prefer not to be involved in this study, that is not a problem.

If circumstance change or if you have any questions, please contact me via email at lisa.durff@waldenu.edu or (215) 644 7982.
 Thank you for your consideration. I will be pleased to share the results of this study with you when it is finished.

Please reply to this email with your responses to the survey below if you are willing to participate in my study.

Sincerely,
Lisa Durff

 Printed Name of Teacher
                                                           _____

Date   _____

Teacher's Written or Electronic* Signature   _____

Researcher's Written or Electronic* Signature _____

How do you use technology in the classroom?

☐ I allow students to use technology for creating projects that demonstrate their learning.

☐ I allow students to use technology for projects in the classroom.

☐ I use presentation software for my lessons without students using technology in the classroom.

Electronic signatures are regulated by the Uniform Electronic Transactions Act. Legally, an "electronic signature" can be the person's typed name, their email address, or any other identifying marker. An electronic signature is just as valid as a written signature as long as both parties have agreed to conduct the transaction electronically.

Date

Dear Administrator [Administrator's Name goes here],

Because teachers at your school successfully use technology in teaching, I would like to invite you to participate in a study I am conducting to discover how teachers overcame barriers to tech integration. The name of my study is *Overcoming Barriers to Technology Integration in K-5 Schools* and I would like your insights into this topic.

I would like to have a one-hour interview with you during March 2015. I will coordinate the exact times for an interview with you so it does not disrupt your instructional or administrative activities.

If you agree to be part of this research project, please answer a short survey regarding your use of technology in the classroom below. If you prefer not to be involved in this study, that is not a problem.

If circumstance change or if you have any questions, please contact me via email at lisa.durff@waldenu.edu or (215) 644 7982.
 Thank you for your consideration. I will be pleased to share the results of this study with you when it is finished.

Please reply to this email with your responses to the survey below if you are willing to participate in my study.

Sincerely,
Lisa Durff

Printed Name of Administrator

Date _____

Administrator's Written or Electronic* Signature _____

Researcher's Written or Electronic* Signature _____

How do teachers in your school use technology in the classroom?

☐ \They allow students to use technology for creating projects that demonstrate their learning.

☐ They allow students to use technology for projects in the classroom.

☐ They use presentation software for lessons without students using technology in the classroom.

Electronic signatures are regulated by the Uniform Electronic Transactions Act. Legally, an "electronic signature" can be the person's typed name, their email address, or any other identifying marker. An electronic signature is just as valid as a written signature as long as both parties have agreed to conduct the transaction electronically.

Appendix B: Interview Protocol and Questions for Teachers, Tech Support, and

Administrator

Teacher Protocol / Questions

Demographic Data

Name:_____ Age: _____

Occupation: _____

Opening Statement

Good morning. Thank you for meeting with me to day in order to discuss how you have overcome barriers to integrating technology in your classroom. Your principal indicated you are a strong user of technology so I am excited to learn from you today.   I will be asking you to discuss how you overcome attitudinal, social/cultural, and pedagogical barriers to technology integration.

Before we begin the interview, I need for you to sign an informed consent indicating you agree to participate in my study. {give copy of form personally if interviewing face-to-face or Screen Share if electronically interviewing the person; allow time to sign and return}

I will be interviewing other teachers, an administrator, and a technology support person in your school and two other schools. Your participation in the interview is voluntary and you may opt out of the interview or decline to answer any question at any time. The interviews are expected to last approximately 45-60 minutes. Each interview will be a recorded audio or video call. Each participant will be provided with a copy of the transcript. You may make any correction or add additional thoughts at any time. The recordings and transcripts will be stored only on a removable hard drive for five years, at which time it will be destroyed. No identifiable information will be preserved or shared with anyone. Interviews will be scheduled with teachers during non-academic time only, such as homeroom, lunch, before/after school, weekends, or holidays.

Interview questions will be:
1. Describe your beliefs about effective ways of teaching using technology.
2. Describe how your teaching experiences have affected how you feel about using technology to teach students in your classroom.
3. Describe how you overcame your attitudes/anxieties/misgivings to technology integration.
4. How do the beliefs and practices of teachers in your school affect your use of technology? Please share an example.

5. How do the beliefs of the school community, including administrators, parents, and staff, affect the integration of technology into instruction for you or other teachers?
6. How would you get other teachers in your school supportive of the use of technology in their classrooms (overcoming barriers)?
7. Why do you think other teachers don't use technology? What are their barriers?
8. Describe the biggest pedagogical barrier(s) to integrating technology in your school.
9. How might that barrier(s) be overcome in order to encourage teachers to use technology in their teaching?
10. How could teaching methods best support the integration of technology into classrooms at your school?

Closing Question

We talked about how you became successful using technology in the classroom and the barriers you overcame. What question(s) should I have asked that I did not?

Thank you again for your willingness to participate in the interview. I will forward the transcripts to you and you may make any corrections to those at any time.

Tech Support Protocol/Questions:
Demographic Data

Name:_____ Age: _____

Occupation: _____

Opening Statement

Good morning. Thank you for meeting with me to day in order to discuss how teachers at your school have overcome barriers to integrating technology in classrooms. Your principal indicated there are strong users of technology at this school so I am excited to learn from you today. I will be asking you to discuss how teachers overcome attitudinal, social/cultural, and pedagogical barriers to technology integration.

Before we begin the interview, I need for you to sign an informed consent indicating you agree to participate in my study. {Give copy of form personally if interviewing face-to-face or Screen Share if electronically interviewing the person; allow time to sign and return}

I will be interviewing other teachers, and an administrator in your school and two other schools. Your participation in the interview is voluntary and you may opt out of the

interview or decline to answer any question at any time. The interviews are expected to last approximately 45-60 minutes. Each interview will be a recorded audio or video call. Each participant will be provided with a copy of the transcript. You may make any correction or add additional thoughts at any time. The recordings and transcripts will be stored only on a removable hard drive for five years, at which time it will be destroyed. No identifiable information will be preserved or shared with anyone. Interviews will be scheduled with teachers during non-academic time only, such as homeroom, lunch, before/after school, weekends, or holidays.

Interview questions will be:
1. Describe how you feel about the teachers you support using technology to teach students in their classroom.
2. Describe your teachers' beliefs about effective ways of teaching using technology.
3. Describe your teachers' beliefs about the importance of technology use in student learning.
4. Describe how your teachers overcame attitudes/anxieties/misgivings to technology integration.
5. How do the beliefs and practices of teachers in the surrounding classrooms affect a teacher's use of technology?
6. How do the beliefs of the school community, including administrators, parents, and staff, affect the integration of technology into instruction for those teachers you support?
7. How would you get teachers in your school interested in using technology in their classrooms?
8. Describe the biggest pedagogical barrier(s) to integrating technology in your school.
9. How might that barrier(s) be overcome in order to encourage teachers to use technology in their teaching?
10. How did your technology using teachers overcome barriers to using technology?

Closing Question
We talked about how teachers at this school became successful using technology in the classroom and the barriers they overcame. What question(s) should I have asked that I did not?

Thank you again for your willingness to participate in the interview. I will forward the transcripts to you and you may make any corrections to those at any time.

Administrator Protocol/Questions:

Demographic Data

Name:_____ Age: _____

Occupation: _____

Opening Statement

      Good morning. Thank you for meeting with me to day in order to discuss how teachers at your school overcome barriers to integrating technology in the classroom. You indicated teachers at your school are strong users of technology so I am excited to learn from you today.   I will be asking you to discuss how they overcame attitudinal, social/cultural, and pedagogical barriers to technology integration.

Before we begin the interview, I need for you to sign an informed consent indicating you agree to participate in my study. {Give copy of form personally if interviewing face-to-face or Screen Share if electronically interviewing the person; allow time to sign and return}

I will be interviewing other teachers, an administrator, and a technology support person in your school and two other schools. Your participation in the interview is voluntary and you may opt out of the interview or decline to answer any question at any time. The interviews are expected to last approximately 45-60 minutes. Each interview will be a recorded audio or video call. Each participant will be provided with a copy of the transcript. You may make any correction or add additional thoughts at any time. The recordings and transcripts will be stored only on a removable hard drive for five years, at which time it will be destroyed. No identifiable information will be preserved or shared with anyone. Interviews will be scheduled with teachers during non-academic time only, such as homeroom, lunch, before/after school, weekends, or holidays.

Interview questions will be:
1. Describe how your teachers feel about using technology to teach students in their classrooms.
2. Describe effective ways your teachers have overcome barriers to using technology for teaching.
3. Describe how your technology using teachers overcame their attitudes/anxieties/misgivings to technology integration.
4. In the current literature, a barrier some teachers were able to overcome was the negative attitudes towards technology integration of surrounding teachers. Did your teachers have to deal with this barrier and how did they overcome this barrier?

5. How do the beliefs of the school community, including teachers, administrators, staff, and parents, affect the integration of technology into instruction?
6. How do you think more teachers in your school could overcome barriers to technology integration?
7. Describe the biggest pedagogical barrier(s) your teachers face in integrating technology in your school.
8. How is that barrier(s) best overcome in order to support teachers' beliefs about teaching and learning?

Closing Question
We talked about how teachers at your school successfully overcame barriers to using technology in the classroom. What question(s) should I have asked that I did not?

Thank you again for your willingness to participate in the interview. I will forward the transcripts to you and you may make any corrections to those at any time.

Appendix C: Informed Consent Form for Teachers, Technology Support, and

Administrator

You are invited to participate in a research study about overcoming barriers to technology integration. This study is being conducted by Lisa Durff, a PhD candidate at Walden University under the direction of Dr. MaryFriend Shepard, Program Director for the Educational Technology Department. You were selected as a potential participant because of your ability to integrate technology into instruction.

Background Information:
The purpose of this study is to identify how elementary teachers in rural northeastern schools overcome barriers that prevent them from integrating technology into their classrooms for student learning.

Procedures:
If you agree to participate you will be asked to:
- Participate in 60 minute interview using the interview method of your choice: face-to-face, at a non-school location, or a virtual interview using a Skype video conference. Interviews will take place during non-instructional time at your convenience, to include after school, holidays, or weekends.
- When provided with a typed transcript, check for accuracy and add any additional thoughts you deem important.

Here are some sample questions you will be asked during the interview:
- Why or why not do you believe technology use is important in student learning?
- How do the beliefs and practices of teachers in the surrounding classrooms affect your use of technology?
- How could teaching methods best support the integration of technology into classrooms at your school?

Voluntary Nature of the Study:
Participation in this study is voluntary. Your decision to participate or not will be respected. No one at your school or district office will treat you differently if you decide to participate or decline to participate. If you choose to participate now, you can choose to decline further participation at any time.

Risks and Benefits of Being in the Study:
There are no foreseeable risks to the participants, they may opt out of participation at any time, and possible benefits are educational and contribute to the body of knowledge about overcoming barriers to technology integration.

Compensation:

There is no payment provided to participants of the study.

Privacy:
Any information you give will be kept confidential. The researcher will not use your name or identifiable information in study reports. The recording and text transcripts will only be stored on a removable hard drive. I will be the only person with access to this information, which will be destroyed in five years. No identifiable information will be preserved.

Contacts and Questions:
You may ask any questions you have now. Or if you have questions later, you may contact me at (215) 644-7982 or lisa.durff@waldenu.edu. If you want to talk privately about your rights as a participant, you can call Dr. Leilani Endicott. She is the Walden University representative who can discuss this with you. Her phone number is 1-612-312-1210 Walden University's approval number for this study is _____ and it expires on _____

Administrator Informed Consent Form

You are invited to participate in a research study about overcoming barriers to technology integration. This study is being conducted by Lisa Durff, a PhD candidate at Walden University under the direction of Dr. MaryFriend Shepard, Program Director for the Educational Technology Department. You were selected as a potential participant because of your ability to integrate technology into instruction.

Background Information:
The purpose of this study is to identify how elementary teachers in rural northeastern schools overcome barriers that prevent them from integrating technology into their classrooms for student learning.

Procedures:
If you agree to participate you will be asked to:
- Participate in 60 minute interview using the interview method of your choice: face-to-face, at a non-school location, or a virtual interview using a Skype video conference. Interviews will take place during non-instructional time at your convenience, to include after school, holidays, or weekends.
- When provided with a typed transcript, check for accuracy and add any additional thoughts you deem important.

Here are some sample questions you will be asked during the interview:
- Why or why not do you believe technology use is important in student learning?
- How do the beliefs and practices of teachers in the surrounding classrooms affect a teacher's use of technology?

- How could teaching methods best support the integration of technology into classrooms at your school?

Voluntary Nature of the Study:
Participation in this study is voluntary. Your decision to participate or not will be respected. No one at your school or district office will treat you differently if you decide to participate or decline to participate. If you choose to participate now, you can choose to decline further participation at any time.

Risks and Benefits of Being in the Study:
There are no foreseeable risks to the participants, they may opt out of participation at any time, and possible benefits are educational and contribute to the body of knowledge about overcoming barriers to technology integration.

Compensation:
There is no payment provided to participants of the study.

Privacy:
Any information you give will be kept confidential. The researcher will not use your name or identifiable information in study reports. The recording and text transcripts will only be stored on a removable hard drive. I will be the only person with access to this information, which will be destroyed in five years. No identifiable information will be preserved.

Contacts and Questions:
You may ask any questions you have now. Or if you have questions later, you may contact me at (215) 644-7982 or lisa.durff@waldenu.edu. If you want to talk privately about your rights as a participant, you can call Dr. Leilani Endicott. She is the Walden University representative who can discuss this with you. Her phone number is 1-612-312-1210 Walden University's approval number for this study is _____ and it expires on _____

Tech Support Informed Consent Form

You are invited to participate in a research study about overcoming barriers to technology integration. This study is being conducted by Lisa Durff, a PhD candidate at Walden University under the direction of Dr. MaryFriend Shepard, Program Director for the Educational Technology Department. You were selected as a potential participant because of your ability to integrate technology into instruction.

Background Information:

The purpose of this study is to identify how elementary teachers in rural northeastern schools overcome barriers that prevent them from integrating technology into their classrooms for student learning.

Procedures:

If you agree to participate you will be asked to:

- Participate in 60 minute interview using the interview method of your choice: face-to-face, at a non-school location, or a virtual interview using a Skype video conference. Interviews will take place during non-instructional time at your convenience, to include after school, holidays, or weekends.
- When provided with a typed transcript, check for accuracy and add any additional thoughts you deem important.

Here are some sample questions you will be asked during the interview:

- Why or why not do you believe technology use is important in student learning?
- How do the beliefs and practices of teachers in the surrounding classrooms affect a teacher's use of technology?
- How could teaching methods best support the integration of technology into classrooms at your school?

Voluntary Nature of the Study:

Participation in this study is voluntary. Your decision to participate or not will be respected. No one at your school or district office will treat you differently if you decide to participate or decline to participate. If you choose to participate now, you can choose to decline further participation at any time.

Risks and Benefits of Being in the Study:

There are no foreseeable risks to the participants, they may opt out of participation at any time, and possible benefits are educational and contribute to the body of knowledge about overcoming barriers to technology integration.

Compensation:

There is no payment provided to participants of the study.

Privacy:

Any information you give will be kept confidential. The researcher will not use your name or identifiable information in study reports. The recording and text transcripts will only be stored on a removable hard drive. I will be the only person with access to this information, which will be destroyed in five years. No identifiable information will be preserved.

Contacts and Questions:

You may ask any questions you have now. Or if you have questions later, you may contact me at (215) 644-7982 or lisa.durff@waldenu.edu. If you want to talk privately about your rights as a participant, you can call Dr. Leilani Endicott. She is the Walden University representative who can discuss this with you. Her phone number is 1-612-312-1210 Walden University's approval number for this study is _____ and it expires on _____

Appendix D: Letter of Invitation to Schools

59 Hill Street
Frostburg, MD 21532
(215) 644-7982

Date

Dear Mr./Ms. [XXX],

I am writing to you for permission to conduct a research study in your school for my doctoral study on *Overcoming Barriers to Technology Integration in K-5 Schools.* Your school stands out as having several teachers who do an exemplary job of integrating technology into their classes. I am interested in finding out how these teachers overcame the barriers many teachers face when adding technology to their instruction.

I am asking you to supply me with the names of teachers who you think are successfully integrating technology at your school, along with the names of your technology support personnel. I will be sending these teachers a short survey and then choosing three teachers at your school to interview. I also will request an interview with one principal/administrator and one technology support person at your school.

I propose to collect data during Spring 2015 during non-instructional times only, such as homeroom, lunch, before/after school, weekends, or holidays. I will coordinate data collection times and sites with each person who agrees to participate in my study.

If you are willing to participate, please reply to this email with your positive response. Thank you for your consideration.

Sincerely,
Lisa Durff

Teachers in your school who are successfully integrating technology:
_____
_____
_____
_____
_____
_____
_____
_____

_____

_____

_____

Technology Support Personnel:

Administrators:

Appendix E: Confidentiality Agreement

AUTOMATIC SYNC
T E C H N O L O G I E S

Handling of User-Submitted Content

Preserving the confidentiality of your intellectual property is very important to Automatic Sync Technologies (AST). We believe that the content that you submit to us for captioning must be both kept confidential and secure. We consistently strive to put our best efforts towards achieving both of these objectives.

"Content" means any media or transcripts that you send to us either through the CaptionSync website or through our mail-in DVD authoring service, and any of the caption results that we generate for you.

AST engages subcontractors to provide portions of the services that we offer to you. It is necessary for AST to disclose your Content to these subcontractors in order to deliver our service to you. All such subcontractors have entered into Non Disclosure Agreements ("NDA") with AST, prohibiting them from using, disclosing, or distributing your Content in any way. Other than our disclosure to such subcontractors as necessary to deliver our service, AST commits to you that we will not disclose or distribute your Content to any other parties.

For Content submitted through our CaptionSync webservice, all Content is transmitted to our servers through encrypted data links. Once on our server, we employ a number of defenses to prevent unauthorized users from gaining access to any information on your account, including any Content that you have submitted. Caption results are returned to you via email at your option; if this poses a security concern to you, you may disable this feature on your account.

Copies of your Content are retained on our server for at least six months to enable you to access and regenerate your caption results. During that time, your Content will be accessible only to AST personnel or users of your account(s).

For Content submitted to our mail-in DVD authoring service, both the captioned DVD and your original media are returned to you via courier. Any electronic residuals that result from this work are treated as your confidential information.

AST is sensitive to user's confidentiality concerns and recognizes the need to communicate how we deal with the Content you submit. Please be assured that AST handles your Content only to the extent necessary to deliver our service to you and nothing more.