2021

ANALYZING FACTORS THAT CONTRIBUTE TO TECHNOLOGY USE: A CASE STUDY ON THE USE OF INSTRUCTIONAL TECHNOLOGY IN A SUBURBAN MIDDLE SCHOOL

Marlee Caroline Rice

ANALYZING FACTORS THAT CONTRIBUTE TO TECHNOLOGY USE: A CASE STUDY ON THE USE OF INSTRUCTIONAL TECHNOLOGY IN A SUBURBAN MIDDLE SCHOOL

A dissertation submitted in partial fulfillment
of the requirements for the degree of

DOCTOR OF EDUCATION

to the faculty of the

DEPARTMENT OF ADMINISTRATIVE AND INSTRUCTIONAL LEADERSHIP

of

THE SCHOOL OF EDUCATION
at
ST. JOHN'S UNIVERSITY
New York
by
Marlee Rice

Submitted Date 11/30/2020 Approved Date 1/29/2021

Marlee Rice

James Campbell

ABSTRACT

ANALYZING FACTORS THAT CONTRIBUTE TO TECHNOLOGY USE: A CASE STUDY ON THE USE OF INSTRUCTIONAL TECHNOLOGY IN A SUBURBAN MIDDLE SCHOOL

Marlee Rice

Over the past decade the ratio of student to computer has decreased rapidly (National Center for Education Statistics, 2008). Technology is constantly evolving; students in today's classrooms are "digital natives" (Prensky, 2005). The United States government has devoted many plans of action through their evolving Office of Educational Technology (U.S. Department of Education, 2017). Schools have employed 1:1 technology programs for students but the National Assessment of Educational Progress (NAEP) assessments have shown limited progress of students' scores for both math and reading (Neuhaus et al., 2018). To what extent do educators integrate technology in their classroom instructional practice? To what extent does technology improve teaching and learning? What impact does technology have on teachers' instruction?

This study used a mixed method case study methodology to gather research in a suburban middle school that currently employs a 1:1 Chromebook initiative, for the past six years. The researcher conducted a survey with a sample size of 64 teachers. Semi-focused interviews also took place with 6 educators in different departments with 5 years of experience before and 6 years of experience after the Chromebook initiative had taken place. Statistical software was used to uncover trends and themes within collected data.

The quantitative findings were significant and resulting implications can be used to support teacher efficacy when integrating educational technology in instruction. Teacher preparation for 1:1 technology integration and a common goal communicated to all constituents would lead to a technology rich environment. Additionally, teachers' content and technological knowledge should be in line with pedagogical knowledge. Technology should be seen as a tool to support pedagogy and content knowledge. A recommendation for future research is to complete an explanatory study to use the quantitative research to structure qualitative interview questions, as this study completed both pieces of the mixed method study simultaneously. This study's findings have implications for teachers, administrators, and educational policy makers.

DEDICATION

I dedicate this work to my students. I believe in you. Reach for the stars. You got this!

ACKNOWLEDGEMENTS

I wish to thank my committee members for their expertise and time. A very special thank you to my committee chairperson, Dr. James Campbell, for his countless hours of support, reading and encouragement through this process. I appreciate your time on Webex sessions focused on quantitative analysis. My committee members, Dr. Anthony Annunziato and Dr. Richard Bernato, thank you for agreeing to serve on my committee. Your feedback has been much appreciated for my growth as a researcher.

I would like to acknowledge my school district, the administration and teachers who aided me in my study. To all the educators who took part in my study; thank you for your willingness to share your experiences related to technology in this especially unprecedented year of 2020.

Next, I would like to thank my parents, especially my dad who has constantly supported my academic journey. You have been a proponent of my goals and have served as the first-round editor of my work. I am forever grateful for your time invested in me.

Finally, I would like to thank my husband. You are forever my rock. Thank you for always believing in me and supporting my goals. You have allowed me to balance everything because of your encouragement and love. Thank you for everything. Tag, you're it!

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1

Introduction

Starting in 1996, the United States Department of Education (ED) Office of Educational Technology has introduced a technological plan to serve as a vision for learning for the country. Every subsequent five years, the Office of Technology has shared a plan of changes and recommendations to address a changing landscape of technology. Uncharacteristically, the plan was updated in 2017 due to the demand of constant changes. The current plan, *Reimagining the Role of Technology in Education,* addresses multiple changes in learning, teaching, leadership, assessment and infrastructure (U.S. Department of Education, 2017). Since 1996, technology continues to evolve and parents and community members want students exposed to more technology (Trotter, 1998). The ratio of student to device has decreased in the time since 1996 (McCabe & Skinner, 2003). More money has been spent on technology but the increase in technology access or technology use is not making differences in national testing scores for students (Doherty & Orlofsky, 2001; McCabe & Skinner, 2003; Neuhaus et al., 2018).

Since the time technology was widely available in schools in the form of personal computers, its impact has been contested. Parents of school aged children pushed for increased opportunities to infuse technology in classrooms, but educational experts and policymakers sought to determine if the increase in technology improved education. Based on polls completed in 1998, "parents and business leaders see technology mainly as a tool to prepare students for the workplace" (Trotter, 1998, p.). While parents and business leaders were strong proponents for technology use in the classroom,

policymakers at the time, sought to determine if the funds spent on classroom technology and school building upgrades payed off in higher test scores (Trotter, 1998).

As time progressed, technology access became more available to students in an educational environment. The ratio of students to computers in all public schools started at 6.6 in 2000 and decreased to 3.1 in 2008 (National Center for Education Statistics, 2008). A student survey was completed in 2001 that was designed to capture the student prospective of technology use in schools. Students identified that technology use was falling short in their own classrooms. Data from an *Education Week and Market Data Retrieval Technology in Education* report of 500 students in grades 7-12 revealed when students needed access to computers, it mainly took place outside of the classroom; computers were mostly located in computer labs and libraries throughout schools. The survey also reported that "86 percent of students said their teachers have demonstrated how to use computers to write papers; 71 percent said their teachers have showed them how to use an Internet search engine. But much smaller percentages reported that teachers used computers to develop innovative approaches to help them learn" (Doherty & Orlofsky, 2001). With a decrease in ratio of students to computers, students' rates of computer use in and out of school were disproportionate. During school time, half of students noted using computers at the rate of an hour or less a week but at home students were using computers for seven hours. States invested educational monies towards instructional technology for students. The results on student achievement were difficult to quantify from one school to another (McCabe & Skinner, 2003).

In 2007, the United States Department of Education released a report about strategies and practices using educational technology. Forty-two states prepared

technology standards for students. At the time of this report, New York State was one of 27 states that provided online materials for students, though New York was not one of the 10 states to provide online materials for teachers (Bakia et al., 2007). Despite much time and money being focused on educational technology, a report card from *Digital Learning Now!* indicates only six states earned a B or higher in 2014 (Digital Learning Now, 2014).

More currently, the National Assessment of Educational Progress (NAEP) scores for both math and reading indicated limited progress of students nationally. Additionally, the achievement gap between high achieving and low achieving students has widened (Neuhaus et al., 2018). Neuhaus et al. (2018) noted that despite the growing achievement gap, the amount of money spent on educational technology has increased. Schools purchase technology products without understanding the efficacy of the hardware. Neuhaus et al. (2018) identified a national need to test out educational technology prior to districts investing large sums of money.

This study focused on the extent technology integration has on improving teaching and learning. The setting for the study was a middle school located in Long Island, New York. The results of the study contain key information for the integration of 1:1 computing technology for teachers, school building leaders, school district leaders, parents, policy makers and boards of education.

Problem Statement

Most school aged children today belong to a generational group known as Generation Z (Dimock, 2019). In 2020, the age of members of Generation Z ranged from eight years old to approximately 23 years old. The oldest members of this generation

were born in 1997. At the turn of the century, there have been many technological achievements (Ball, 2018). Video calling was made possible by Skype in 2003, Facebook, a social media powerhouse, was establish in 2004, and Apple's iPhone was released in 2007 (Ball, 2018). This generation has been considered synonymous with its use of technology because members have grown up with considerable resources throughout childhood and early adulthood (Dimock, 2019).

In 2001, Prensky coined the term "digital native" to describe the technology habits of students (2005). A "digital native" is described as an individual who is a user of "technology, fluent in the digital language of computers, video games and the Internet" (Prensky, 2005, p. 9). Prensky notes that educators who teach "digital natives" must be willing to adapt their pedagogical style based on this groups' needs (2005). Educators should tap into students' technological savviness and make connections using technology to the classroom. Technology can be used to increase student engagement, collaboration, and flexibility in the organization of ways to support students (Prensky, 2005).

With an abundance of resources available and relevant to school aged children, recommendations became essential to help align the knowledge and skills students need to be competitively employed in the workplace. The skills needed to be effective in the current workforce are starkly different from the middle of the 20th century. Successful candidates must able to multitask, work as a member of a team, and problem solve on a daily basis to be competitive in the 21st century (Crane et al., 2003).

The current role of the educator has evolved to imbed 21st-century skills into learning activities. These skills should be incorporated at all levels and within all subject matter, not taught as a standalone class. The four skills that are most critical for students

to become 21st-century learners are: critical thinking, communication, collaboration, and creativity (Hallerman et al., 2019). The skills that students learn in K-12 classrooms will help transition them for college and career readiness (Crane et al., 2003).

Given the current ED Office of Technology's *Reimagining the Role of Technology in Education* plan, it is recommended that teachers utilize technology to increase learning opportunities for students (U.S. Department Education, 2017). In order for teachers to create new learning experiences for students, teachers should be properly trained in educational technology best practices (Crane et al., 2003, p. 21).

As a part of the ED Office of Technology's *Reimagining the Role of Technology in Education* plan, teachers are recommended to deliver online access to support more effective teaching and increase educational opportunities where they were not available previously (U.S. Department Education, 2017). Teachers must be given tools in order to learn how to use technology effectively to impact student learning. To address this need for teachers to have a good understanding of how to use technology successfully, professional development must be offered and continually maintained to support teacher growth (U.S. Department of Education, 2017).

Statement of Purpose

The purpose of this study was to:

1. Understand the use of educational technology utilized in educators' lessons with middle school students
2. Discover the impact educational technology has on teachers' practices and students' learning

3. Analyze the impact of the use of educational technology on a school community and how the impact of the change relates to technology use

Research Questions

The following research questions served as a guide to the current study. The current study sought to understand the impact instructional technology has had on teachers and building leaders' efficacy at a suburban middle school and understand educator perceptions related to the 1:1 Chromebook initiative that is in the sixth year of infancy at the focus middle school.

1. To what extent do educators integrate technology in their classroom instructional practice?
2. To what extent does technology improve teaching and learning?
3. What impact does technology have on teachers' instruction?

Overview of Methodology

Research Design and Data Analysis

For the first research question, to what extent do educators integrate technology in their classroom instructional practice, the researcher coded educator responses from semi-structured interviews using NVivo for qualitative analysis. Once the data was coded in NVivo, responses were analyzed to determine themes in participant responses. Additionally, the researcher conducted observations in classrooms to view how technology was being used. The observation notes were exported to NVivo and coded for common themes in classroom visits.

For the second research question, to what extent does technology improve teaching and learning, the researcher used interview responses, coded using NVivo for

qualitative analysis. Common themes in participant answers were identified in response to research question three.

The final research question, what impact does technology have on teachers' instruction, used an adapted version of Christensen's (2003) "Teachers' Views of Technology and Teaching Survey." The survey was administered to all teachers at the school in focus. Teachers were invited to complete the survey as a Google Form. Once surveys were completed, results were exported to Statistical Package for Social Sciences (SPSS) to analyze responses.

Sample and Participants

The sample of participants for this mixed method study were selected through purposeful sampling. It is important to understand the experiences of teachers who teach different subjects and school leaders. This research will help generalize findings of the target population. Teachers from the following subjects were included: English, mathematics, social studies, science and world language. In addition, a school district leader was included in the research to help identify the perceived expectations of technology use, the perception of the need to incorporate instructional technology, and a leader's beliefs regarding the use of technology over the past six years. In this study, teachers instructed classes in which every student had been given a Chromebook. Every classroom in the current study was equipped with wireless internet. Students had been issued a Chromebook in sixth grade and will continue to use the same device until their senior year of high school. Students brought their Chromebook to school from home daily. Students were permitted to keep their Chromebook at home with them during the

summer months. A small percentage of students returned their Chromebook in June and picked it up in September at their respective school.

The Chromebook initiative has been implemented for six years. During the initial rollout, teachers were provided with professional development opportunities during school hours, after school during the building's professional development hour, workshops, and independently through multiple outside resources such as TEQ Online Professional Development and the local Teacher Center. Teachers were provided with their own Chromebook to ensure comfortability with the new hardware and to eventually use for instructional purposes in the classroom (Knowles, 2014). The school district has employed teacher technology mentors to help support the execution of a 1:1 Chromebook program for students. The technology mentor position was designed to serve as a model for teacher integration of technology (Bandura, 1977) and has served as a professional development guide to support the facilitation of introducing new technological tools and programs to support student learning.

Instruments

The researcher conducted a semi-structured interview with a purposeful selection and administered a survey. The interviews focused on one teacher from the following departments: English, mathematics, social studies, science and world language. The school's principal was also interviewed for his perceptions regarding the use of instructional technology with students attending his school. The interview was recorded using speech-to-text application on Google Chrome. From the recording, the interview was coded on NVivo. Teachers were asked demographic questions about the subject and grades taught and the amount of time teaching. In addition, the selected teachers were

asked about the impact that technology has had on their teaching practice. The researcher used a survey by Christensen (2003), Teachers' Views of Technology and Teaching with permission from the survey author. The survey was adapted to an online format using Google Forms. The surveys' results were analyzed in SPSS.

Rationale and Significance

Many schools in the United States are moving towards a 1:1 computing program. Empowering every student with a connected device changes the way classrooms operate. In 2014, New York voters pass a two-billion-dollar bond referendum known as the New York State Smart Schools Bond Act, to improve educational technology in schools. Specific school districts submitted plans to New York State's Office of Educational Design and Technology to use the Smart School funds to improve broadband or internet connectivity and/or for various hardware. The submitted plans were reviewed and verified to ensure that each district's plan that included instructional technology also had an approved Instructional Technology Plan. The Instructional Technology Plan and the Smart Schools Plan had to agree with one another (New York State Education Department, 2019).

The district in focus received 2.9 million dollars that was used to purchase individual Chromebooks for sixth grade students. Every subsequent year, the incoming sixth graders received a Chromebook device. Students were assigned their own Chromebook to take home with them every day and keep over the summer. The district collects Chromebooks back from students in their senior year of high school.

The focus district has spent a considerable amount of time planning this 1:1 Chromebook initiative at the secondary level. The district-provided Instructional

Technology Plan outlines the professional development plan for building the capacity of educators and administrators in the attainment of the instructional technology vision. The plan outlines multiple avenues for support such as an in-house team, consultant technology specialist, and digital classes. This continuum of professional development is offered before school, during school on preparation periods, and after school hours. Given the amount of support offered and money spent on instructional technology, the technology would be futile if teachers do not incorporate technology initiatives into their own practice.

One of the goals of this research was to determine whether teachers utilize student Chromebooks in their lessons and to identify impediments to teachers fully implementing technology into their classrooms. This information will help provide educational leaders with a means to address the shortcomings of the implementation. Moreover, leaders will be able to develop relevant professional development that is based on needs and will hopefully increase teacher use of technology.

Role of the Researcher

The program in the case study's district has provided every student with a Chromebook device. With students being able to access their own device throughout the school day and at home, the researcher's focus was to determine the instructional impact of the technology on teachers and leaders. For the present study, the researcher was also a teacher at the school in focus and a technology mentor to her colleagues. The methods and procedures used in the present study may guide leaders and teachers in developing programs for 1:1 implementation.

Definitions of Key Terminology

- Educational Technology refers to tools that outfits students with technology knowledge in order to be successful in the 21st century (Crane et al., 2003).
- **Instructional Technology** is defined as using the appropriate technological tools to facilitate learning and increase performance of students (Januszewski et al., 2008).
- **Chromebook** is a technological internet-based tool. The Chromebook functions the Chrome operating system, which is has less features compared to a traditional laptop (Donovan, 2020).
- **Blended Learning** is a type of program where online instruction is combined with digital instruction with access to online materials that are related to the course (Lewis, 2016).
- **1:1 Initiative** refers to a program in schools where each student has access to his or her own internet connected device (Downes & Bishop, 2015).
- **"Digital Native**" is described as an individual who are natural users of technology, comfortable with the language of computers, connected games and the internet (Prensky, 2005).
- **21st-Century Learning** is defined as the skills, knowledge, technology and connections to make learning engaging (Battelle for Kids, 2019).

Connection with Social Justice and/or Vincentian Mission in Education

The current research intends to promote global connections for educational advancement. When educational technology is used correctly, it helps to improve the learning community for students. Students can interact with the world, digitally, during

the school day. Using resources that are readily available in schools, teachers can support a 21st-century learning environment and improve the performance of students. Technology allows students to connect to content related media and collaborate with peers (Joo et al., 2018).

CHAPTER 2

Literature Review

Technology has been rapidly changing the landscape of education since the release of personal computing devices. The hardware which we use as consumers is also rapidly changing. Since the mid 1980s, technology has been available in classrooms (Dwyer et al., 1990). The student to computer ratio started at 6.6 in 2000 and decreased to 3.1 in eight short years. With bond act funding, school districts are able to provide devices for students on a 1:1 basis.

In New York, school districts are able to use state funding to upgrade internet connectivity, improve broadband, and purchase hardware (New York State Education Department, 2019). In order to receive funding, the district's Instructional Technology Plan and the Smart Schools Plan had to agree with one another. With much funding available, the culture of the school was destined to change.

This chapter begins with a detailed explanation of culture. In order to implement a progressive program, it is important to recognize the cultural aspects that already exist in the organization. The literature review continues by examining teacher behavior linked to a strong culture and how strong cultures can impact student achievement.

After presenting the current literature on culture, technology integration and evolution is presented. It is important to recognize the effect that the evolution of technology has had on the current study. For example, at one point in time, the radio was considered prime technology (*The Evolution of Technology in the Classroom*, n.d.). When incorporating a technology initiative, it is important to recognize the standards for

technology integration. Recent literature on 1:1 technology integration study is also presented.

The literature review also expansively presents two frameworks for technology integration: Technology Pedagogy and Content Knowledge (TPACK) Framework and the Substitution, Augmentation, Modification and Redefinition (SAMR) Model, which describe levels of synthesis of technology into content and pedagogical practices (Koehler et al., 2014; Puentedura, 2014).

Studies that focus on teacher perceptions about technology and teacher beliefs are also discussed in this chapter. Teachers are extremely influential for the success of technology programs. Past studies have made a variety of recommendations for current practice and future research.

Lastly, this chapter focuses on the theoretical framework supporting the study. Four frameworks are presented in this section: Culture (Schein, 2017), social learning theory (Bandura, 1971), adult learning theory (Knowles, 2014) and change theory (Fullan, 2017), which all provide a critical piece to understanding the current study. Finally, the chapter ends with a synthesis of how the four theories are integral to the present research.

Culture

School Culture

"Organizational climate" was a term initially used in the 1950s, as "school scientists were trying to conceptualize variations in work environments" (Hoy, 1990, p. 150). Over time, "organizational climate" became a more generalized description of working life (Hoy, 1990, p. 156). Similarly, the idea of organizational culture is not a

new idea; it had roots as far back as the 1930s. In its early depictions, culture was defined as the "norms, sentiments, values, and emergent interactions in the workplace" (Hoy, 1990, p. 156). Deal (1985) made a connection between successful schools and the presence of a strong culture. Schools with strong cultures had shared visions and beliefs that created unity within. Wagner (2006) acknowledged Deal's (1985) work and elaborated; educational culture is described as the characteristics of a school. Culture is formed through the common experiences that bring people together: students, teachers, leaders, and the community. Strong cultures had "open and honest communication" and "an abundance of humor and trust" (p. 41). "Tangible support from leaders at the school and district level is also present" (Wagner, 2006, p. 41).

School culture has also been defined as the "common set of expectations" for those within a building (Gruenert, 2008, p. 57). To best understand the difference between climate and culture, Gruenert employed the analogy related to people: climate would be the "attitude" while the culture is regarded as the "personality" (Gruenert, 2008, p. 58). Climate was described as more of the short-term feelings within an organization while culture was more of a long-term condition. As Hoy (1990) tried to describe the differences between organizational climate and culture, Gruenert (2008) used the days of the week as an example to show the contrast between the two. Gruenert stated the following:

> Typically, in U.S. schools, Mondays are perceived as miserable and Fridays are thought of as fun. This viewpoint reflects the business model's values and, thus, we learn that we are not supposed to want to come on Mondays. Teachers and students often talk about the weekend or the next holiday or vacation, often

> counting down the days. To come in on Monday morning, happy about being there and not looking forward to the weekend would challenge the existing climate. As a result, we can expect the climate to be less positive on Mondays than it is on Fridays. (2008, p. 58)

It is part of the United States school's culture to dread Mondays or the start to the week. The feeling on Friday becomes more uplifting. The short-term elevated feeling on Fridays was connected to the building's climate. It is part of the culture to "feel miserable" on Mondays; the climate in a school on Mondays was characterized as dull and gloomy (Gruenert, 2008, p. 58).

Culture has been deemed one of the most important aspects of a school environment. MacNeil et al. (2009) agreed that culture was created through "norms, values, rituals and climate" (p. 75). A school's culture can enhance the learning process for students and create a trusting environment for innovative teachers. Without a strong culture, a school building can feel judgmental, cold and unwelcoming.

All school buildings have a unique culture that defines them. Demirda (2016) reported culture as the "beliefs and norms created by ongoing employees and transferred to the next generations in a pattern of values" (p. 50). Each organization has a distinctive culture that relates to its space and to one other. The norms of two schools may be drastically different from building to building, even within the same district. Cansoy and Parlar (2017) described school culture as "the atmosphere that creates a feeling of being a member of a community, family, and team, attributes importance to the experiences shared in and outside the school, has common objectives, and in which there is agreement on the curriculum and instructional elements" (p. 312). A school is a true intersection

between the community of students, parents, local members and those selected to work within the building's perimeters: leaders, teachers, and other staff.

The cultural values within a school help normalize members' behaviors. At the commencement of the school year, leaders may welcome teachers back with open arms, stating that they missed the feeling of the building being full. In the middle of the school year, buildings have collaborative activities that promote togetherness. At the end of the school year, it may be a part of the school's culture to have a large celebration to recognize the dedication and service of retirees. Traditions like these can have an influence on those involved in the school setting (Cansoy & Parlar, 2017).

Schools that communicate a strong culture have characteristics that support its mission. Demirda (2016) listed slogans that indicate strong school culture: "Schools are for students", "Set high but realistic goals for your students," and "Trust your colleagues and understand your students" (p. 50). These slogans are uplifting, convey strong ideas of communication, and put students at the forefront of everything a school does. The strong principles were shared among staff members for a common goal and student success. Demirda (2016) also noted that, "In addition, a school with strong cultures employs a trend of promoting change and development in creating effective school environments" (p. 50). Schools that are open to change are indicative of the staff being willing and open to trying out strategies to best support all learners (Demirda .

A school's culture can also be described as negative. Negative cultures are characterized as having "resistance to innovational changes and often experience conflict situations" (Demirda p. 50). In a negative school culture, communication is more constricted, not allowing information to flow as in a strong culture. Teacher burnout is

higher in a negative culture. There is a lack of motivation and there are low expectations for one another. In a negative culture, negativity can be bred in many aspects of school life. In negative cultures, student achievement suffers, "it is likely that students in those schools may exhibit poor academic performances" (Demirda .

Peterson and Deal (2016) conceded that the focus of the most recent educational climate is influenced by outside policy changes and national reforms. The authors described that that positive change in culture can be changed from inside the building. The culture in education has been persuaded by successful business models. However, the culture of a strong school is very different from the culture of a prosperous private sector for profit business. Peterson and Deal (2016) defined culture as "the glue, the hope, the faith that holds people together" (p. 6). The terms, climate and ethos had been used to describe culture in years past, but the authors found culture the most "accurate and intuitively appealing way to help school leaders better understand their school's unwritten rules and traditions, customs, and expectations" (Peterson & Deal, 2016, p. 7). Culture allows all members of a school community to understand its treasured traditions.

Teacher Behaviors Linked to a Strong Culture

There are many behaviors exhibited by teachers that influence their school's culture (Peterson & Deal, 2016). Many of these behaviors help support a positive school culture. Researchers have commonly agreed on the characteristics and strategies exhibited by teachers; some characteristics may only be identified by a few researchers: teacher collaboration, classroom management, teacher empowerment, teacher learning, and teacher leadership (Balkar, 2015; Bower & Parsons, 2016; Cansoy & Parlar, 2017; Demir, 2015; Demirda E n, 2016; Hongboontri & Keawkhong, 2014;

Ohlson et al., 2016; Peterson & Deal, 2016; Thapa & Guffey, 2012; Tichnor-Wagner et al., 2016; Wilcox & Angelis, 2012).

Teacher Collaboration. One common characteristic in positive school cultures is high levels of teachers collaborating with one another. Hongboontri and Keawkhong (2014) identified teacher collaboration as the awareness of sharing work and resources among professionals. The idea of teacher collaboration was to unite many minds in order to solve problems within a shared school building. High levels of collaboration allow different perspective for teachers to brainstorm new ideas. "Many minds tended to work better together than the few" (Hongboontri & Keawkhong, 2014, p. 82). The researchers identified a relationship between teacher collaboration and classroom instruction. Bower and Parsons (2016) also agreed with this claim, stating that positive school cultures were linked to ''increased student motivation and achievement, increased teacher collaboration, and improved attitudes among teachers towards their jobs" (p. 744). Teachers who display high levels of collaboration are integral to the positive school culture. Another benefit of positive school culture is that teachers implement different behavioral approaches with students compared to teachers who work in environments that do not have a positive culture.

In addition to the previous claims, Ohlson et al. (2016) agreed with the idea that teacher collaboration helped build a positive school culture. Their research drew a connection between high levels of teacher collaboration and a decrease in the student suspension rate. The suspension rate decrease was due to many aspects of a positive school setting. "Student suspensions would decrease by 6.709%" (Ohlson et al., 2016, p. 114), which created an overall more positive school culture.

Tichnor-Wagner et al. (2016) also acknowledged the idea of teacher collaboration and its connectedness to positive school culture. The authors identified that collaboration "may also occur across organizational levels, for example, between teachers and administrators" (Tichnor-Wagner et al., 2016, p. 606). In positive school environments, there were also collegial associations that have positive collaboration. Related to teacher collaboration, classroom management techniques were another characteristic present in schools with positive cultures.

Classroom Management. Positive classroom management techniques from teachers helped encourage a positive school culture. Hongboontri and Keawkhong (2014) explained that classroom management was defined as "teachers' overall consistency in enforcing the rules for student conduct on students in their organization" (p. 69). Overall, consistent classroom management techniques throughout the building provide uniform expectations for students. Similar techniques provide consistency and enable all teachers to foster the same approach. In addition, Atiles et al. (2017) found that a teacher's effectiveness in his or her classroom was related to his or her use of positive classroom management techniques. The more positive classrooms a school develops, the more beneficial it was to the overall school culture. In addition to positive classroom management procedures, it also encouraged teachers to feel empowered within their school buildings (Atiles et al., 2017).

Teacher Empowerment. Another important characteristic that is linked to a positive school culture is teacher empowerment. According to Balker (2015), empowerment is a result of a positive school culture as well as a causative force. "Therefore it can be said that empowerment is both a result and a characteristic of

organizational culture" (p. 207). Teacher empowerment could be accomplished with the support of both school principal leaders' and teachers' contributions (Balker, 2015). Balker (2015) explained:

> School culture acts as a kind of facilitator for principals to empower teachers via their principal leadership. The sense of empowerment of teachers is related to the facilitative leadership regarding issues that are related with the school as well as classrooms. (p. 209)

With teachers feeling a sense of empowerment, they can take on a role in larger school issues, creating solutions as a community. When teachers take on a role of much more than is expected, this helps distribute responsibilities and allows many more professionals to be able to contribute to the school community. For positive school cultures to flourish, there must be teacher empowerment coupled with teacher desire for learning and improvement. Therefore, the existence of teacher improvement through learning is another characteristic of a strong school culture.

Teacher Learning. Hongboontri and Keawkhong (2014) described teacher learning as a "variable [that] measures the degree to which teachers were given opportunities to improve themselves. Also, it examined the extent to which a school 'facilitates or hinders teachers' professional development'" (p. 69). Teachers that worked to solve school issues had also attended professional development and had learning opportunities to gather strategies. Positive school cultures were related to teachers who were open to learning new information and updating best practices.

Ohlson et al. (2016) also agreed that teacher learning and improvement was key to building and maintaining a positive school culture. Ohlson et al., (2016) suggested "that

school leaders participate in activities that encourage teacher learning. These activities may include leading educational improvement, fostering effective change efforts, and directing the implementation of new standards, which are central to shaping strong, professional school cultures" (p. 116). Education is constantly evolving and teachers must be open to change. With this involvement, many teachers learned about new initiatives, programs and new resources. In positive school cultures, teachers familiarized themselves with new material that was constantly being developed. Positive school cultures also included teachers with leadership aspiration.

Teacher Leadership. School culture may also be impacted by the role of teacher leadership in buildings. Cansoy and Parlar (2017) defined teacher leadership as "an informal structure that refers to professional behaviors that promote school development" (p. 311). There are many different roles for teacher leaders in school buildings. Cansoy and Parlar (2017) wrote that teachers could form learning communities, help support new teachers, assist in administrative matters, make decisions about the school, and play a role in the school progress. The researchers identified a strong correlation between "collaboration, collegiality, and effectiveness" (p. 313).

In agreement with Cansoy and Parlar (2017), Demir (2015) also suggested there is an effect of organizational trust on the culture of teacher leaders. In Demir's article, Katzenmeyer and Moller (2001) were quoted in the following, "teachers who are leaders lead within and beyond the classroom, identifying with and contributing to a community of teacher learners and leaders, and they influence others toward improved educational practice" (p. 17). Teacher leaders add to a highly collaborative environment.

Demir (2015) suggested that in a positive school culture, the people who make up the school must have shared values and norms. The author provided an example that if the culture of the building was focused on learning, then students, staff and leaders would all focus on learning. In a positive school culture where there are shared values and norms, students have clear expectations for what is anticipated from them. Teachers and leaders can take part in meaningful professional development opportunities.

In a high-functioning, positive school culture, there must be room for "risk taking, functional democratic norms, recognition of teachers as professionals, participation, cooperation and sharing of experience" (Demir, 2015, p. 623). In such cultures, there must be room for teachers to endeavor new strategies, for students to take chances and for leaders and parents to try out something innovative. Positive school environments must allow for all voices to be heard in a democratic way. Teachers must be allowed to practice as professionals who have knowledge and insight to perform in such ways. Elevated levels of participation and clear communication would allow all members to stand on common ground.

E n (2016) identified trust as being the pinnacle of a school with a positive culture, stating that a "high level of trust within an organization has a positive effect on organizational efficiency and worker job satisfaction" (Thapa & Guffey, 2012). This evidence confirms that positive school environments rely on increased amounts of trust between staff members, which impacts the overall culture. In addition, the research also noted that schools with trust also have teachers with common values (E n, 2016).

Wilcox and Angelis (2012) also identified that building "capacity at the middle level" was an additional strategy that took school culture to a high-performance status (p.

40). The areas of capacity that improved the performance were "shared academic goals and teachers' sense of shared mission, community support and programmatic integrity, and administrator leadership and resource support" (Wilcox & Angelis, 2012, p. 40). In addition, the collaboration between teachers and leaders was particularly important. For increased collaboration, trust and respect must be fostered. The researchers also identified that when the English Language Arts test results were below par, school and district leaders asked teachers for guidance in the best ways to support teachers in the classroom and in turn, support the students.

In addition to the previous research, the work of Ohlson et al. (2016) supported teacher behavior as being critical to schools with strong cultures. "The relationship between effective teaching and effective leadership is reinforced in the vital role of school culture" (Ohlson et al., 2016, p. 116). It was also suggested that schools with positive cultures have "fewer suspensions, increased attendance rates, and increased achievement on standardized test scores" (Ohlson et al., 2016, p. 116). Thus, teacher behavior in a positive school culture impacted students both socially and academically. Consistent with Wilcox and Angelis (2012), Ohlson et al. (2016) identified teacher and leadership effectiveness as distinguishing features of schools that have strong cultures. There were themes of support for all members in the school community in environments of robust cultures.

In sum, there were many teacher characteristics that have a profound impact on the positive culture of a school. Some schools have used teacher collaboration and collegial associations to promote positive school cultures. Some teachers have used positive classroom management techniques to improve and enhance the current culture of

the building. Some schools have focused on teacher learning and teacher leadership. There were schools that used organizational trust to move teachers to the next level. With that level of trust attained, risk-taking was also supported. There were also teachers in environments where teacher empowerment was encouraged. In some schools, teachers learned new materials to improve their current tool kit to benefit the school's culture. In many of the schools that had teachers who exhibited positive culture, there were shared values and norms. Lastly, some schools have promoted teachers' leadership to encourage shared responsibility of building decisions.

Strong Culture Impacting Student Achievement

Research suggests that there are many aspects of a strong school culture that may impact student achievement. One characteristic of strong culture that has related to student achievement surrounds teacher performance. Many researchers have examined different teacher qualities, to determine which characteristics had the largest impact on student achievement.

MacNeil et al. (2009) analyzed the impact of teacher motivation on student achievement. "Strong school cultures have better motivated teachers. Highly motivated teachers have greater success in terms of student performance and student outcomes" (p. 77). Driven teachers were highly invested in student success, which positively impacted student achievement. Similarly, Ohlson et al. (2016) found that teacher quality had an impact on student achievement in a positive school culture. The researchers concluded, "Specifically, the quality of a teacher may have a direct and lasting influence upon student outcomes" (Ohlson et al., 2016, p. 115). Ohlson et al. (2016) concluded that teacher quality as an important indicator of student achievement and is a better predictor

than other variables such as class size, teaching salary and the amount of money spent per-student.

The researchers defined teacher quality as "teacher expertise and certification" (p. 115) and as a function of teacher evaluations and preparation pathways. The more experience a teacher has, the greater the degree of impact he or she is expected have on students. Ohlson et al. (2016) conducted research to explore whether hiring teachers with higher teacher certification test scores in poor schools increased student achievement compared to other factors. They found educator experience to be important, "suggesting that years teaching shows a very strong relationship with increased student achievement" (Ohlson et al., 2016, p. 115). Increased student achievement helped to build on a positive school culture due to student success. The more successful students were, the more successful the building was. There was a sense of accomplishment when students achieved goals set forth by themselves and their teachers. In a positive school environment, teacher quality had a greater impact on students, even more so than class size, student spending or teacher incentive salary. Teacher quality was more impactful because the better a teacher was, the higher student achievement was in his or her class, and the more it enhanced the school's culture.

Cansoy and Parlar (2017) acknowledged Ohlson et al.'s (2016) ideas on teachers improving student achievement in environments with strong school cultures. They believe that teacher collaboration has a great influence on student achievement.

In schools with positive cultures Cansoy and Parlar (2007) wrote:

There is a supportive environment, the level of autonomy is high, and sharing and collaboration are its basis. Moreover, taking responsibility and being sympathetic are

important, common values are emphasized, harmony and justice are dominant, and the results yielded for the success of the organization are critical. (p. 312)

In environments where teacher collaboration was supported and encouraged, higher quality education was available for students. The higher the quality education for students, the more successful and positive the school's culture was. The success of the organization was dependent on the success of the students. If there were high levels of teacher collaboration, students would benefit academically. In a weak, negative school culture, students would suffer due to lack of collaboration among teachers. If teachers' colleagues were supportive and collaborative, these collaborative teachers could problem solve, create curriculum, and find new strategies to support all learners.

Similarly, teacher empowerment has been directly tied to student success in a positive school setting (Balkar, 2015). For example, one participant in the Balkar's (2015) study explained the following:

> Teachers feel satisfied about their profession in two different ways. The first one takes place when they see the success of their students; and the other one takes place when they feel that they were trusted and given a chance on decision-making and implementation. (p. 215)

Teachers must feel secure in a setting so that they can be empowered to become involved in leadership. Teachers who believed the building's culture was based on trust would then be empowered to make decisions. Teachers also felt empowered when students were successful in their classrooms. Student success based on the information presented by a teacher brought a personal sense of appreciation for the teacher.

Wagner (2006) identified a correlation between a school's culture and student achievement. The school's culture represented "staff member satisfaction, parent engagement, and community support" (p. 42). Melton-Shutt (2004) determined the greater the score on the School Culture Triage Survey, the greater the state assessment scores. The results also indicated the opposite: the poorer the survey score, the poorer the state assessment scores. These results show that there was a direct relationship between a school's positive culture and student achievement. Brucato (2005) stated that in order to improve any aspect of the school, it was wise to start with changing the school's culture.

School becomes more meaningful for students when they have a feeling of connectivity. School safety and organization impacts student relationships; the more positive a school's culture is, the more of a positive impact it can have on a student's ability to connect and foster meaningful relationships (Balkar, 2015; Cansoy & Parlar, 2017; Demir, 2015; E n, 2016; Ohlson et al., 2016; Ohlson, 2009; Hongboontri & Keawkhong, 2014; Atiles et al., 2017; Thapa & Guffey, 2012; Wagner, 2006; Wilcox & Angelis, 2012). Teaching and learning may also have a large impact on a school's environment. Teachers and leaders clearly define the expectations and standards that mold the school's culture. When students understand the school's culture, the more successful they will be in their school setting. Teachers who have used relational strategies for learning in their classrooms have built an environment of trust (Thapa & Guffey, 2012). This relationship is strongest in elementary buildings. There is evidence to suggest that a school's environment may have a short-term impact on students as well as impacts that can last for many years to come (Thapa & Guffey, 2012). In addition to positive environments for students to learn in, Thapa and Guffey (2012) also identified

the importance of character education for elementary school students. At other grade levels, service learning has a positive impact on students, which in turn, will have an impact on a strong school culture. Teachers who rated their schools' culture as strong also showed strong student achievement scores (Cansoy & Parlar, 2017; Demir, 2015; Love, 2016; Thapa & Guffey, 2012). It was key to have all stakeholders in the school feel positive and welcome (Thapa & Guffey, 2012).

For schools with strong cultures, research has revealed many positive student outcomes. Schools with positive school environments had lower numbers of student mental health problems and substance issues. A strong culture may cause students to abuse drugs less frequently. According to Thapa and Guffy (2012), students that attend schools with positive cultures have "lower rates of student suspension in high schools" (p. 6) and "decreased student absenteeism in middle and high schools" (p. 4). Therefore school culture was deemed "critical to effective risk prevention" (Thapa & Guffey, 2012, p. 4).

High expectations of student achievement and the level of preparedness by the students were indicators of student achievement in schools with positive school cultures. Sundell et al. (2012) described how the culture of one high school supported a program of study to encourage achievement "with high-tech career-themed programs and enriched co-curricular experiences" (p. 30). The program of study prepares students for the real world by explaining the reason behind topics and the various ways to solve a problem, which helped to prepare students for life after high school. Students who struggled in traditional classes were encouraged by the school's culture to become immersed in an

area of interest. The schools that had programs of study had a focus on achievement, which fostered a positive environment for students and set the bar for success.

Love (2016) identified how behavior interventions and a focus on positivity may breed a positive school culture that promotes student success. Love's research was based on her school's behavior problems. As a school, a behavior plan was implemented in which students received individual and class points as a reward for meeting goals or individual behavior plans were created when goals could not be met (p. 56). The school used an online platform to help collect behavior information for students. At first teachers focused on capturing undesirable behavior but as the collection period went on, teachers who gave positive points had more superior classroom management than those teachers who used the negative marks. Students who collected positive points exchanged them for various rewards and privileges. The environment in the school went from a negative school culture to a positive environment where students were eager to earn positive points for behaving appropriately. The positive school culture increased instructional time for all students, providing more opportunity for all students to be successful.

Rhodes et al. (2011) identified a different characteristic that promoted student achievement: a "clear vision and core values" (p. 82). A clear vision was described as a direction for the school to head in, the blueprint for what aspects were highly regarded. According to Rhodes et al. (2011):

> Values are the foundation of school organization cultures because they have a profound influence on whether school administrators and teachers emphasize individual autonomy over teamwork, entrenched tradition over innovation, or fierce competition over constructive collaboration. They were the moorings for

how everyday life in offices, classrooms and corridors is actually lived. (p. 83)

Values give awareness to ideas, behaviors and vitals for the school. Rhodes et al. (2011) also suggested that schools which promote a strong culture have relational trust present. Relational trust was trust between students, teachers, leaders and families. Elevated levels of relational trust is conducive of a caring environment. Rhodes et al. (2011) also explained that schools with strong cultures promote "a strong sense of community" (p. 82). The school community brings all members close together. Lastly, the authors also suggested that having a combination of strong teachers and leaders within a school would promote positive change to best support all students.

There were many aspects of a positive school that have been shown to promote the success of all learners. Some researchers have focused on the impact that teachers can make in the classroom through motivation, quality, collaboration, preparation and empowerment. Other researchers have focused on how the school community can unite together for student learning and build a level of trust. Certain high schools were selected as the focus of research based on their high levels of expectations. Some researchers examined how behavior impacts the school's culture and demonstrated how positive behavior can have a profound impact on instructional time and on student success. Taken together, this research has helped to explain how and why a strong school culture influences student achievement.

Collins (2001) characterized what qualities a great leader has. The author notes there are five levels of leadership that vary in effectiveness. A level four leader is an effective type of leader that can guide the organization to high levels of performance. A level five leader is determined, can guide the organization to high levels of performance,

especially during times of transition. The goals a level four leader has, may be tossed to the wayside when that leader transitions out of the position. However, the goals of a level five leader has embedded become the core of the organization and in a time of transition, the goals set forth by the level five leader will be continued to be worked towards.

Technology Integration

Evolution of Technology in Schools

Technology has been synonymous with education for the past 100 years (*The Evolution of Technology in the Classroom*, n.d.). Before the current era of 1:1 technology for students in the 1920s, radios were thought to be cutting-edge as students of this time were able to hear presentations from a distance away (*The Evolution of Technology in the Classroom*, n.d.). Educational technology continued to progress as the years continued. The overhead projector was brought to classrooms in 1930 and in 1940 ballpoint pens arrived to classrooms, followed by headphones in 1950 (*The Evolution of Technology in the Classroom*, n.d.). In 1951, videotapes were introduced into classrooms, this new tool excited students and teachers alike (*The Evolution of Technology in the Classroom*, n.d.). Photocopy machines were being used in schools around 1959 which allowed for copies of teacher made documents and other reproducible work made for student use (*The Evolution of Technology in the Classroom*, n.d.). Handheld calculators and Scantron "systems of testing" were brought to schools in 1972 (*The Evolution of Technology in the Classroom*, n.d.). These tools allowed educators to customize their practice over the course of time. The first personal computer was developed in 1981 and by 1984, Apple released the Macintosh computer. In continued progress related to personal computing

devices, the internet was born in 1990 when The World Wide Web was established (*The Evolution of Technology in the Classroom*, n.d.).

Technology has changed in the past century. Dwyer et al. (1990) described some of the impacts the *Apple Classrooms of Tomorrow* (ACOT) had on classrooms in the mid-1980s. Dwyer et al. (1990) set out to explore "what happens when teachers and students have constant access to technology" (p. 3). Each participant, student or teacher, received two computers: a computer for school and a computer for home. The outcomes of the study showed that adding technology changed the practices commonly carried out in schools. The findings also included various ways to support a technologically rich classroom environment.

Dwyer et al. (1990) described phases that schools must work through when increasing technology in classroom: entry, adoption, adaptation, appropriation and invention (p. 38). "Entry" is the first phase of Dwyer et al.'s (1990) technological revolution. At this phase the focus is on the install of the technology, planning time and creating opportunities for the identified members to share experiences, especially with teachers who are not a part of the ACOT program. "Adoption" is geared towards maintaining good practices and initially embedding new programming into classrooms. The support provided during this phase gives educators a deeper knowledge of the technology and develop confidence in the technological tool. "Adaption" evolves when the programs are being seamlessly integrated into the curriculum to increase productivity. Support in this phase involves allowing educators to observe one another and teaching using technology in a collaborative way. Educators must also be trained in the offered software options. "Appropriation" is noted when educators create cross-curricular

experiences for students. This phase is also highly experimental for students and teachers alike. Lastly, "invention" concentrates less on experimentation and more on implementation of desired methods to embed technology in classrooms. The support for this last level fosters a level of collaboration and mentoring for participant and non-participant teachers (Dwyer et al., 1990, p. 39).

Standards for Technology in Education

The International Society for Technology in Education (ISTE) is a non-for-profit organization that focuses on implementing educational technology. The vision of ISTE "is that all educators are empowered to harness technology to accelerate innovation in teaching and learning, and inspire learners to reach their greatest potential" (ISTE, 2020). ISTE's mission is to encourage educators to integrate technology in instruction, "accelerate good practices and solve tough problems in education by providing community, knowledge and the ISTE Standards" (ISTE, 2020).

ISTE has four sets of standards, each focused on a specific subgroup: students, educators, education leaders, and coaches. The student standards have seven components: empowered learner, digital citizen, knowledge constructor, innovative designer, computational thinker, creative communicator, and global collaborator. The educator standards also have seven components: learner, leader, citizen, collaborator, designer, facilitator, and analysist. The education leader's standards have 5 components: equity and citizenship advocate, visionary planner, empowering leader, system designer, connected learner. Lastly, coaches have seven ISTE standards: change agent, connected learner, collaborator, learning designer, professional learning facilitator, data-driven decision-maker, digital citizen advocate (ISTE, 2020). Each level of the standards focuses on three

key ideas: learning, collaboration and citizenship. These key themes are the core of a well-planned educational technology implementation.

1:1 Technology Integration

Implementing a new program takes careful planning. Sykora (2014) describes an example that took place in 2010, when Apple's iPad and Common Core Learning standards were both released. Common Core assessments were intended to be delivered electronically, which increased the amount of technology that schools needed in order to keep up with the change. Los Angeles Unified School District had difficulty rolling out their 1:1 iPad program for all students. Given the situation, educational leaders wanted to learn from Los Angeles' missteps.

ISTE has identified lessons learned from the early integration of employing 1:1 technology programs. It was recognized that the number of schools that are moving toward such 1:1 program is constantly expanding (Sykora, 2014). ISTE has identified essential conditions that are critical for implanting technology in school for the purpose of learning. These conditions include "shared vision, empowered leaders, implementation planning, consistent and adequate funding, equitable access, skilled personnel, ongoing professional learning, technical support, curriculum framework, student-centered learning, assessment and evaluation, engaged communities, support policies" and "supportive external context" (International Society for Technology in Education [ISTD], n.d.).

Sauer and McLeod (2018b) analyzed the impact of a 1:1 technology implementation on teachers' technology skills and the technological implementation in classrooms. Participants in this program were teachers in schools with a 1:1 technology

implementation program and the schools without 1:1 technology implementation acted as the control. The schools selected for the study were matched using 22 variables to ensure the schools selected had similar characteristics. After matching based on relevant variables, the study included 37 schools with a 1:1 initiative and 75 schools without a 1:1 initiative. Sauers and McLeod (2018) used data from the Iowa Department of Education and the National Center for Educational Statistics. The teacher data was collected from an online survey adapted from an instrument created by Hutchinson and Reinking (2011). Qualtrics was used to collect survey data. Teachers accessed the survey through a hyperlink sent to their emails. Teacher email addresses were acquired from school websites and school leaders and the response rate for teacher-completed surveys was approximately 37%. This study showed there was a statistically significant impact of teachers' technology skills and integration for those who taught in buildings with 1:1 initiatives ($p < .001$). Teachers in schools with a 1:1 initiative reported higher integration ($M = 30.38$) compared to teachers in schools without a 1:1 initiative ($M = 25.73$). In addition, teachers in schools with a 1:1 initiative reported higher competency ($M = 6.32$) compared to teachers without a 1:1 initiative ($M = 5.96$; Sauers & McLeod, 2018b). This study is crucial to demonstrating the connection between 1:1 initiatives and higher levels of technological skills and integration of technology.

Russell et al. (2004) aimed to determine whether teaching and learning changes in fourth and fifth grade classes when students are provided their own laptop computers. The ratio of students to computers has become smaller and smaller over the last 30 years, but computer use in classrooms accounts for only a short amount of time during the school day. The authors sought to determine how a temporary 1:1 laptop program

influenced teaching and learning in a fourth and fifth grade class. There was a multitude of positive outcomes resulting from the 1:1 laptop use. Throughout the study, the students increased the amount of time they used technology from 15-60 minutes a day without the availability of a 1:1 laptop cart to 1 to 2 or more hours a day with use of a 1:1 laptop cart. Technology was used for many aspects of the curriculum: creativity, research and using a word processing system. Students had higher motivation and engagement in the 1:1 classroom compared to classrooms without 1:1 technology. In this study, students worked in smaller groups, peer reviewed work, and teachers were able to individualize instruction. Teachers also reported that students could "learn more independently, cooperatively, and collaboratively than through traditional instruction" during 1:1 teacher interviews (Russell et al., 2004, p. 325). The temporary laptop cart that enabled a 1:1 laptop program had an overall positive impact on teaching and learning for this specific case study in fourth and fifth grade classrooms.

Frazier and Trekles (2018) followed K-5 teachers through their experiences using iPads in an instructional setting with students. The researchers sought to identify the successes and struggles of implementing 1:1 iPad tablets for elementary school students. iPads have the ability to promote literacy for elementary school students (Frazier & Trekles, 2018). The technology "provides students with opportunities to learn the new literacies of 21st-century technologies by responding to texts in unique ways" (Hutchison et al., 2012, p. 16). Teachers must become comfortable with the technology before it can be implemented. Throughout the study, teachers utilized the technology in their classes. During the course of the study, teachers focused on professional development to become more skilled at embedding technology in classes. One to one programs must be carefully

planned and not rushed. At the core, teacher professional development is key to be able to understand and use the technology as a tool to support learning in the classroom. Teachers involved in 1:1 initiatives need professional development. It is essential for professional development experiences to be embedded into the teacher's practice and not a one-time, meeting-style workshop. Teachers who participated in Frazier and Trekels' (2018) study had become more comfortable using the iPads in their classroom with students for instructional purposes at the end of the year.

Downes and Bishop (2015) explore the connection between a 1:1 laptop program and a middle school concept outlined by the Association for Middle Level Education (AMLE). The researchers drew on many similarities between the integration of a device for every student and the ideas of the AMLE. The AMLE has identified three areas of characteristics for effective middle schools: "curriculum, instruction, and assessment; leadership and organization; culture and community" (Downes & Bishop, 2015, p. 2). The research for this study was based in a rural area of Vermont. When equated to the other schools in the county, the target school had the lowest performing students measured by state assessments. This study focused its work on a team called the "Engagers" (Downes & Bishop, 2015, p. 4) comprised of an English and social studies teacher, a math and science teacher, and a special education teacher. The students and teachers on this team all received their own computing device. In addition to the technology tools, the teachers also worked with a coach for additional professional development support. One member of the team of teachers recognized the blending of the two key components as "I feel like it's adding the 21st-century learner to what is already good middle school, middle level practice" (Downes & Bishop, 2015, p. 4).

From the analysis of this study, three themes emerged related to the AMLE concepts. Regarding culture and community characteristics, the computing devices offered all participants of the study membership to a "high-tech team" (Downes & Bishop, 2015, p. 11). A team culture emerged from this research as the students had additional opportunities to find their position as a member of this high technology team. Additionally, there were curriculum, instruction and assessment characteristics that also played a part in this study, as students were excited to interact with technology and make lessons come alive as they could not previously do without technology. Lastly, there were impacts to the participants' leadership and organizational characteristics. Teachers felt that they lacked a common planning time to prepare for technology-infused lessons. Additionally, there was difficulty between the work the "Engagers" were completing and their non-1:1 colleagues. There was also a struggle with the district's vision for developing new technology students. A misalignment from the task of embedding technology for students and the new curriculum allowed for less time for the educators involved to support student learning. By infusing technology into middle school classrooms, teachers were able to engage students in ways they were unable to before.

The SAMR Model

Another framework for technology in education is the SAMR Model (Puentedura, 2010). SAMR stands for the model's four classification levels: substitution, augmentation, modification, and redefinition (Puentedura, 2010). This model serves as a guide to incorporate educational technology into classrooms (Hamilton et al., 2016). As teachers develop from the lowest level of the SAMR taxonomy, substitution, to the highest level, redefinition, their growth strengthens teaching and learning (Hamilton et

al., 2016). Even though the SAMR is growing in its popularity with practitioners, the model itself is very limitedly represented in the literature (Hamilton et al., 2016).

The two lowest levels of the SAMR hierarchy are found in the enhancement level: substitution and augmentation. Puentedura (2014) defines the lowest level, substitution, as when "tech acts as a direct tool substitute with no functional change" (2014, p. 2). An example of substitution in the classroom would be a teacher swapping out a traditional hard copy test review with a digital test review (Hamilton et al., 2016). The next level of technology integration is augmentation. Augmentation, is defined as when "tech acts as a direct tool substitute, with functional improvement" (Puentedura, 2014, p. 2). An example of augmentation would be if students use their own devices to read and listen to digital stories, independently, instead of the whole class reading aloud (Hamilton et al., 2016).

The next two levels on the SAMR hierarchy, modification and redefinition, are identified at the transformation level. Puentedura (2014) defines modification as when "tech allows for significant task redesign" (p. 2). At this level of technology integration, instead of showing students a model of light traveling, students can experience a computer simulation of how the speed of light can change due to other factors (Hamilton et al., 2016). Lastly, the highest level of the SAMR model is redefinition. Puentedura (2014) defines redefinition as when "tech allows for creation of new tasks, previously inconceivable" (p. 2). A classroom example of this level would be instead of a teacher assigning a persuasive essay, students are asked to create and edit a video to prove their arguments (Hamilton et al., 2016).

As previously stated, the SAMR model has been growing in popularity with practitioners. The work that Puentedura presents has no theoretical explanation in the peer-reviewed literature (Hamilton et al., 2016). Additionally, there are limited connections from Puentedura's work to prior literature and theory. Lastly, there are a multitude of online pictures to represent the SAMR model, and some models misalign to Puentedura's (2010) work (Hamilton et al., 2016).

TPACK Framework

Technology Pedagogy and Content Knowledge (TPACK) is a theoretical framework for teacher technology implementation. The key components of the framework consist of pedagogical knowledge, technological content knowledge, and technological pedagogical knowledge which all intersect to create an approach called technological pedagogical content knowledge. Prior to this theoretical framework's creation, there was a lack of frameworks to describe the collision of technology implementation, pedagogical knowledge, and content knowledge. Mishra and Koehler (2006) have been cited as seminal researchers of this framework. Many researchers cite Mishra and Koehler's work to describe 1:1 technology implementation (Abbitt, 2011; Benton-Borghi, 2013; Joo et al., 2018). The TPACK framework is a guide to help support teacher development in the area of technology, infusing technological, pedagogical, and content knowledge.

Joo et al.'s (2018) research sought to identify the relationship between pre-service teachers and the influence of TPACK on their practice. The government of South Korea analyzed data from research to construct the importance of technology use in school and its impact on student achievement. "Based on the three main knowledge categories for

teachers (i.e., content, pedagogy, and technology), TPACK emphasizes the dynamic interaction and integration of knowledge with the use of technology" (Joo et al., 2018, p. 49). This study described the use of technology to support specific pedagogies within a particular content area. TPACK describes the use of technology as an instructional technique, not as a current educational tool. The researchers described it as "the use of technology to help teachers improve student learning" (Joo et al., 2018, p. 49). It was noted that a positive relationship was identified between TPACK and teacher self-efficacy, technology use, and intention to use technology. Teachers with higher levels of TPACK were associated with increased levels of self-efficacy (Joo et al., 2018). Joo et al. (2018) inferred that pre-service teachers with a high level of TPACK find technology helpful and easy to embed in instruction. The researchers identified ways technology benefits student achievement including the flipped classroom model, high tech learning environments, and live webcasts. TPACK allows teachers to become familiar with technology and become comfortable to embed resources in their own classrooms. Technology can amplify learning. By using resources that are readily available in schools, teachers can support a 21st-century learning environment and improve performance of students. Technology is a way to improve student performance, allowing students to connect to content-related media and collaborate with peers (Joo et al., 2018). TPACK describes technology as a tool to help teachers support student learning. Pre-service teachers with high levels of TPACK would find technology helpful in his or her classroom. If a teacher's comfort of TPACK is elevated, he or she is best able to support students' learning by embedding technology as a tool and not as an instructional strategy (Joo et al., 2018).

Courduff et al. (2016) analyzed two theoretical frameworks, TPACK and Technology Acceptance Model (TAM) to create a model that explains "the process leading to exemplary integration of technology into special education instructional practice" (Courduff et al., 2016, p. 26). The researchers attempted to answer the following questions:

> What is the process by which special education teachers begin to use and effectively implement technology in their classrooms? What are the factors of effective integration of technology in a special education classroom? What obstacles do special education teachers face when integrating technology in a special education classroom? (Courduff et al., 2016, p. 28)

This grounded theory study included 10 special education teachers. Teachers' demographic information was collected and interviews and observations were performed. Prior to the research, there was no theoretical framework to explain how technology is embedded in special education classrooms. The authors cite how technology helps improve student learning outcomes and individualizes learning for students, especially in special education settings. Teachers' "personal attributes, beliefs, and opportunities set the stage for special education teachers to begin exploring and adopting technology in smalls steps" (Courduff et al., 2016, p. 35). It is important to note, teachers do not implement technology that is unplanned or unfamiliar. Teachers who believe technology is useful will go out of their way to embed technology in their instruction. Many factors hold back student utilization of technology. Teachers must feel confident with using the technology and feel that the technology is purposeful, in order to use it. At some point, each of the participants recognized that technology was a tool that could be leveraged to

improve their students' educational experience and increase progress toward learning goals" (Courduff et al., 2016, p. 35). This grounded theory study produced a unique framework that had a multitude of recommendations to implement technology in a special education setting.

Teachers' Technology Perceptions

Teacher Beliefs About Technology

Baek et al.'s (2018) research focused on physical education teachers' opinions of the impact of technology in physical education (PE) classrooms. This qualitative study sampled 12 PE teacher-participants. The teachers were in a graduate program offered at a Mid-Atlantic university. The participants completed a course that focused on instructional technology and athletics. The participants were given the Stage of Adoption of Technology survey, a single-item survey and individual, semi-structured interviews that included 20 open-ended questions about their experiences in three learning situations. This study supports previous findings that experiences must be individualized for participants to feel genuinely connected to the experience. One major theme identified through interviews was that participants reflected on their own experiences in PE at the kindergarten through 12 level. Each identified the lack of technology they experienced as a student. Based on the participants' earlier educational experiences, many participants felt that technology did not belong in PE classes as it would reduce the amount of time that students can be physically active in class. The graduate program required participants to observe other educators using technology in physical education lessons. Many participants shared positive experiences associated with the observation. One finding from this study involved teachers' personal educational experiences as having negatively

impacted their perception of using technology while teaching. Despite exposure to many technological resources, many of the participants (nine out of 12) felt they were being instructed on the technological knowledge but not the application the technology could bring to their students.

Sullivan et al. (2018) conducted a study that was completed through a State University of New York (SUNY) initiative. The program, Tools of Engagement Project (TOEP) had two goals. The first was to teach educators how to interact with technology and expose them to different tools that could help support their teaching. The second goal was to support learning through the establishment of an online community to share experiences and ask questions. Approximately 32 SUNY campuses participated in the TOEP initiative to enhance educators' capacity in educational technology. There were 29 participants in this study who were educators within the SUNY network. The research conducted in this qualitative study surrounded the online platform for this SUNY instituted TOEP initiative. Educators posted to the site to forge an online community to make meaning of their own work. Participants were encouraged to post on the Google Plus platform. Once data was collected, each post was coded based on major themes in the TOEP online community. Multiple researchers coded the information to ensure valid text analysis. This study found the online network allowed educators to learn about new technology to incorporate in their classes. It served as an online community for reflection on utilizing technological resources as well. Moreover, this platform served as a uniting ground for SUNY educators who were geographically widespread throughout New York. Educators stated that they viewed TOEP as part of a technological journey and it served as a launch pad to incorporating more technology in their own practice.

Lumpe and Chambers (2001) completed a study that focused on teacher beliefs and technology use in the classroom. This study administered a survey, the Belief About Teaching with Technology (BATT) which is based on Ford's Motivation Systems Theory. The researchers set out to understand the significance between context belief and capability belief of teachers utilizing technology in schools. In 2001, many teachers scored high in the enabled beliefs but low in the likelihood item related to the technology availability in their building. Teachers have reported high levels of confidence with the use of technology. When technology implementation was rolled out, teachers felt barriers would reduce the effective use. If teachers believed they will not have access to equipment, they were less likely to act on the pursuit of the acquisition of such equipment. Furthermore, with limited technology access, teachers were also less likely to participate in professional development. Actions, or lack thereof, may in turn reinforce negative beliefs and create a cycle of stagnation (Lumpe & Chambers, 2001). The authors believe teachers must be motivated by their own beliefs. Self-efficacy is key to a successful implementation in each teacher's classroom. Teachers that maintain negative beliefs regarding the technology movement will not be interested in the positive impacts that technology can have on student learning. Technology in education brings about a change culture (Lumpe & Chambers, 2001). It's important to recognize the teachers' beliefs about technology use to understand the impact they have on student learning.

Benton-Borghi (2013) has argued for the need to synthesize two frameworks: Universal Design for Learning (UDL) and Technological Pedagogical Content Knowledge (TPACK). These two frameworks are taught to pre-service teachers independently, but the author argues that they should be integrated together as technology

is more often being used in classrooms. The UDL framework is a resource that helps provide structure for learning in a way that is rigorous, yet accessible, for all learners (CAST, 2018). The framework provides strategies in three areas: "engagement, representation, and action and expression" (CAST, 2018). Engagement refers to the reasons why something is learned. It allows learners to be "purposeful and motivated" (CAST, 2018). In the UDL framework, representation relates to "the what of learning" and allows learners to become "resourceful and knowledgeable" (CAST, 2018). The last piece of the UDL framework is "action and expression," which is defined as "the how of learning" (CAST, 2018). This area allows learners to be "strategic and goal-directed" (CAST, 2018). Utilizing UDL as an instructor ensures learners are motivated and taught using multiple methods and strategies. Learners are able to show that they have connected to material and grasped content (Gauvreau et al., 2019).

Benton-Borghi (2013) suggests, "The infusion of UDL throughout the TPACK model may result in a multi-dimensional, transformational practitioners' model that will improve outcomes for all students" (p. 246). Pre-service teachers born after 1984 have grown up native in technology. Why is the technology native teacher skill set and comfort in daily living not being transferred to the teacher's classrooms to embed technology in lessons? These UDL and TPACK frameworks are at the core of current teaching. This synthesis of the two frameworks is a unique way of thinking, as it seamlessly integrates UDL with technology standards. UDL and TPACK represent the most current frameworks in education. Benton-Borghi (2013) mentions a connection between technology and special education:

Modern technology that provides equal access to curriculum content changed the

> dynamic and increased the demand for the inclusion of students with disabilities in the general education classroom. Teacher educators must prepare teachers to confront the challenge of access to the general education curriculum within general education classrooms for all students including students with disabilities, academically at-risk students, and students from different racial, cultural, linguistic, and socioeconomic backgrounds. This cannot be accomplished without collaboration and communication between general and special education teachers. (p. 249)

The implications of the blended frameworks may improve student learning outcomes for both general and special education students, alike. Additionally, pre-service teachers will lack the skill for incorporating technology into their future classrooms. Technology has become more and more common in schools as the student to device ratio has decreased dramatically over the past 30 years. Technology should be incorporated to best suit the needs of all learners for individualized instruction. TPACK is a framework to improve the learning of all students. Teachers who utilize the infusion of UDL and TPACK can have a deep understanding of good teaching and implementation of technology in their lessons.

Abbitt (2011) conducted research "to explore the relationship between preservice teachers' perceived knowledge, as represented by the TPACK framework, and self-efficacy beliefs about their ability to successfully use technology in the classroom" (p. 139). The researcher wanted to understand the connection between pre-service teacher self-efficacy and technology to examine whether it changes throughout the course of the program. Results indicated there was a direct correlation between TPACK and

technology self-efficacy improvement throughout the program of pre-service teachers. "TPACK framework is a conceptual model for the knowledge that supports effective technology integration into classroom teaching practices" (Abbitt, 2011, p. 135). Technology is a powerful positive tool in schools. Teachers who are new to the profession must be competent and confident at using the tools in their lessons. Teachers who are trained will not only have the knowledge of technological instruments but can actually use the tools to "facilitate student learning" (p. 135). If pre-service teachers are not trained, they will not feel confident at embedding technology in their classes when they become a full-time teacher. New teachers are less likely to use technology if they do not have technological, pedagogical, or content knowledge (Abbitt, 2011). It is crucial to support pre-service teachers with the technological support needed, in order to feel comfortable with embedding technology in their instructional practice.

Williams' (2017) study was designed to investigate the experiences of in-service teachers' perceptions of educational technology support at their building level.

Study participants took part in semi-structured interviews and a demographic survey. The participants were selected based on four components: employed in a public school in the 2015-2016 school year, certified to teach K-12, completed a traditional teacher education program at a four-year institution, completed the *Digital Opportunity Trust TeachUp!* USA Program. Williams' (2017) research noted multiple strengths of supporting instructional technology initiatives. The participants noted many positive outcomes from the support of a teacher technology mentor, who helped alleviate issues that could be resolved without help of IT support. Additionally, the researchers noted that beyond the support of a teacher technology mentor, many buildings had administrators

who supported technology for improved student learning outcomes. Some teachers in the study stated that the queue waiting time for IT support was lengthy. Teachers also stated that instructional technology was not supported with fidelity by all building leaders. Participants reported that internet connectivity, the number of computers for a class to work on, and internet filters all hindered the ability to "enhance student learning experiences" (Williams, 2017, p. 80). The authors concluded with three teachers' recommendations: increase training for new and veteran teachers, share internet passwords with teachers, and increase the amount of professional development.

Vongkulluksn et al. (2018) sought to identify if teacher beliefs on classroom technology integration related to their own internalization of technology. The researchers gathered information on how barriers impact teachers' technology use in the classroom. Secondly, researchers attempted to identify the impact of teachers' views of technology on their classrooms. The population for this study was 624 sixth-to-twelfth grade teachers and 20 administrators from schools across a Midwestern state. The teachers had on average 13 years of teaching experience. The administrative participants completed a survey with four areas of focus: technology resources, organizational resources, administrative support, and school culture in support of technology integration. This survey used open numeric response ratings to answer items. The administrative survey items were rated using a six-point Likert Scale. Teacher participants completed a survey online that focused on demographic information, their use technology, teacher perception of support on "first-order barriers," and their beliefs about technology (Vongkulluksn et al., 2018, p. 73). The instrument used for this study was a 25-item survey for teachers. The administrators were asked to answer items related to four subscales: technology

resources, organizational resources, administrative support and school culture related to instructional technology integration adapted from Labin's (2014) work. Descriptive statistics were computed for the surveys. Teachers implemented technology 46% of the time in class. There was a strong correlation between teacher beliefs of technology and technology use in classrooms. The researchers found that teachers who thought using technology would improve instruction used more technology with their students. Teachers who placed value on instructional technology cited fewer barriers than teachers who placed less value on instructional technology. These findings solidify that teacher beliefs are very important to the success of a new program.

Lucas (2018) sought to determine the barriers that impact the implementation of a 1:1 tablet initiative. The researcher employed a qualitative study to analyze three schools in Portugal that took part in the EduLab project. This study aimed to identify external barriers that prohibited the 1:1 initiative from its full implementation. Schools that participated in the project received a device for each student and teacher, interactive whiteboard, "access points to the network and school server", a student information system, learning management system, and software support (Lucas, 2018, p. 3). There were 80 students and 19 teachers who participated in this study by completing open-ended online questionnaires. Focus groups also took place: four with students, four with teachers, and two with parents. Three interviews were conducted: one with the CEO of an educational consortium, and two with school leaders. Lastly, field notes were collected during meetings with school leaders and project coordinators (Lucas, 2018).

The findings of Lucas (2018) study were organized into four areas. These four areas included: technology and infrastructure, content and curriculum, professional

development, and organization and leadership. Teachers, students, and parents agreed that the hardware was slow and did not have the proper specs to support certain software (Lucas, 2018). A student commented in the questionnaire that teachers struggled with the ability to teach using the 1:1 tablet. It was noted in the questionnaire that teachers also struggled with the delivery of lessons; lessons were more traditional compared to learning without the 1:1 devices. Parents and teachers agreed that teachers needed more professional development to support the 1:1 initiative (Lucas, 2018). Time was noted as a barrier for the successful implementation of the 1:1 devices. The deficiency of time was defined as a lack of time for training, experimentation, implementation, and discussion of the findings with peers (Lucas, 2018). Teachers also critiqued the structure of this study. Teachers felt that they needed time with other program participants to discuss and share best practices from their classrooms (Lucas, 2018). It was also noted that there was a lack of technological support built into the project, which would have helped resolve hardware and network issues. This lack of technology support largely was due to budget constraints (Lucas, 2018). Lastly, parent involvement and monitoring and evaluation were the last two barriers mentioned. There was an overall lack of opportunities for parents to be involved in this project. The monitoring and evaluation fell short as this project mostly focused on "satisfaction with equipment" or device used in this 1:1 tablet initiative (Lucas, 2018, p. 5).

The barriers identified from Lucas' (2018) work are crucial for implementing top down 1:1 approaches. It is important to recognize the amount of time needed for teachers to assimilate incorporations of technological pedagogy into their classrooms. It was stated that teachers felt peer collaboration was crucial in allowing them to try new approaches

and communicating with other teachers for deeper learning. Lastly, before a school implements a 1:1 technology program, there must be ample technology support in terms of teaching pedagogy as well as IT support (Lucas, 2018).

Conceptual Framework

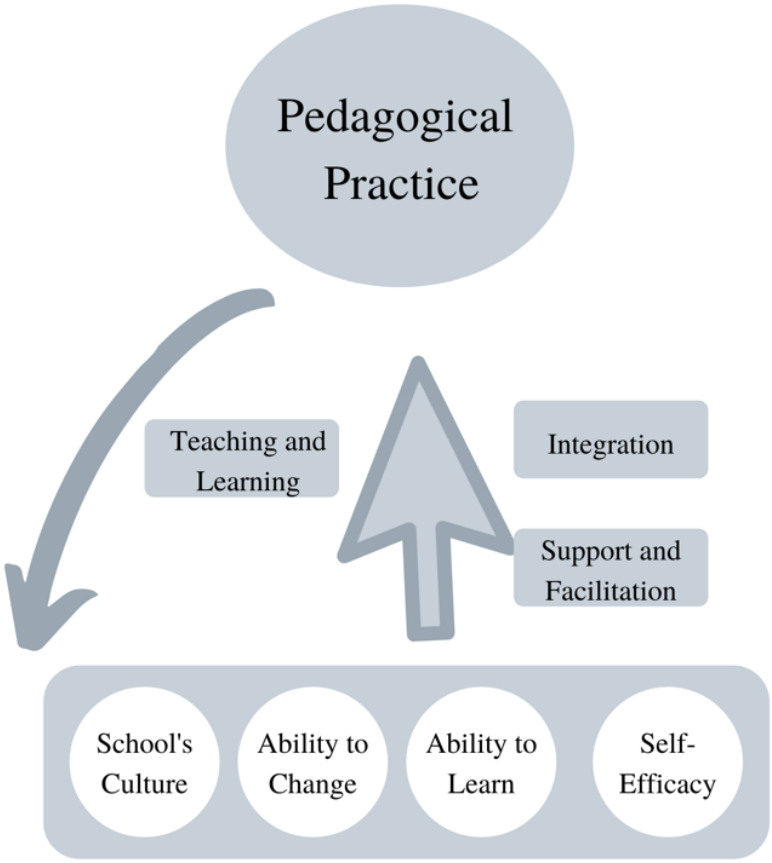
This following section focuses on the conceptual framework, which is a structure that guides the analysis of the current study (Creswell, 2019). The conceptual framework adopted for this study has been heavily influenced by four theorists: Schein (2017), Knowles (2014), Bandura (1971), and Fullan (1997). At the top of this conceptual framework is pedagogical practice. In order to influence a teacher's pedagogical practice there are four key components: the culture of the school (Schein, 2017), the ability to change (Fullan, 1997) ability to learn newly acquired materials (Knowles, 2014), and self-efficacy. These four components are the foundation of a teacher's pedagogical practice. Three key areas that are able to improve a teacher's practice are teaching and learning experiences, integration, and support and facilitation.

The quality of a teacher's experiences with implementing new technology and the learning experiences connected to the new technology will impact the teacher's overall practice (Glover et al., 2016; Lucas, 2018; Mishra & Koehler, 2006). In addition to teaching and learning, support and facilitation are also important to the level of technology integration in a teacher's pedagogical practice. Support from building leadership, IT, and facilitation of continued learning and peer collaboration is essential for teachers' success (Fenton, 2017; Lucas, 2018; Sauers & McLeod, 2018a; Sykora, 2014). Lastly, the level of integration plays a role in a teacher's pedagogical practice. The greater the access a teacher has to utilize technology in their classroom, the more

opportunities they will have to integrate technology into lessons (Downes & Bishop, 2015; Fenton, 2017; Frazier & Trekles, 2018). With a constant influx of new tools, the cycle of shaping one's pedagogical practice must be fluid and readily adaptable to new items.

Figure 2.1

Conceptual Framework (Rice, 2019)



Theoretical Framework

Four theoretical viewpoints that impacted this study are Schein's culture theory, Bandura's social learning theory, Knowles' adult learning theory and Fullan's change

theory. The theoretical frameworks provided by Schein (2017), Bandura (1971), Knowles (2014) and Fullan (2017) shaped the current study's approach.

In any environment, culture lies deeply. Culture is an abstract idea that is layered with many deep meanings. Schein (2017) defined culture with three aspects on his triangle. At the most surface level feature, he describes an underlying assumption. In the current research, the implementation of a 1:1 Chromebook program in a middle school changed the culture. This can be identified by Schein's term of underlying assumptions. The next layer is a culture's artifact. In the current study teachers had access to tools to support individualization of learning. The deepest layer of Schein's culture are espoused values. In the current study, no specific mandate has been put in place to use the Chromebook. Some teachers felt strongly about the benefits of technology for student learning and have implemented technology into their classrooms while others have not.

Social learning theory was another important construct that helped shape the current study. Bandura (1971) has identified three important aspects that determines human behavior: environmental factors, cognitive factors, and behavioral factors. In the current study, teachers learned about technology from observing other teachers modeling exemplary technology integration through an instructional rounds process or mentoring. In the current study, teachers who implemented Chromebooks with students were reinforced by other educators to continue on the path to support the 1:1 initiative. Teachers' motivation to use technology is varied; those who embed technology in instruction are rewarded and at this time in the 1:1 initiative, those who do not foster technology use are not punished.

The third theoretical framework that helped guide the current research centers on adult learning theory. Knowles (2014) has identified five assumptions of adult learners: self-concept, adult learning experience, readiness to learn, orientation to learning, and motivation to learn. These five assumptions guide educators' andragogy. In the current study, teachers had five assumptions of adult learners as the Chromebook initiative at the case study middle school had progressed for the past six years. Some teachers were more eager to learn about redefining what education looks like in this technological age and other teachers were not. Teachers had a variety of motivational reasons for learning and improving their teaching practice in regard to utilizing technology to support student learning.

The last theoretical framework that impacted the current study is Fullan's change theory. According to Fullan (2017), there are four key components for a smooth implementation of change to occur. In education, it is imperative that specific variables align to positively impact change. Fullan (2017) has identified these factors as falling into three categories: "characteristics of change", "local characteristics", and "external factors" (Fullan, 2017, p. 87). These factors are not a set of rules to allow for smooth implementations of change, but factors that may help facilitate the process.

Culture

Schein (2017) has described culture as a way in which those in a group with a common past norm approach situations and place value on items. The culture of a group relates to the length of time the group has been together. The longer the group has worked together, the more apparent the culture grows. Within each organization, Schein

(2017) identified different levels that are unique to the organization itself: artifacts, espoused beliefs and values, and basic underlying assumptions.

Artifacts in an organizational culture are most apparent. This level of culture is the most visible for the organization in which it belongs to. To someone who is not a part of the group, he or she would describe the artifacts that make up the culture as it is the most surface level characteristic of the organization. To a visitor of a school, the items that are observable such as a mission statement, school newsletters, wall colors, building style, cleanliness and other characteristics allow the visitor to make some form of judgement about the school. If the visitor spends more time at the organization, deeper meaning about the observable features become evident.

Espoused beliefs and values are more deeply rooted within an organization. Many of the beliefs and values will forecast expectations for many of the group's situational responses. The observable artifacts may relate to the espoused beliefs and values of the organization if they are congruent. However, the artifacts and espoused beliefs and values of the organization may not line up and it may lead to inconsistent ideas regarding the organization's culture. The artifacts of the culture allow constituents to foresee the way the organization reacts.

The most embedded level to a culture is the basic underlying assumptions. Assumptions are solid ideas that are at the core of the organization. It is difficult to change an assumption about the g. The group will struggle with its identity if a basic assumption is altered and does not follow its previous pattern. New members of an organizational group lack the underlying assumptions that long term members have acquired. New members must make meaning of the assumptions of their organization.

Every new situation allows the group to develop more complex assumptions about organizational standards and protocols to help congeal the team.

In the current study, the research surrounded a middle school that is in its fifth year of a 1:1 technology implementation. Based on past practice, the artifacts of the school building identify structures and supports for new technology. The school district carefully decided to assign devices to students in sixth grade, one graduating class at a time. Based on artifacts, the district and school building has been supportive of professional development for teachers to learn to embed technology as a tool in classrooms. The espoused beliefs and values of the school included a message to be technologically innovative. The underlying assumptions of the school were one aspect of research this study hoped to uncover. With the artifacts and espoused beliefs and values aligned, the assumptions of these members remain misaligned. The culture of the organization plays an important part of the implementation of a new program.

Social Learning Theory

Bandura (1978) articulated that social learning is carried out in a triadic approach. In his earlier work, Bandura expressed that social learning cannot be explained as a shared process between just an individual's personality and their environment. This concept does not consider that behavior can influence the environment and vice versa. Both behavior and environment influence individuals (Bandura, 1971).

Bandura recognized a three-way approach that influences learning. The three factors, known as "reciprocal determinism and interactionism" that support social learning are environmental factors, cognitive factors, and behavioral factors (Bandura, 1978, p. 345). Environmental factors are listed as the physical situation and location,

cognitive factors reflect "which external events will be observed, how they will be perceived, whether they have any lasting effects, what valence and efficacy they will have and how the information they convey will be organized for future use" (Bandura, 1978, p. 345) and behavioral factors include the way one acts in response to the environment and cognitive factors (Bandura, 1978).

This theory partly explains how a new initiative can have a variety of effects on teacher's adaptations. In the current study, teachers' social learning can be attributed due to a combination of three factors: environmental, physical, and cognitive. These three factors help explain why some teachers in the current study are more likely to utilize 1:1 learning with students in departments where many of their colleagues have similar practices. She school building leaders, other teachers, students, and parents may act as environmental factors that impact teachers reinforce or negate Chromebook use in the classroom.

Adult Learning Theory

Knowles (2014) used the word andragogy to describe adult learning. Adult learning is different than pedagogy as adult learning has different characteristics compared to children. Knowles identified six principles of adult learning: the learner's need to know, the self-concept of the learner, the prior experience of the learner, readiness to learn, orientation to learning, and motivation to learn (Knowles, 2014, pp. 65–68).

The first assumption focuses on the reasons the adult need to learn the new material. In order to devote time and energy into something new, they need to understand why the learning is impactful before learning can take place. The adult learner's self-

concept also plays a role in learning new materials. Adults flourish in educational settings where they can transition from "dependent to self-directing learners" (Knowles, 2014, p. 65). Adults have had more learning experience incidents compared to their child learner counterparts. Experiences from learning for adults tap into previous childhood experiences and allow them to utilize those experiences as predispositions to the acquisition of knowledge. Adult learners' "readiness to learn" recognizes the match up between "developmental tasks" and timing; it is essential that the timing is appropriate for learner willingness (Knowles, 2014, p. 67). A learner's orientation also plays a key role in learning new information. When adult learners feel that learning something will help them perform better, they are more inclined to absorb that learning opportunity (Knowles, 2014, p. 67). Lastly, intrinsic motivators are the most impactful to adult learners. Most adult learners are determined to continue to grow and develop (Knowles, 2014, p. 68). These assumptions relate to the experiences of adult learners as the staff begins to integrate new technology into the current curriculum.

Change Theory

Within the factors of implementing change, Fullan (2017) identified the three subcategories as: "characteristics of change," "local characteristics," and "external factors" (p. 87). He stated that there are four factors that are necessary for implementation of change to occur described as "need," "clarity," "complexity" and "quality/practicality" (2007, p. 87). The necessity for implementation should be based on "priority needs;" the school district must clearly define the need for technology infusion (Fullan, 2007, p. 88). Fullan noted the importance of "clarity" during times of change (Fullan, 2007, p. 89). For a smooth implementation of technology into multiple grade levels, the goals of the

program should be categorically defined. Levels of "complexity" is another factor Fullan described for a well implemented plan (Fullan, 2007, p. 90). The more complex the change is from current practices, the more energy required to yield the preferred outcome. Fullan's last factor of implementation was "quality and practicality" (Fullan, 2007, p. 91). Consistent and succinct implementations rolled out over time assure a high quality of change.

Local characteristics are essential in the promotion of positive change. The factors within local characteristics are the district, community, principal, and teacher. These four aspects play an important role in the efficacy of a new program. When new programs are implemented without regimented follow-through, the reasons may be questioned as ill conceived. The involvement of the central office and school building leaders with the new program is incredibly impactful (Fullan, 2007). The school community and board of education play an important role in the "hiring or firing of reform-oriented superintendents" (Fullan, 2007, p. 95). Successful schools have established close relationships between the community and school. The principal's actions have an important role in a program's success. Principals that are actively involved have a higher success rate (Fullan, 2007). Teacher actions also play a large part in implementation of a new program. Huberman (1988) identified that teachers' mental states can have a lot to do with their tendency to accept or reject new programs. The interactions that teachers have with colleagues and leadership influence how they proceed with embedding a new program in their classroom. The more isolated a teacher is, the less likely they will be to share ideas, receive support, and have a positive disposition towards work (Fullan, 2007).

School buildings that have thriving programs are very supported and have interconnected beliefs among all constituents that make up the local community.

Fullan (2007) finally described external factors as the last factor that impacts change. Within external factors, Fullan (2007) listed government and other agencies as obstructions that would impact implementation. State and national government policies impact educational systems. The ebb and flow of government-created policies and programs and their implementation has been problematic for schools. Given this predicament, the government is more aware of the crucial role implementation plays in the success of new policies and programs (Fullan, 2007).

Summary

The presented research fits within the previous scholarship in an abundance of ways. Most of the studies presented in this chapter have focused on 1:1 initiatives that have been implemented for two years. The current study adds to the literature as it examined how the 1:1 Chromebook program has determined how educators integrate technology in their instructional practice, how the Chromebooks improve teaching and learning, and aims to understand the overall impact of the technology on instruction. Technology brings about a change in the current culture (Lumpe & Chambers, 2001). When teachers value technology, they will identify fewer barriers than teachers who place less value on instructional technology (Vongkulluksn et al., 2018). Educators will need time to assimilate to incorporating technology into their pedagogy and content. Teachers in the current study have had six years to assimilate technology into their practice. The teacher is viewed as a driving factor that can either support or hinder the

growth of the 1:1 educational technology movement (Lucas, 2018; Vongkulluksn et al., 2018; Williams 2017; Abbitt, 2011).

CHAPTER 3

Introduction

As more schools are implementing 1:1 device programs for students (National Center for Education Statistics, 2008), the increase in instructional devices in education today has impacted teachers' pedagogical practice. The purpose of this mixed method case study was to understand the impact of instructional technology on teachers and building leaders in a suburban middle school located on Long Island. This study also sought to discover whether the advancement in technology has improved teaching and learning to understand how the elements of a school community impact the 1:1 device program. This information will assist with the implementation of 1:1 device programs. Chapter three consists of the rationale for the approach, research setting and context, research sample and data sources, data collection methods, data analysis, trustworthiness, and concludes with limitations of the study.

Rationale for the Research Approach

This mixed method case study examines the implementation of a 1:1 Chromebook initiative taking place at a Long Island middle school. While all students were equipped with their own district-issued device, teachers' views impact the use of technology and the level of integration in their classrooms. It is crucial to learn from teacher and building leaders their belief systems regarding the extent to which technology improves teaching and learning. Findings focused on the implementation of new technology noted that teacher perceptions of technology are especially crucial for classroom technology integration.

Case Study

To understand the level of technology integration in classrooms, it is critical to understand the perception and mindset of the teachers a part of the 1:1 Chromebook program. Yin (2014) describes a case study as an empirical inquiry that "investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomena and context are not clearly evident" (2014, p. 13). In the current study, the content is described as the school in which the 1:1 program is in its sixth year of implementation, the phenomena is the program itself, where before this time, students did not have access to their own Chromebook device throughout the school day and at home. Yin (2014) goes on to describe that the case study inquiry "copes with the technically distinctive situation in which there will be many more variables of interest than data points" (p. 13). Due to the multitude of sources that needs to be triangulated, theoretical frameworks guide data collection and analysis in case study methodologies.

Research Setting and Context

This study's setting was a middle school on Long Island, New York. As a part of the New York State's Smart School Bond Act, the district in focus submitted plans to increase instructional technology. The Long Island district received 2.9 million dollars in 2014. The funds were used to acquire instructional technology, increase internet connectivity, and to install security features.

Research Sample and Data Sources

Participants

All teachers in the selected middle school, approximately 70, participated in a survey on teachers' views of technology in the classroom. To gain more insight into

teachers' perceptions of technology, five teachers and a building administrator participated in individual interviews.

Criteria for purposeful sampling of select teachers to participate in semi-focused interviews included ten years of teaching experience in the focus school, balanced number of male teachers to female teachers, and a teacher from each core subject: English, math, science, social studies, and world language. Additionally, a building administrator was interviewed.

Setting

The setting of this study was a middle school on Long Island, New York. Permission was requested from the district's superintendent prior to conducting research. The school district in focus serves nearly 6,000 students from pre-kindergarten to twelfth grade. Based on the 2016-2017 school year, the student ethnic makeup of the district was 43% white, 41% Hispanic or Latino, 7% black or African American, 6% Asian or Native Hawaiian / Other Pacific Islander, and 3% multiracial. It was indicated based on the 2016-2017 school year that 54% of students are considered economically disadvantaged, 17% of students are English Language Learners and 14% of students have a disability. The focus middle school serves approximately 1,000 students in seventh and eighth grade.

Quantitative Data Collection and Analysis

The current study used multiple data sources to triangulate findings related to teachers' beliefs regarding school culture and use of educational technology. For the quantitative piece of this mixed method study, a survey was administered to all teachers in the target middle school asked to participate in this study. The survey was adapted

from Christensen's (2003) research which focused on the impact of technology integration education on teachers' and students' attitudes. The survey has been adapted due to the passing of time since the survey was created. Technology has rapidly changed from the initial study conducted in 1997 and the current research focuses on specific tools that are not mentioned in the original Christensen survey. Permission to use and modify Christensen's work was obtained. The survey was administered through email and conducted during one of the building's faculty meetings.

The survey invitation asked teachers for their participation in the current study by completing the survey to the best of their ability. The survey began with three demographic questions: teacher's gender, subject area taught, and years of teaching experience. These demographic questions allowed the researcher to analyze teacher beliefs based on inclusion in various demographic subgroups.

The 10-item survey gathered information about teachers' beliefs on the use of educational technology. Each item used a 9-point Likert scale (1 = *strongly disagree*, 1 = *strongly agree*). This survey was sent using Google Forms. All items on the survey were required in order for the participant to submit their responses. Participant responses from the survey were uploaded and analyzed using SPSS.

Qualitative Data Collection and Analysis

The qualitative aspect of the current study consisted of semi-focused individual interviews with six educators (an English teacher, math teacher, science teacher, social studies teacher, world language teacher, and building level administrator) to understand how technology is being used.

The semi-focused interviews took place with participants in a one-on-one setting. The researcher asked the interviewees if they give consent for the interview to be recorded. If consent was granted, the interview was recorded using the researcher's laptop for transcription purposes. Prior to the interview, the researcher explained to the participant that the interview is used for doctoral research and participants will remain anonymous. The researcher also asked the participants to be as honest as possible in their responses as the goal of the interview was to gather the educators' perceptions of educational technology in instructional practice.

The first two items of the semi-structured interview asked the educator for demographic information (subject taught and years of experience teaching). The next 15 items were open-ended questions geared to gather insight on the educator's beliefs about instructional technology, school culture of technology use, and pedagogical application of educational technology devices. A color copy of Puentedura's (2010, p. 2) SAMR model was used for the purpose of teachers' self-evaluation of their level of technology integration at the start of the interview. The last item of the interview asked teachers to again evaluate their technology integration on Puentedura's (2010, p. 2) SAMR model to identify whether their perceived level changed based on the interview conversation.

The six recorded interviews were transcribed using NVivo. Once the data was transcribed for all six interviews, the researcher coded the data using NVivo. The observational field notes were uploaded to NVivo to be coded. The interview transcriptions and observational field notes were saved on a password-protected laptop. The interview transcriptions and observation notes were coded based on themes that emerged from each session.

Research Question Analysis

Research Question 1

To what extent do educators integrate technology in their classroom instructional practice? To address this question, the researcher coded educator responses from semi-structured interviews using NVivo for qualitative analysis. Once the data was coded in NVivo, responses were analyzed to determine themes in participant responses. Additionally, the researcher conducted observations in classrooms to view how technology is being used. The observation notes were exported to NVivo and coded for common themes in classroom visits.

Research Question 2

To what extent does technology improve teaching and learning? To address this question, the researcher used interview responses that were coded using NVivo for qualitative analysis. Common themes in participant answers were identified to provide meaning to the quantitative research in response to the third research question.

Research Question 3

What impact does technology have on teachers' instruction? The present study used an adapted version of Christensen's (2003) "Teachers' Views of Technology and Teaching Survey" to answer this question. This survey was administered to all teachers at the target middle school. Teachers were invited to complete the survey as a Google Form. Once surveys were completed, results were exported to SPSS for analysis.

Researcher Role

The role of the researcher in this current study may have impacted the data collection and interpretation of the study in a few ways. First, the researcher is a teacher

in the focus school. In addition to being a teacher, the researcher is also a building technology mentor who provides support to all teachers. Being a technology mentor has resulted in additional professional development to support the 1:1 initiative. The researcher has been working at the focus school for seven years, six of which have been years where students have been assigned a device for the 1:1 Chromebook program.

Given the researcher's investment to technology programs as a technology mentor in supporting teachers, building leaders, and other staff, it was crucial for the researcher to only include findings that can be supported using data collected during the study's data collection period.

Summary

It was the researcher's goal to develop a case study of the focus middle school that has instituted a 1:1 Chromebook initiative for students for the past six years. The goal of this research was to identify the extent to which educators have integrated instructional technology into their classrooms, to understand educator beliefs on how technology improves teaching and learning, and the impact technology has had on teachers' instruction. The researcher sought permission to use and modify an instrument to adapt to current technology. The researcher also conducted one-on-one interviews using an interview protocol to provide qualitive findings to this mixed method study. The goal of this research was to analyze the factors that contribute to technology use at the middle school in focus.

CHAPTER 4

Introduction

This mixed method study utilized both quantitative and qualitative data to understand the impact the 1:1 Chromebook initiative has had over the past six years of implementation. This chapter focuses on the quantitative findings from a building-wide survey on Google Forms. The qualitative findings of this research have been collected through one-on-one, semi-structured interviews through a video conferencing platform. The survey and one-on-one interviews were completed synchronously.

The following research questions guided this study:

1. To what extent do educators integrate technology in their classroom instructional practice?
2. To what extent does technology improve teaching and learning?
3. What impact does technology have on teachers' instruction?

Results

Quantitative Data Analysis

This chapter focuses on the analysis of survey items administered through Google Forms and one-on-one interviews.

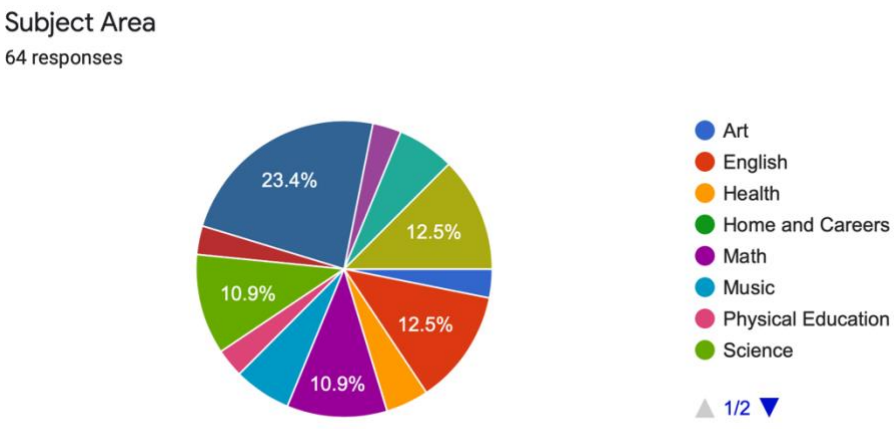
For the quantitative portion of this mixed method study, a survey was administered. A Google Form survey invitation was sent to all teachers at the focus middle school. There were 64 participants that took part in the study out of a total of approximately 70 possible participants (91% response rate). This study focused on a middle school in its sixth year of implementation of a 1:1 Chromebook initiative. The focus school serves approximately 1,000 seventh and eighth grade students.

Demographics of the district's student body included 43% white, 41% Hispanic or Latino, 7% black or African American, 6% Asian, Hawaiian or Other Pacific Islander and 3% multiracial; Fifty-four percent of those students are considered economically disadvantaged, 17% of students are English Language learners while 14% of the students have a disability. For the past six years, students have been given their own Chromebook device in sixth grade. Students bring their issued device from school to home, daily. Teachers at the school in focus have taught in a 1:1 Chromebook setting for the past six years.

The first three questions of this survey were demographic-focused. The first question gathered gender information: 71.9% of participants identified as female and 28.1% identified as male. The next demographic question focused on subject area: 23.4% of participants were special education teachers, 12.5% were English teachers, and 12.5% were listed as other which included guidance counselors, social workers, school psychologists, related service providers, and school building leaders (See Figure 4.1).

Figure 4.1

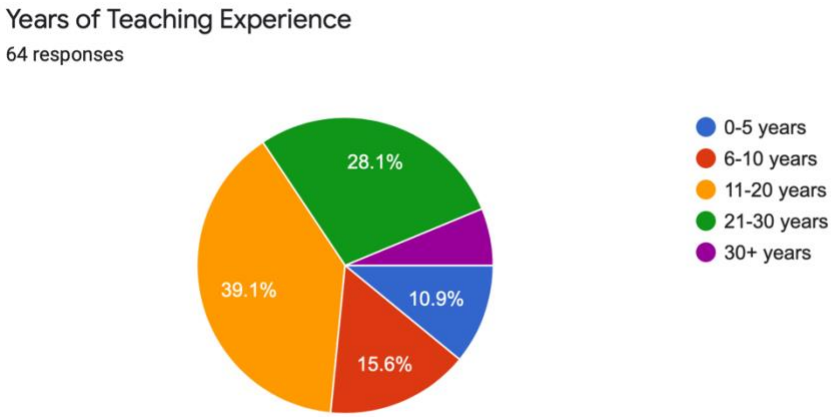
Distribution of Subject Area



Responses to the question about years of teaching experience reflected a wide range of experience. Ten percent listed 0-5 years of experience, 15.6% identified 6-10 years of experience, 39.1% of teachers listed 11-20 years of experience, 28.1% reported 21-30 years of experience, and 6.3% noted 30 or more years of experience. The results of the survey were exported to SPSS for analysis.

Figure 4.2

Distribution of Years of Teaching Experience



Factor Analysis

A factor analysis was performed to group common items. Three factors were identified from the original 13 items in the survey. The first factor, "Positive Factors of Technology Use", consisted of eight survey items: (12) "My students were prepared to quickly shift to a distanced format due to COVID-19 because I often used technology in the classroom prior to the school closure"; (11) "My level of comfort with technology made the COVID-19 school closure manageable in March"; (13) "I am more comfortable with technology this school year due to hybrid learning"; (9) "My students enjoy using new tools for instruction"; (10) "I believe that my students enjoy using computers for

instructional purposes"; (5) "Computers help me individualize instruction to many of my students"; (8) "I enjoy using new tools for instruction."

The second factor, named "Technology Pedagogy," was comprised of three survey items: (3) "Computers in my classroom make me a better teacher"; (4) "I enjoy having computers in my classroom"; (2) "Teachers should know how to use technology."

The third factor, titled, "Learning With Technology," encompassed three survey items: (6) "I'm not afraid to let my students know I am still learning, too"; (7) "I can get most materials that I need using a computer"; (1) "Technology is a valuable tool that can be used to improve the quality of education" (See Table 4.1).

Table 4.1

Factor Analysis Results of Survey Responses

	Factor Loading		
	1	2	3
Factor 1: Positive Factors of Technology Use			
12. My students were prepared to quickly shift to a distanced format due to COVID-19 because I often used technology in the classroom prior to the school closure	**.969**		-.202
11. My level of comfort with technology made the COVID-19 school closure manageable in March	**.798**	-.236	
13. I am more comfortable with technology this school year due to hybrid learning	**.725**	.277	-.288
9. My students enjoy using new tools for instruction	**.601**		.290
10. I believe that my students enjoy using computers for instructional purposes	**.582**	.254	.175
5. Computers help me individualize instruction to many of my students	**.551**	.339	
8. I enjoy using new tools for instruction	**.511**	.179	.298
Factor 2: Technology Pedagogy			
3. Computers in my classroom make me a better teacher		**.995**	-.181
4. I enjoy having computers in my classroom		**.890**	
2. Teachers should know how to use technology	.205	**.437**	.272
Factor 3: Learning With Technology			
6. I'm not afraid to let my students know I am still learning, too	.157	.-489	**.904**
7. I can get most materials that I need using a computer	-.316	.321	**.788**
1. Technology is a valuable tool that can be used to improve the quality of education		.503	**.584**

Note. $N = 64$. The extraction method was principal component analysis with an oblique (promax with Kaiser normalization) rotation. Factors above 4.0 are in bold. Rotation converged in 6 iterations.

Linear Regression

Prior to the statistical analysis, assumption tests were conducted. The relationship between the independent and dependent variable, technology is a valuable tool that can improve the quality of education, was linear, as was demonstrated with scatterplots. When analyzing for multicollinearity, the data were all below 1.0 (see Table 4.3). There was no multicollinearity.

The values of the residuals were independent as were noted by the Durbin-Watson statistic which was close to 2 (Durbin-Watson = 1.764). The variance of the residuals was constant, which was identified by the plot showing no signs of funneling, which suggests the assumption of homoscedasticity has been met. The values of the residuals were normally distributed, which was evidenced by the P-P plot. Finally, there were no influential cases of biasing or outliers evident in the data, which were verified by calculating Cook's Distance values which were all under 1.00.

A linear regression model was used to predict the relationship among five factors: technology pedagogy, learning with technology, subject area taught, gender and years of experience and the dependent variable, the survey item: (1) "Technology is a valuable tool that can be used to improve the quality of education."

Before the regression model could be produced, two categorical variables, subject area taught and gender, needed to be transformed into dummy variables. Each categorical variable was assigned a dummy code equal to one, while everything else was assigned a zero. For example, the respondents that identified their subject area taught was special education, it was recoded as a one, while every other subject area was recoded as a zero.

After each variable was recoded and analyzed, a hierarchical multiple regression analysis was selected, using four levels.

Multiple regression was conducted to determine the best linear combination of Technology Pedagogy (Factor 2), and Learning with Technology (Factor 3), subject area taught, gender, and years of experience for predicting the teachers' belief that technology is a valuable tool that can be used to improve the quality of education. The means, standard deviations, and intercorrelations can be found in Table 4.2. This combination of variables significantly predicted a teachers' belief that technology is a valuable tool that can be used to improve the quality of education, F (2, 61) = 117.62, $p < .001$, with all four variables significantly contributing to the prediction. The adjusted R squared value was .803. This indicates that 80% of the variance in the belief that technology is a valuable tool was explained by the model. The beta weights, presented in Table 4.3, suggest that the strongest predictor of a belief that technology is a valuable tool was Factor 3, Learning with Technology.

Table 4.2

Analysis of Variance Output

ANOVA[a]

Model		*SS*	*df*	*MS*	*F* ratio	*p*
1	Regression	5.825	2	2.913	1.297	.281[b]
	Residual	137.034	61	2.246		
	Total	142.859	63			
2	Regression	6.621	3	2.207	.972	.412[c]
	Residual	136.238	60	2.271		
	Total	142.859	63			
3	Regression	116.558	5	23.312	51.407	.000[d]
	Residual	26.301	58	.453		
	Total	142.859	63			

a. Dependent Variable: Technology is a valuable tool that can be used to improve the quality of education.

b. Predictors: (Constant), Years of Teaching Experience, Gender

c. Predictors: (Constant), Years of Teaching Experience, Gender, Subject Area

d. Predictors: (Constant), Years of Teaching Experience, Gender, Subject Area, Factor 3, Factor 2

The coefficient output, Table 4.4, determines how the predictors, years of teaching experience, gender, subject area, Technology Pedagogy (Factor 2), and Learning with Technology (Factor 3) predict the independent variable, belief that technology is a valuable tool that can be used to improve the quality of education. The first model was not significant $p = .281$. The first model used years of teaching experience and gender as predictors of a teacher's belief that technology is a valuable tool that can be used to improve the quality of education. This shows that a teachers' years of experience and a teachers' gender did have a statistically significant impact. The second model used years of teaching experience, gender, and subject area taught as predictors for a teacher's belief

that technology is a valuable tool that can be used to improve the quality of education. This model also was not significant, $p = .412$. This shows that the combination of teaching experience, gender, and subject area taught were not significant predictors of teachers' beliefs regarding technology to improve education. Lastly, the third model of the regression used teaching experience, gender, subject area taught, Technology Pedagogy (Factor 2), and Learning With Technology (Factor 3), revealing statistical significance with predicting a teachers' belief that technology is a valuable tool that can be used to improve education, $p < .001$.

The first two levels of the regression model showed that none of the dummy variables were significant (see Table 4.4). This demonstrates that neither subject area taught, nor gender were significant predictors in the linear regression. Likewise, the number of years teaching was not a significant predictor.

Factor 1, Positive Factors of Technology Use, was comprised of eight items from the survey. When a regression model was produced, it showed that Factor 1 did not have statistical significance, $p = .302$. Factors 2 and 3 showed a statistical significance, $p < .001$.

Table 4.3

Regression Coefficients of Factors on Teachers' Beliefs

Variable	*B*	SE *B*	*β*	*t*	*p*
Constant	.038	.528		.071	.943
Factor 1	.093	.089	.100	1.041	.302
Factor 2	.402	.111	.376	3.618	.000
Factor 3	.555	.083	.520	6.691	.000

The beta weights, presented in Table 4.4, suggest that a belief that technology is a valuable tool contributes most to predicting Factor 3, Learning With Technology. Examination of the standardized coefficients beta weights presented in Table 4.4, Technology Pedagogy (Factor 2) was a strong predictor, β = .413, but when analyzing the entire table, Learning With Technology (Factor 3) was the strongest predictor, β = .607. This means that Factor 2, Technology Pedagogy, is a strong predictor of the dependent variable, but Factor 3, Learning With Technology, was the best predictor of a teacher's perception that technology is a valuable tool that can be used to improve the quality of education. Learning With Technology (Factor 3) significantly predicted technology's contribution to the quality of education, as did Technology Pedagogy (Factor 2) to a significant, but lesser extent.

Table 4.4

Hierarchical Regression Results for Teachers' Beliefs

Model	*B*	*SE B*	*β*	*t*	*p*
1					
Constant	8.347	.590		14.138	.000
Gender	.494	.418	.149	1.182	.242
Years of Teaching Experience	-.176	.177	-.125	-.991	.326
2					
Constant	8.127	.700		11.613	.000
Gender	.436	.432	.131	1.011	.316
Years of Teaching Experience	-.177	.178	-.125	-.991	.326
Subject Area	.031	.052	.077	.592	.556
3					
Constant	.215	.597		.361	.719
Gender	.241	.194	.072	1.241	.219
Years of Teaching Experience	.012	.082	.009	.151	.880
Subject Area	.009	.023	.022	.384	.702
Factor 3	.649	.070	.607	9.206	***.000
Factor 2	.355	.058	.413	6.079	***.000

*** $p < .001$

Qualitative Data Analysis

This section will present the general findings related to the one-on-one, semi-structured interviews. The interviews were conducted using a video conferencing platform, Google Meet. Each participant agreed to allow the researcher to record the interview for transcription purposes. Each interview was transcribed using NVivo's transcription service then the text was imported to NVivo for analysis of text.

Six educators agreed to participate in one-on-one interviews. The criteria to be a participant in the one-on-one interviews was as follows: the educator needed to teach in

the focus middle school for 10 years, five years before the Chromebook implantation and six years after the Chromebook initiative. Secondly, each educator had to have taught a core class: English, math, social studies, science or world language. Additionally, the building principal was also interviewed for their insight. Lastly, the researcher aimed to have a balanced female to male ratio of 50% male and 50% female participation in the one-on-one interviews.

The analysis of the qualitative data led to 21 codes (See Table 4.5). The code that occurred most often in the analyzed interview transcriptions was the theme, district culture. District culture was mentioned 14 times by four different participants. Goals of technology use was mentioned nine times by two participants. Next, the theme of positive technology experience was coded nine times, by four participants. Technical knowledge (TK) and pedagogy knowledge (PK; Mishra & Koehler, 2006) was coded nine times from text spoken by four participants. The least common theme was high tech compared to low tech, which was only coded once.

Table 4.5

Frequency Table of Interpreted Themes

Theme	Frequency (%)
District culture	14 (12.3)
Goals of technology use	9 (7.9)
Positive tech experience	9 (7.9)
TK and CK	9 (7.9)
Difficult content to teach	7 (6.1)
Redefining lessons	7 (6.1)
Apprehensions	6 (5.3)
Limitations	6 (5.3)
Continuing learning	5 (4.4)
Student off task	5 (4.4)
Student use	5 (4.4)
Teacher's experience as a student	5 (4.4)
Rapid change	4 (4.4)
Student levels of tech use	4 (4.4)
Technical limitation	4 (4.4)
Chromebook issue	3 (4.4)
Future of Ed tech	3 (4.4)
Lack of experience confidence	3 (4.4)
Technology uses	3 (4.4)
Negative impact of student learning	2 (4.4)
High tech vs. low tech	1 (0.9)

Table 4.6

Descriptive Statistics on Survey Items (N = 64)

	Item	Min, Max	*M*	*SD*
1.	Technology is a valuable tool that can be used to improve the quality of education.	2, 9	7.95	1.51
2.	Teachers should know how to use technology.	2, 9	8.19	1.36
3.	Computers in my classroom make me a better teacher.	1, 9	6.12	2.33
4.	I enjoy having computers in my classroom.	1, 9	7.03	2.32
5.	Computers help me individualize instruction to many of my students.	1, 9	6.58	2.39
6.	I'm not afraid to let my students know I am still learning, too.	1, 9	8.42	1.47
7.	I can get most materials that I need using a computer.	1, 9	6.92	2.28
8.	I enjoy using new tools for instruction	1, 9	7.02	1.99
9.	My students enjoy using new tools for instruction.	1, 9	6.50	1.82
10.	I believe that my students enjoy using computers for instructional purposes.	1, 9	6.17	2.22
11.	My level of comfort with technology made the COVID-19 school closure manageable in March.	2, 9	6.98	2.02
12.	My students were prepared to quickly shift to a distanced format due to COVID-19 because I often used technology in the classroom prior to the school closure.	1, 9	5.61	2.72
13.	I am more comfortable with technology this school year due to hybrid learning.	3, 9	7.95	1.52

Table 4.7

Frequency Table of Survey Item 1 (N = 64)

Technology is a valuable tool that can be used to improve the quality of education.

Response	Frequency	Percent	Valid Percent	Cumulative Percent
2.00	1	1.6	1.6	1.6
4.00	1	1.6	1.6	3.1
5.00	4	6.3	6.3	9.4
6.00	3	4.7	4.7	14.1
7.00	9	14.1	14.1	28.1
8.00	12	18.8	18.8	46.9
9.00	34	53.1	53.1	100.0

Table 4.8

Frequency Table of Survey Item 2 (N = 64)

Teachers should know how to use technology.

Response	Frequency	Percent	Valid Percent	Cumulative Percent
2	1	1.6	1.6	1.6
3	1	1.6	1.6	3.1
6	2	3.1	3.1	6.3
7	11	17.2	17.2	23.4
8	11	17.2	17.2	40.6
9	38	59.4	59.4	100.0

Table 4.9

Frequency Table of Survey Item 3 (N = 64)

Computers in my classroom make me a better teacher.

Response	Frequency	Percent	Valid Percent	Cumulative Percent
1.00	5	7.8	7.8	7.8
2.00	2	3.1	3.1	10.9
3.00	2	3.1	3.1	14.1
4.00	2	3.1	3.1	17.2
5.00	12	18.8	18.8	35.9
6.00	8	12.5	12.5	48.4
7.00	16	25.0	25.0	73.4
8.00	4	6.3	6.3	79.7
9.00	13	20.3	20.3	100.0

Table 4.10

Frequency Table of Survey Item 4 (N = 64)

I enjoy having computers in my classroom.

Response	Frequency	Percent	Valid Percent	Cumulative Percent
1.00	2	3.1	3.1	3.1
2.00	3	4.7	4.7	7.8
3.00	1	1.6	1.6	9.4
4.00	1	1.6	1.6	10.9
5.00	12	18.8	18.8	29.7
6.00	3	4.7	4.7	34.4
7.00	6	9.4	9.4	43.8
8.00	9	14.1	14.1	57.8
9.00	27	42.2	42.2	100.0

Table 4.11

Frequency Table of Survey Item 5 (N = 64)

Computers help me individualize instruction to many of my students.

Response	Frequency	Percent	Valid Percent	Cumulative Percent
1.00	5	7.8	7.8	7.8
3.00	4	6.3	6.3	14.1
5.00	10	15.6	15.6	29.7
6.00	6	9.4	9.4	39.1
7.00	12	18.8	18.8	57.8
8.00	9	14.1	14.1	71.9
9.00	18	28.1	28.1	100.0

Table 4.12

Frequency Table of Survey Item 6 (N = 64)

I'm not afraid to let my students know I am still learning, too.

Response	Frequency	Percent	Valid Percent	Cumulative Percent
1.00	1	1.6	1.6	1.6
4.00	1	1.6	1.6	3.1
5.00	3	4.7	4.7	7.8
7.00	3	4.7	4.7	12.5
8.00	6	9.4	9.4	21.9
9.00	50	78.1	78.1	100.0

Table 4.13

Frequency Table of Survey Item 7 (N = 64)

I can get most materials that I need using a computer.

Response	Frequency	Percent	Valid Percent	Cumulative Percent
1.00	3	4.7	4.7	4.7
2.00	1	1.6	1.6	6.3
3.00	2	3.1	3.1	9.4
4.00	3	4.7	4.7	14.1
5.00	8	12.5	12.5	26.6
6.00	5	7.8	7.8	34.4
7.00	8	12.5	12.5	46.9
8.00	12	18.8	18.8	65.6
9.00	22	34.4	34.4	100.0

Table 4.14

Frequency Table of Survey Item 8 (N = 64)

I enjoy using new tools for instruction.

Response	Frequency	Percent	Valid Percent	Cumulative Percent
1.00	1	1.6	1.6	1.6
3.00	3	4.7	4.7	6.3
4.00	3	4.7	4.7	10.9
5.00	10	15.6	15.6	26.6
6.00	4	6.3	6.3	32.8
7.00	12	18.8	18.8	51.6
8.00	10	15.6	15.6	67.2
9.00	21	32.8	32.8	100.0

Table 4.15

Frequency Table of Survey Item 9 (N = 64)

My students enjoy using new tools for instruction.

Response	Frequency	Percent	Valid Percent	Cumulative Percent
1.00	1	1.6	1.6	1.6
2.00	2	3.1	3.1	4.7
4.00	1	1.6	1.6	6.3
5.00	19	29.7	29.7	35.9
6.00	5	7.8	7.8	43.8
7.00	15	23.4	23.4	67.2
8.00	12	18.8	18.8	85.9
9.00	9	14.1	14.1	100.0

Table 4.16

Frequency Table of Survey Item 10 (N = 64)

I believe that my students enjoy using computers for instructional purposes.

Response	Frequency	Percent	Valid Percent	Cumulative Percent
1.00	4	6.3	6.3	6.3
2.00	2	3.1	3.1	9.4
3.00	3	4.7	4.7	14.1
4.00	2	3.1	3.1	17.2
5.00	10	15.6	15.6	32.8
6.00	9	14.1	14.1	46.9
7.00	14	21.9	21.9	68.8
8.00	12	18.8	18.8	87.5
9.00	8	12.5	12.5	100.0

Table 4.17

Frequency Table of Survey Item 11(N = 64)

My level of comfort with technology made the COVID-19 school closure manageable in March.

Response	Frequency	Percent	Valid Percent	Cumulative Percent
2.00	2	3.1	3.1	3.1
3.00	5	7.8	7.8	10.9
4.00	1	1.6	1.6	12.5
5.00	5	7.8	7.8	20.3
6.00	8	12.5	12.5	32.8
7.00	13	20.3	20.3	53.1
8.00	10	15.6	15.6	68.8
9.00	20	31.3	31.3	100.0

Table 4.18

Frequency Table of Survey Item 12 (N = 64)

My students were prepared to quickly shift to a distanced format due to COVID-19 because I often used technology in the classroom prior to the school closure.

Response	Frequency	Percent	Valid Percent	Cumulative Percent
1.00	8	12.5	12.5	12.5
2.00	2	3.1	3.1	15.6
3.00	6	9.4	9.4	25.0
4.00	5	7.8	7.8	32.8
5.00	12	18.8	18.8	51.6
6.00	3	4.7	4.7	56.3
7.00	5	7.8	7.8	64.1
8.00	11	17.2	17.2	81.3
9.00	12	18.8	18.8	100.0

Table 4.19

Frequency Table of Survey Item 13 (N = 64)

I am more comfortable with technology this school year due to hybrid learning.

Response	Frequency	Percent	Valid Percent	Cumulative Percent
3.00	1	1.6	1.6	1.6
4.00	2	3.1	3.1	4.7
5.00	3	4.7	4.7	9.4
6.00	4	6.3	6.3	15.6
7.00	9	14.1	14.1	29.7
8.00	9	14.1	14.1	43.8
9.00	36	56.3	56.3	100.0

Research Question 1

The first research question the research aimed to answer was, to what extent do educators integrate technology in their classroom instructional practice? This question was answered through both quantitative and qualitative findings.

Quantitative Findings

The linear regression revealed that 80% of the variance in participants' responses to the first survey item, the belief that technology is a valuable tool, was explained by the model containing the factors Technology Pedagogy (Factor 2) and learning with technology (Factor 3). Technology Pedagogy (Factor 2) was comprised of questions related to Technology Pedagogy beliefs and factor three focused on the teachers learning with technology. The survey was based on a 9-point Likert scale. A score of a one indicated the participant strongly disagreed, five indicated the participant was undecided and a score of a nine meant the participant strongly agreed.

The survey items that related to how an educator integrated technology in their classroom instructional practice were indicated by the following:

- 5. Computers help me individualize instruction to many of my students.
- 7. I can get most materials that I need using a computer.

The 64 participants all answered survey items five and seven. The minimum and maximum scores were indicative of the lowest and highest score on the item's Likert scale. For the survey item, Computers help me individualize instruction to many of my students, the mean was 6.58 (*SD* = 2.39). Table 4.11 shows that 45 participants responded to this item with a Likert score of six or greater, indicating at least 70% of participants in some form agree with the statement that computers help individualize instruction to many students.

The survey item, "I can get most materials that I need using a computer*,"* had a response rate of 100% by all participants. Again, the minimum and maximum scores assigned to that item were spread from the lowest score to the highest score on the Likert scale. Responses to this item revealed a slightly higher mean of 6.92, with a smaller standard deviation of 2.28. Table 4.13 indicates that 47 of the 64 participants responded with a Likert score of six or greater, indicating that 73% of participants feel they are able to get most materials they need using a computer.

Qualitative Findings

The interview protocol items related to research question one asked participants the following questions:

- How do you incorporate Chromebooks in [subject]?
- Take a minute to look at the SAMR Model. Which step do you place yourself on? Why?

- Think about your classroom six years ago, before students in your classes had their own Chromebook device. How is your class instruction different today than it was years ago?
- What have you been excited about to implement blended learning in your classroom?
- What reasons would you avoid technology use in a lesson or unit?
- Comparing yourself to a teacher that teaches in a different wing of the building. Do you think they have a different view of technology? Do you think they have a different use of technology in their instruction? Why?
- Do you feel that students have more learning opportunities today with using technology? If so, in what ways?
- Looking again at the SAMR Model. Which step do you place yourself on and why?

The theme that emerged from these questions included the teachers' perceptions of what level they identify with most closely on Puentedura's (2010) SAMR Model. Participants were asked twice to indicate the level on which they place themselves in the SAMR Model. This question was asked twice, in order to explore whether conversations generated during the semi-structured interview provided more insight to the teacher's technological approach. All five teacher-participants stated that they felt their classrooms functioned between the augmentation and modification levels of the model a majority of the time. The sixth participant, a building leader, felt that the teaching staff as a whole ranged on a continuum of between substitution to redefinition. The sixth participant stated the following about the building's teaching staff related to the SAMR Model:

> Hard to say, because I think departmentally, if I'm speaking to certain departments, I think are more towards the redefinition range of things and I think certain areas of this building are still probably a substitution range of things, if that makes sense. For me, I think in this building redefinition would probably be some of our classrooms like world language where I've seen things, especially this school year, which I'm just floored by what I see. Some of our science classrooms as well. I think we are kind of there with social studies as well. Although I think that some of our social studies teachers are probably still at that augmentation range and same thing with our math department and that's not to their fault. I think that with the math specifically speaking to math, it's a struggle to use the Chromebooks in a way that we're able to use it in a science classroom or world language classroom.

A pattern arose from the questions addressing research question one: the teachers' first opinions regarding their level on the SAMR Model were the same beliefs they had towards the end of the interview. Most teachers identified that the SAMR level depended on the lesson being taught. A world language teacher stated:

> I would say I'm probably in between an A and an M, in between the two things. In many cases I'm using it [technology] to substitute a lot of the things that I did previously where students just would write things down. They're doing a project that they could have done previously, on a different device, but now they're doing it on their own. Some of the tasks that I've done before with projects have been totally redesigned because you can do them in a different way. The inconceivable is the part at the top that I really don't know if that I'm doing anything that's

> totally inconceivable to be done in a different way. That's why I'm not sure that I could, I would, I don't think that what I'm doing is totally at that point at all. At the redefinition point. Yes, definitely not [all the time]. I may have done some things like that, but I think overall on a day to day basis, it's probably more in that range [A and M].

It was also identified by multiple participants that math was a difficult area to implement Chromebooks effectively. A social studies teacher noted:

> Teachers in other departments might not think it [technology] works in a math classroom, they might think it's a pain to convert all that math into documents. I don't know how that works if it's easier or if it's harder, especially writing formulas and whatnot. But, you know, for my subject matter, I think it was easy [to implement the Chromebook].

Another participant noted:

> They can't really use technology in math as much as science could. I've seen world language can definitely use it almost every day. It just depends on the teacher; how comfortable they feel using technology. They want to use it if they want to get the most out of it than they will. Teachers who are invested at implementing blended learning practices in their classroom are the ones that are going to be most successful.

Discrepancies that were noted were largely based on the disproportionate use of Chromebooks in the mathematic classrooms. Four of the six participants brought up the math department in their responses, stating that the mathematic teachers either could or could not use their device in daily instruction.

Research Question 2

The second research question this research aimed to answer was, to what extent does technology improve teaching and learning? This question was answered through qualitative findings.

Qualitative Findings

The interview protocol included multiple items that sought to determine educators' beliefs in the extent to which technology improves teaching and learning. The interview protocol was designed to ask all participants the same questions about how technology improves teaching and learning for their students. The interview protocol items that related to this research question were the following:

- Again, think about a time before the 1:1 initiative. How has your view of Chromebook use for student learning changed?
- What do you feel the district's goals are of the 1:1 Chromebook initiative?
- What reasons would you avoid technology use in a lesson or unit?
- What do you feel the school's principal goals are of the Chromebook initiative? Do you feel that you are in line with meeting said goals?
- What barriers do you feel currently exist that hinder you from significantly redefining your classroom for technology use if you haven't done so already?
- Do you feel that students have more learning opportunities today with using technology? If so, in what ways?
- How has the COVID-19 school closure changed your instructional technology use?

Participants were reflective of their own experiences as students who were without the technology that the students in the focus middle school currently have. The code, teachers own experiences as a student and student use, led to the discoveries that teachers feel that students today have an advantage. Participant one stated:

> I do think that they have more opportunities, but I also think that part of the problem is, is that because the tech is so accessible and so available that parts of their brains aren't being challenged in the way that maybe I was being challenged growing up.

Participant two also believes that students today are benefiting from the access to technology. She recounted:

> A girl in my class this year completed a research project on American Girl Baseball League, you know, like the League of Their Own, type thing. That's what I wrote my like AP American History paper on in 11th grade where I had to go to the C.W. Post Library and Stony Brook Library. My mom had to drive me there so I could look through like the microfilms and research things and then photocopy like old newspaper articles from the 40s.

Participant four also credits the availability of technology for student use:

> I think [students] have way more information at hand than we did when we were in school. Whereas, if I wanted to learn about something I had to go to a library and find a book for it or had to go to the library to find a computer that had Internet access.

Based on the codes, patterns surrounded the idea that the very own existence of technology for students was the driving factor that improved teaching and learning. Most

participants noted their own experiences of hurdles they needed to overcome to gain access to materials in order to be successful in school. The existence of the Chromebook has put an endless amount of resources in the hands of students. The participants noted negative aspects to the Chromebook initiative. Participants identified that despite students' access to this tool, students tend to over-utilize tools such as Grammarly or Google Docs suggestions when writing text, as described by participant one: "when they're writing essays on their Chromebooks, a lot of suggestions when it comes to even just simple mechanics come up and they can shut that off. But a lot of students will either forget to or have to remind them to shut it off and it's not genuine [their writing]." Participant three describes the off-task behavior exhibited by some students, "kids will want to be on them [Chromebooks], not what we're doing in class, but want to play games or be doing something that they want to do.

A discrepancy was noted in the responses regarding where teachers placed themselves on the SAMR Model and their current practice. The responses for the third interview protocol item, "How do you incorporate Chromebook in [subject]?" and the protocol question, "Take a minute to look at the SAMR Model. Which step do you place yourself on? Why?" did not align. All participant- teachers, one through five, identified themselves between the augmentation and modification levels, teetering between enhancement and transformation of lessons. However, when teachers were asked how technology is integrated in their subject matter, it seemed that most answers were aligned closer to substitution and augmentation levels of the SAMR Model. Participants listed the following classroom activities that integrate technology as follows:

- for vocabulary

- specific aspects of writing
- posting in [Google] Classroom
- collaborative Google Docs to for independent practice
- searching for information on the internet
- showing a video clip of a concept
- resource of class materials for students that missed class
- taking notes
- independent practice
- graphing on a coordinate plane
- creating a Google Slide presentation
- taking a virtual field trip to another country
- Google Meet breakout rooms for independent practice

Research Question 3

The last research question to drive this research was, what impact does technology have on teachers' instruction? This question was answered through both quantitative and qualitative methods.

Quantitative Findings

The researcher sought to answer this question through the use of a building-wide survey. Of the 70 possible participants invited to participate in the survey, 64 participants responded. Each survey item asked educators to respond on 9-point Likert scale. A score of a one indicated the participant strongly disagreed, five indicated the participant was undecided and a score of a nine meant the participant strongly agreed.

The survey items used to identify the impact of technology on teachers' instruction were the following items:

- 3. Computers in my classroom make me a better teacher.
- 4. I enjoy having computers in my classroom.
- 2. Teachers should know how to use technology.
- 6. I'm not afraid to let my students know I am still learning, too.
- 7. I can get most materials that I need using a computer.
- 1. Technology is a valuable tool that can be used to improve the quality of education.

The data from the survey responses was exported to SPSS. Two strong factors were noted consisting of items 3, 4, 2 and another strong factor was comprised of items 6, 7, and 1. The second factor was titled, Technology Pedagogy, as all of the items related to a teacher's beliefs on incorporating technology into classroom instructional practices and the extent that technology is being integrated. The third factor was titled, Learning With Technology. The third factor was geared towards understanding the impact of technology on a teacher's instructional practices. The dependent variable was survey item 1: technology is a valuable tool that can be used to improve the quality of education, which was identified as an item that synthesized what this research sought to gain a deeper understanding of.

Analyses revealed a significant linear regression, F (2, 61) = 117.62, p < .001. The model accounted for approximately 80% of the variance in the dependent variable, technology as a valuable tool to improve the quality of education (R^2 =.810, adjusted R^2 =.803). Factor two, technology pedagogy (β = .361, p < .001), and factor three, learning

with technology (β = .651, $p < .001$), predicted higher scores in teacher beliefs that technology is a valuable tool to improve the quality of instruction.

The demographic information reported in the survey (years of teaching experience, gender, and subject matter taught) were held constant. Years of teaching experience and gender did not produce a significant regression $F(2, 61) = 1.30$, $p = .281$. Years of teaching experience, gender, and subject area taught did not produce a significant regression $F(3, 60) = .97$, $p = .412$. Lastly, years of teaching experience, gender, subject area taught, combined with factor 2 and factor 3 did produce a significant linear regression $F(5, 58) = 51.41$, $p < .001$.

Qualitative Findings

The interview protocol items related to research question three were the following:

- 3. How do you incorporate Chromebooks in [subject]?
- 4. Take a minute to look at the SAMR Model. Which step do you place yourself on? Why?
- 5. Think about your classroom six years ago, before students in your classes had their own Chromebook device. How is your class instruction different today than it was years ago?
- 6. Again, think about a time before the 1:1 initiative. How has your view of Chromebook use for student learning changed?
- 10. What do you feel the district's goals are of the 1:1 Chromebook initiative?

- 13. What do you feel the school's principal goals are of the Chromebook initiative? Do you feel that you are in line with meeting said goals?
- 15. What barriers do you feel currently exist that hinder you from significantly redefining your classroom for technology use if you haven't done so already?

Themes that emerged from these questions included that educators' responses related to district and building goals were quite varied; it was also noted that interviewed teachers cited content knowledge and pedagogical knowledge but the infusion of the two with technological knowledge into all aspects of teaching and learning was a missed opportunity to redefine instruction with the 1:1 Chromebook initiative. Participant two stated the following when asked about district level goals for using technology:

> The district would like to see the Chromebook being used to enhance the student's education. Whether it is used for taking notes, whether it's used for making a Google Slides presentation, I think that the district would like to see the Chromebooks enhance the learning within a classroom.

The same participant went on to say the goal was "to see kids using the Chromebooks in the classrooms. You know, in a positive way and doing what they're supposed to be doing with the Chromebooks and using it to enhance learning." Participant three had a different view of increased levels of technology use in the focus middle school. This participant thought the goal of the 1:1 Chromebook initiative was based on funding and college and career readiness, stating:.

> Probably increasing support. A lot of things are based on money, money coming in and getting funding. We are giving Chromebooks to children and we want them

> to get the most education out of it. We want them to have success, we want to have a higher graduation rate stay or match student achievement up with using the devices. I would think that we would give them Chromebooks because they're going to have to be using technology more in the future to get them used to it, to get them typing everything. I would hope that would be the reason because they're going to be using computers more [in their future].

Participant four noted two specific ideas: how the Chromebooks can be used to support students and a limitation of how Chromebooks cannot be used in every lesson because they are often damaged:

> I'm sure they want them using them on a regular basis and being able to use it as a support tool. I don't know if they want us completely changing our instruction to it, but as far as I know, I don't have a clear-cut answer from the district and what they want us doing with them. We don't have the resources to have the kids' Chromebooks fixed quick enough and I don't think the kids are held accountable for destroying our Chromebooks; which leads to the fact that if you try to do a Chromebook lesson, some kids don't have them [the Chromebook].

When asked about the district's goal of Chromebook use, participant six, the building leader, stated that the goals were a mix between giving students devices for learning and supporting the neediest population in the school environment: low socioeconomic students and special education students:

> And I think that devices do help and support with that, but it's not just the answer. I think the biggest answer is the individual sitting behind the computer across the me, and that's the teacher. You can never replace that. I do think we are light

> years ahead of other districts, but again, I don't want to compare ourselves to others. I think internally we do a really nice job using technology in a very effective way with our classrooms. I would go so far to say that, obviously you have some very amazing talented teachers here that use it [technology] in ways that bring you right up to redefinition the minute you walked through the door.

The varied responses to the primary goals of the district's 1:1 Chromebook initiative point to a pattern and discrepancy in a common understanding shared by all constituents in the district.

The second theme noted was the educators' content knowledge, pedagogical knowledge, and technological knowledge. It was observed that teachers felt confident in their content knowledge and knowledge of technological tools, but the integration of content and technological knowledge with pedagogical knowledge was an area of deficiency among all teachers.

Participant one, an English teacher, found that the implementation of a Chromebook changed certain aspects, but not all areas of current instructional practices:

> Some things are very different and some things are not different at all. The material that we present hasn't changed. It really comes down to simply just the manner in which we present it. Now they have this Chromebook, this device where everyone has the material right in front of them, where they can kind of augment onto that document.

Participant four, a math teacher, found that the available technology is not supporting his instructional practice at this time:

> Very rarely do we use the Chromebook. The apps that we have on there don't

> really work or translate well enough for us to be able to do a lot of stuff on there that we need to do. I try to use it for video support and using it here and there but it's very rare that we actually get a chance to really use them to do instruction. It's more along the lines of using as reinforcement for them [students].

Participant five, a world language teacher, stated that creating an activity for students to demonstrate their knowledge is the most difficult part for her. The participant also stated that some technological limitations are one reason that the intersection of technology, pedagogy, and content are not happening in her classroom:

> It's the vehicle of having students apply their knowledge, right? I thought about flipping the classroom. So, if I give this video of me instructing something for homework and then what could we do the next day? What happens when the kids don't watch it? What happens when someone didn't know it was there because they were absent or sick? I think those things are really the roadblocks when you have kids who are missing something or what to do with those kids that become frustrated. I want things to go well in my classroom so when there's hiccups or things don't go well, you know, not that you feel like a failure, but you do get a feeling when that happens, then it makes you reluctant to try things again.

The impact that technology has on teacher instruction is twofold in this case study; first the building and district culture plays a large part in teachers' instruction. The second finding was that that there is a mixed attempt to integrate technology, content, and pedagogy into instruction.

The significance of this chapter's findings will be discussed in chapter 5. Multiple themes were found in the one-on-one interviews with a sample of the building's teachers

and survey results of 64 (of the 70 possible) teachers gave insights regarding how technology is integrated into classroom instruction. The multiple regression analyses noted statistically significant effects of two factors (factor two, technology pedagogy, and factor three, learning with technology) on the dependent variable of teacher's beliefs that technology is a valuable tool that can be used to improve the quality of education. All participants that were interviewed felt their classroom practice was between augmentation and modification of technology, most of the time. However, teachers' responses regarding how technology is being utilized in classrooms proved to be more consistent with activities at the substitution and augmentation levels of the SAMR Model (Puentedura, 2014). Lastly, the impact technology has on teachers' instruction is quite varied depending on the teacher and content area. The building and district's goals have an impact on teachers' technology use in instruction. This varied sense of goals may lead to differences in the intersection of teachers' integration of technology, content, and pedagogy knowledge.

CHAPTER 5

Discussion

Introduction

Technology-saturated classrooms have become more commonplace in American education, especially as COVID-19 wreaks havoc on the traditional education model of in-person learning. Computers have become widely available over the past 20 years but have not significantly improved national testing scores measuring student learning (Doherty & Orlofsky, 2001; McCabe & Skinner, 2003; Neuhaus et al., 2018). The use of technology can increase learning. Access to technology can not only prepare students for 21st-Century Learning, but also improve student performance (Joo et al., 2018).

The purpose of the current study was to explore teachers' views of technology use in their instruction in a setting where students have been issued a Chromebook device to use in school and at home for learning. Additionally, the research aimed to understand how teachers implement the Chromebook device in their classrooms and how the implementation of a 1:1 Chromebook initiative has, or has not, changed teachers' practices.

This study's setting was focused on a suburban middle school on Long Island, New York. The middle school served approximately 1000 students in grades seven and eight. The participants of this research were teachers in the middle school. All 70 teachers in the middle school were invited to complete the Google Form survey through an emailed link. Of the 70 invited teachers, 64 teachers completed the Google Form survey, titled, *Teachers' Views of Technology and Teaching.* Concurrently, while the digital survey was collecting responses, six educators were interviewed. The researcher aimed to

interview a participant from each core department: English, math, social studies, science and world language. Additionally, the researcher included a school building leader. The criteria for teachers to be selected for an interview included being a teacher in the building for five years prior to the Chromebook initiative starting and six years of implementation, a balance of male to female ratio of all six participants, and being an instructor of a core subject. Survey data was collected and analyzed through SPSS. The six participants' interviews were transcribed using NVivo Transcriptions and analyzed in NVivo.

Implications of Findings

This research was guided by four theoretical frameworks: Schein's culture theory, Bandura's social learning theory, Knowles' adult learning theory and Fullan's change theory. Each theory played a critical role in each of the findings.

The first finding identified that most teachers believe that computers support learning by acting as a resource to find materials they need and to individualize instruction for students. This finding is best supported by Knowles' adult learning theory and Fullan's change theory. Teachers must learn a new way to gather materials when introduced to 1:1 learning. The availability of a Chromebook has changed the processes used for teachers to gather resources for instruction. Fullan (2017) describes "characteristics of change" as the basis for why change needs to occur, how complex the change is, and the quality of the new program. In the case of the 1:1 Chromebook initiative, devices were handed to all students and educators six years ago. The characteristic of change is described as the new technology put in the hands of all at the focus school. The "local factors" of this change include the people who are behind the

change. In this case, this grant was written by a district level leader to utilize Smart School funds as funding for this initiative. Additionally, the district leaders, teachers, and students are considered internal factors that impact change. The external factors are the governmental agencies that allow for this change to happen. The United States Department of Education has been rolling out new plans rapidly to address the need to incorporate technology in classrooms.

Knowles (2014) notes assumptions of adult learners: self-concept, adult learning experience, readiness to learn, orientation to learning, and motivation to learn. These assumptions are key to understanding why teachers believe that computers support individual student needs and a place where materials can be found to support learning.

Most teachers agreed that math was a difficult area to implement technology for student learning. This finding most closely ties in to Schein's (2017) change theory. Espoused values can be the deepest level of the culture triangle. These espoused values are the generally understood beliefs of the building culture. The agreement between building teachers and the building leader that incorporating technology in mathematics was an area of struggle, created a shared value. The building leader stated the following:

> I hate to pick on math. When we had [neighboring school district] come over to kind of see what we're doing with Chromebooks, one of the first questions asked is how they're working in the math department, because I think that becomes the struggle.

There is a deep common value that mathematics is a difficult area to incorporate technology, which is shared by many educators in the focus school.

It was also noted in the findings that teachers felt students today have an advantage with Chromebook use. The educators felt that students have access to an abundance of resources. Bandura's (1978) social learning theory explains why the initiative can have a variety of effects on educators' adaptations. If students have access to the internet full of resources, how are educators incorporating strategic and extended thinking to challenge the abundance of information students are made available to? In addition to the four theoretical frameworks, the TPACK and SAMR Frameworks fit into this finding. This idea will be explored further in the relationship to prior research section of this chapter.

The findings of this research also showed a general discrepancy in the level teachers place themselves on the SAMR model and what they cited as typical classroom use of educational technology. This finding relates closest to Knowles (2014) adult learning theory. Based on Knowles' six assumptions of andragogy, the first assumption relates to the adults' need to know the new material. Responses were indicative that educators have not understood why the learning needs to take place. It was noted in the focus school, educators were invited to a variety of professional development, in-service, and graduate courses focused on best practices of instructional technology. The shift from learning about the technological tool to transforming learning with educational technology is something that needs additional time to develop.

Gender, levels of experience, and subject area taught were not significant predictors but on teachers' beliefs that technology has an impact on technology pedagogy and learning with technology were significant predictors; together, these variables accounted for 80% of the variance in the dependent variable, technology is a valuable

tool to improve the quality of education. The culture of the building indicated an espoused belief that technology is valuable for student learning. Connecting to the idea that educational technology is valued in this building, there is a lack of consistency of understanding the district and building's goals of the use of the instructional technology. The artifacts of this organization's culture and espoused beliefs tended to not be directly related, which may cause inconsistent ideas about the overall use of educational technology.

Relationship to Prior Research

Research Question 1: Relationship to Prior Research

To what extent do educators integrate technology in their classroom instructional practice? This research question was designed to understand the level of technology educators incorporate into classroom instruction after six years since the start of a 1:1 Chromebook initiative.

Educators believed that computers support learning as a resource to find materials to support instruction. Ninety-two percent of teachers agreed or strongly agreed with the statement, I'm not afraid to let my students know I am still learning, too (see Table 4.12) Seventy-three percent of teachers agreed or strongly agreed with the statement, I can get most materials that I need using a computer (see Table 4.13). Seventy percent of teachers agreed or strongly agreed with the statement, Computers help me individualize instruction to many of my students (see Table 4.14).

The disruption to schools from COVID-19 has caused educators to lean more heavily on technology for instruction. In the present sample, 80% of teachers indicated that their level of comfort with technology before the school closure in March 2020

made for a more manageable experience using technology exclusively to teach (see Table 4.17). Even though teachers felt more comfortable with technology use due to the 1:1 implementation of Chromebooks over the past six years, 48% (see Table 4.18) of teachers thought their students were prepared to quickly adapt to a virtual format due to technology use in their classroom prior to the school closure.

The shared belief that knowledge about instructional technology prior to the school closures brought on by COVID-19 made teachers more comfortable to exclusively teach virtually was a shared finding in Frazier and Trekles (2018) 1:1 iPad initiative. It was a shared belief that teachers must be able to become comfortable with technology before it can be implemented. In the current study, the technology had to be implemented rather quickly, almost overnight, to continue teaching students.

Downes and Bishop (2015) researched a 1:1 laptop program in a middle school. One of the key findings was that teachers felt they lacked common planning time to prepare for infused lessons. In the current research, two participants also mentioned this theme. Participant six, in the current study noted, "I think that the challenge becomes time with everybody and falling back on. It's just easier to do it this way [the old way]." Downes and Bishop (2015) noted, "In an ideal setting, effective daily common planning time creates opportunities to examine student work collaboratively, as well as discuss the successes and failures of day-to-day teaching" (p. 11). This common idea of lack of time proves to be a constraint of full integration of technology. Not only are teachers given new technology to learn themselves, they are being asked to integrate the technology into their lessons. When planning to use a new tool, teachers need to have a certain level of proficiency before they can begin to use it as a vehicle to support learning in their

classrooms. This challenge of time may explain why despite six years into the 1:1 program, less than half the teachers felt ready to shift gears with students to go completely technology-based.

Sauers and McLeod's (2018) findings are consistent with the current study; the researchers reported a 1:1 initiative had a statistically significantly impact on teachers' technology skills and level of integration of technology. By providing all students and educators a device, the program has impacted teacher behaviors and beliefs. This finding is unique to 1:1 programs compared to previous technology integration initiatives. Six years in, teachers felt that they were still learning and they were not afraid to let their students know that. Lucas (2018) cited that time was a barrier to full integration of technology. Similar to the current study, teachers felt they needed to be given time, but with the uncertainties that the virus has caused, teachers have had to shift instructional practices on the fly.

It was noted that mathematics was a difficult course to implement Chromebook effectively in the current study. There appears to be a gap in the literature reporting difficulty with utilizing a Chromebook device for mathematics instruction. When participants were asked about how their colleagues in different departments use Chromebooks in instruction, participants cited that it was an area in which students struggled to type in their responses. Students could not show the progression of their work in a cohesive manner by typing their responses in. Participant one noted that hopefully the technology will be changing down the road and students can use their Chromebook and a pen to annotate. Participant one stated,

> I know the iPad, the iPad Pro you can use a pen, you can do things with the pen itself. It's like a perfect harmony in a marriage because now you can actually have them actually write it out in type font and then you can go back and make corrections with a pen.

The continuous exposure to new technology for student learning and the progression of the hardware seems to be indicative that the 1:1 Chromebook initiative will continue to flourish.

Research Question 2: Relationship with Prior Research

To what extent does technology improve teaching and learning? This research question was designed to gather the educators' perceptions on the level of impact the 1:1 Chromebook initiative has had on classrooms at the focus school and how the Chromebooks have improved teachers' current practice.

Based on the interview responses in the current study, it was a shared belief among educators, that the students had access to a litany of information, which put them at an advantage compared to students without access to a device. Russell et al. (2004) studied the impact of 1:1 devices on upper elementary school students. Students originally had access to technology for 15-60 minutes a day prior to the initiative and during the initiative, the level of access increased to one to two or more hours a day with the use of the 1:1 laptop cart. Key findings in the research included that students could "learn more independently, cooperatively, and collaboratively than through traditional instruction" during 1:1 teacher interviews. Overall, it was found that the 1:1 laptop cart had a positive impact on teaching and learning in this case study. This finding supports the current study that students had an advantage in having access to a multitude of

resources to support learning. Downes and Bishop (2015) reported that a 1:1 implementation has allowed for teachers to engage students in ways they were unable to before.

It was a concern of teachers in the current study that students did not have to think independently with the availability of a Chromebook almost all of the time during instruction. Courduff et al. (2016) studied the impact technology has on special education instructional practice. This grounded theory study found that teachers' beliefs, attributes, and opportunities led to adoption of technology. If teachers see the Chromebook as a reference tool and not a resource to improve instruction, then there will be a lack of planning to use the device during instruction.

Teachers' beliefs about technology are integral to the use of Chromebooks during instructional time. During the 1:1 semi-structured interviews, participants noted that they all believed most of their integration of technology use during instruction fell between the augmentation and modification level of the SAMR Model (Puentedura, 2014). However, when participants were asked about typical classroom activities, the activities that educators listed were more in line with substitution, when technology acts as a direct substitute, and augmentation, when technology acts as a substitute with a slight functional improvement.

It is important to look at this finding under the lens of the TPACK Framework (Mishra & Koehler, 2006). In this framework, teachers must combine three types of knowledges to be successful with the integration of educational technology. The three overlapping ideas that construct the TPACK Framework are technical knowledge, pedagogical knowledge and content knowledge. The collision of all three ideas in the

framework show the relationship needed for successful integration of student devices. Content knowledge is a teacher's understanding about the subject and grade level in which they teach. It is important for a middle school mathematics teacher to be focused on teaching middle school standards and not high school. Technological knowledge is the way that teachers can apply technology into their classrooms. Technology knowledge is the ability to integrate different resources to support instruction. The third major part of the TPACK Model is pedagogical knowledge. This type of knowledge is comprised of a knowledge of how students learn, as well as planning, assessment, and management skills.

Teachers felt that students do not need to think anymore because all the answers can be found using their Chromebook; this shows a high knowledge of content and technology knowledge, but pedagogical knowledge is area for growth. Joo et al. (2018) identified that teachers with a high level of TPACK at the pre-service level, found technology easy and helpful to embed into instructional practice. When teachers think of the technology as a resource, instruction is a way to have students connect deeper and make connections to content in a meaningful way. Technology is a tool that amplifies learning.

Benton-Borghi (2013) suggests an infusion of the UDL and TPACK Framework to support technology integration in classrooms. To transform the way the Chromebook is viewed, as a shortcut for finding answers, instruction must provide the why, what, and how of learning to engage, represent, and put learning into action for students. The goal of the UDL framework is to produce learners who are "purposeful and motivated," "resourceful and knowledgeable," and "strategic and goal directed" (CAST, 2018).

Students that can think for themselves when presented with resources is a true synthesis of technology, content, and pedagogy. Sauers and McLeod's (2018) findings are consistent with the current study as there needs to be a balance of pedagogy and content knowledge for effective instruction. When including technology, content and pedagogical knowledge need to be at the forefront of instructional design.

Research Question 3: Relationship to Prior Research

What impact does technology have on teachers' instruction? This research question was designed to identify the impact technology has on teachers' instruction based on teacher beliefs of the use of technology and districtwide goals.

The belief of learning with technology significantly predicted technology's contribution to the quality of education; technology pedagogy served as a significant predictor, but to a lesser extent. Mishra and Koehler's (2006) research suggests that technology integration, when successful, technology, pedagogy, and content are merged together. Joo et al. (2018) analyzed specific pedagogies in content areas to describe technology use. Interestingly, teachers who identified with high levels of TPACK also identified with an increased level of efficacy (Joo et al., 2018). Teachers studied in Joo et al. (2018) concluded that if a teacher's comfort with TPACK is elevated, then technology is viewed as a tool and not an instructional strategy.

In the current research, teachers' beliefs that technology is a valuable tool predicted 80% of the variance of technology pedagogy and student learning with technology. This belief shows that most teachers share a common culture (Schein, 2017) and the artifacts and espoused beliefs and values are aligned. The middle school teachers share a similar basic underlying assumption about technology use. When all three levels

of culture agree, the stronger the culture is. Artifacts and espoused beliefs are considered more surface level. One artifact a new member of a group would encounter is the Chromebooks that every student and educator has been issued in the focus school; this would be visible upon entering the school building. Much discussion and conversation about Chromebook use occurs throughout the day. Diving a little deeper, the espoused beliefs of the group entailed that technology is perceived as a tool that can be used to strengthen the quality of education for students.

The underlying assumptions of this 1:1 Chromebook culture varies, as supported by the fact that teachers' beliefs about their level on the SAMR Model and classroom activities do not correlate. The underlying assumptions about the technology program have been infused by a top-down belief of school district leaders. Analyzing the district's latest technology plan, a vision statement on instructional technology has been provided. When asked about the building and or district's goal of technology use, educators provided a variety of reasons. Schein's (2017) work indicates that there is still work to be done in the focus school to align all three aspects of culture: artifacts, espoused beliefs and values, underlying assumptions. The lack of congruence between all three, may indicate why there were slightly conflicting ideas on the purpose and goal of the 1:1 program.

With leadership being the foundation of beliefs, it is especially important for all levels of culture to disseminate the same goals. The district leader who wrote the district instructional technology plan that was publicly available has left the district. Collins (2001) indicated that there are five levels of leadership. Looking closely at level four and level five characteristics, both leaders can lead an organization into high levels of

performance. However, only a level-five leader will have his or her goals be continued by the organization during a time of leadership transition. It is crucial for a strong culture and success of the 1:1 program, for all constituents of the culture to have a common belief regarding instructional technology.

McNeil et al. (2009) analyzed the connection between a strong culture and motivated teachers. Teachers who are motivated have higher levels of student success. Sauers and McLeod (2018) also supported the belief that there needs to be a balance between pedagogy, content, and technology for integration of technology. Technology should be viewed as a tool and not a pedagogical practice when it is integrated in learning. Increased levels of student achievement are indicative of a supportive environment. Despite congruence between all three levels of culture, Wagner (2006) identified a correlation between student achievement and school culture. Multiple regression analysis indicated that 80% of teachers believed that technology is a tool that can improve the quality of education using technology pedagogy and learning with technology as predicting factors. This high percentage of prediction shows that there is congruence between teacher beliefs of outcomes using instructional technology. There are still areas for the focus school's culture to strengthen in order to have a multitude of other positive outcomes of teaching and learning (Cansoy & Parlar, 2017; Demir, 2015; Love, 2016; Thapa & Guffey, 2012).

Limitations of the Study

This research, however, is subject to several limitations. The study conditions included using electronic surveys to gather teachers' beliefs on technology use. When the electronic survey on Google Forms was administered, it was completely anonymous. The

survey could have required participants to sign in to their Google account to complete the survey, but that would have impacted the anonymity of the participants' results. The researcher relied on consent and release form submissions to determine which teachers completed the survey. The survey was sent out an additional time to those teachers who did not complete the survey on the first request, based on a lack of submission of the consent and release form. In the future, it would be helpful to administer paper surveys with a unique identification code for all participants with a consent and release form attached to the survey. This method would allow the researcher to ensure the participants consent form cross-referenced with a survey response.

As stated in the previous limitation, the survey was sent out twice. The second invitation to complete the survey was only directed to participants who did not complete a consent and release form. The digital survey may have been lost in participants' inboxes as it was sent as a URL. The digital survey approach could have also led to a feeling the survey lacked significance compared to a more traditional paper survey. The participant rate could have also been impacted due to the timing of the survey. The survey was sent during the first quarter of the 2020-2021 school year. Many changes had taken place before this school year to prepare a safe and equitable environment for in-person and digital learners. Educators may have felt overwhelmed at the start of this very unique school year, impacting their ability to complete a survey outside their work responsibilities.

The current study's methodology was a case study. Case studies are difficult to replicate. This case study investigated the implementation of a 1:1 Chromebook initiative in a middle school. The findings of this study are generalizable to the setting in which it

takes place, which was a specific school's program initiative. The conclusions being drawn from this study may not be transferable to other setting in the district or to other settings in general. The scope of this study focused on the focus school's experiences.

To triangulate the data of this case study, it would also be suggested to take part in classroom observations of technology use. Given the extraordinary circumstances of the 2020-2021 school year, almost all classrooms in the focus school were utilizing Chromebooks instead of paper to provide a level of equity for the various groups of learners: two alternating hybrid students who attended school every other day and fully remote students. At the early stages of this research, the educators in the school had a more varied use of the Chromebook in instruction. Once new conditions were put in place due to COVID-19, the researcher noticed a shift in technology practice. Technology was used much more frequently and consistently among all classes. It is suggested that future research revisit this additional source of data collection if and when classroom capacities return fully in-person school models.

Lastly, the qualitative portion of this study used a sample of five teachers and one school building leader. The school building has approximately 70 teachers. The views of the five teachers who were interviewed make up 7% of the teachers in the building. To increase the amount of teacher voice in this study, open-ended responses could be integrated in the survey so that more teacher beliefs and perceptions can be analyzed. The quantitative results yielded a 91% response rate. Leveling out the number of teachers involved in both the qualitative and quantitative portions of the research may provide unique insights for future research.

Recommendations for Future Practice

As a result of funding from the New York Smart Schools Bond Act to improve educational technology in school, school districts are allowed to use funds to purchase devices for students. The school in focus was allotted 2.9 million dollars as a result of this Act and used bond funds to purchase Chromebooks for the entire student body. The 2014 – 2015 school year kicked off the first device distribution to sixth grade students. Every subsequent year, sixth graders were given their own Chromebook device they could use for school until high school graduation. After six years of implementation of the 1:1 Chromebook program, it can be generalized that teachers believe that technology improves education, but the way technology is implemented in classroom instruction can be improved upon.

It is important to note that prior to a drastic change in an organization, the organization's culture must be in a position to accept and integrate the change. These Chromebooks were the change for the middle school in focus. Before handing out a powerful technological tool, it is important for teachers to understand how technology integrates with content and pedagogical practice. Fullan (2017) described three factors affecting change. Characteristics of change, local characteristics, and external factors. In the current study, it was the local factors that need to be in line with the characteristics of change and external factors. When change occurs, follow-through is essential for the organization's capacity to carry it out.

When participants were asked about their understanding of the goals of the district and the goals of the building principal for the initiative, the responses were differing. These varying responses point to a top-down approach of this initiative, with very little

teacher or building-level leadership involved. Secondly, it also seemed as if the goals, mission, and basic underlying assumptions (Schein, 2017) were not created with input from all stakeholders in this organization. Future implementation of programs by this organization should factor in the needs of all stakeholders, especially those who implement the program on a day-to-day basis, to be actively involved from the early stages.

Participants noted many professional development activities that have had an impact on their teaching practice during the one-to-one observations. Making the leap from surface-level integration of technology to using technology to complement content and pedagogy in classrooms will leverage deeper learning and increased engagement (Courduff et al., 2016; Joo et al., 2018) for students. Courduff et al. (2016) noted that teachers will not integrate technology that is unplanned or unfamiliar. Technology integration takes time. Teachers must be confident with technology use and understand the purpose it plays in instruction before they will use it. Baek et al. (2018) cited that despite exposure to a variety of technology resources, most participants felt that they struggled most on the application technology could bring to their students. Teachers need time to digest tools and identify ways to integrate technology to go beyond the transformation levels of the SAMR Model and use technology as an enhancement to learning (Puentedura, 2010).

Lucas' (2018) work continues to support the need for time for teachers to effectively integrate technological pedagogy into their classrooms. Lucas' work supports the need for an organization to support teachers, not only with information technology support on hardware and software issues but supporting teachers with integrating

technology into their teaching pedagogy. The results of the current study indicate a misalignment of technology-based classroom activities and level on the SAMR Model. For most teachers, the interview was the first time they have seen a technology framework despite six years of 1:1 technology integration in their classrooms. Teachers need to know how to integrate content and pedagogy with technology for maximum student outcomes.

Recommendations for Future Research

This study used a mixed methodology to analyze the factors that contribute to educational technology use. The case study focused on a suburban middle school in New York that was in its sixth year of full implementation. Recommendations for further research are outlined below.

The current research simultaneously employed quantitative and qualitative methodologies. Educators in the focus school were asked to complete a survey. The same week when the survey was completed, six participants were invited to take part in a one-on-one semi-structured interview. It is recommended for future research to complete an explanatory study where the quantitative findings from the survey can drive the interview protocol.

A longitudinal study should be conducted to analyze the factors of technology use that contribute to student learning in a 1:1 environment. At this point, the school district in focus has had a graduating class that has been a part of the 1:1 Chromebook program since sixth grade. It would be insightful to learn if the students' Chromebook use has led to higher knowledge and integration of technology in college and beyond. The current study was focused on the educators' perspectives by analyzing factors that contribute to

technology use in the 1:1 Chromebook setting. Participants of the current study provided their input about how this program has impacted students' learning. A future study focused solely on student learning would provide a deeper context to the current study.

Another recommendation for future research would be to study the impact that this current topic has on school district and school building leaders. A school district leader was included in the qualitative portion of this research. It would have been insightful to include a school district leader, especially someone who served as an early founder of the program. Understanding the perspectives of district leaders could provide more clarity on the history and goals of the Chromebook initiative.

As COVID-19 disrupted the traditional in-person schooling model, more and more youngsters have been assigned a device in the event the student have to move quickly to a remote learning model. It is recommended to study the factors that contribute to technology use in a 1:1 program for elementary students as the circumstances are much different than the current study.

Conclusion

The integration of technology improves the quality of education. The integration of 1:1 devices has been essential during COVID-19-interrupted classrooms. As the traditional model of education has moved to the wayside, Chromebooks have been a crucial tool to ensure all students have access to their classes when they are attending school remotely. Students in today's classrooms are considered "digital natives" (Prensky, 2005). As students come to school with a different set of skills than the generation before, it is imperative that educators shift their method of instruction from paper to utilizing technology to transform learning. Technology is a way to increase

student engagement and collaboration and provides flexibility in the ways teachers can support students.

Teachers agreed that students have access to a myriad of information with their devices at hand. The Department of Education's most recent technology plan (U.S. Department of Education, 2017) has had a goal to support effective teaching and increase student opportunities. Educators must have a solid understanding of technology tools at hand and be able to integrate the tools with thought given to their content and pedagogical practice. Shifting instructional approaches takes time to fully implement, but with clear goals in mind, the outcomes can support deeper knowledge of content and more meaningful learning.

APPENDIX A

From: irbstjohns@stjohns.edu
Subject: IRB-FY2021-113 - Initial: Initial Submission - Expedited - St. John's
Date: October 27, 2020 at 11:06 AM
To: campbelj@stjohns.edu, marlee.rice18@stjohns.edu

ST. JOHN'S UNIVERSITY

Federal Wide Assurance: FWA00009066

Oct 27, 2020 11:06 AM EDT

PI: Marlee Rice
CO-PI: James Campbell
Ed Admin & Instruc Leadership

Re: Expedited Review - Initial - **IRB-FY2021-113** *TECH AS A TOOL: A CASE STUDY ON THE CULTURAL USE OF INSTRUCTIONAL TECHNOLOGY IN A SURBURBAN MIDDLE SCHOOL*

Dear Marlee Rice:

The St John's University Institutional Review Board has rendered the decision below for *TECH AS A TOOL: A CASE STUDY ON THE CULTURAL USE OF INSTRUCTIONAL TECHNOLOGY IN A SURBURBAN MIDDLE SCHOOL*. The approval is effective from 2020-10-27 through 2021-10-26.

Decision: Approved

PLEASE NOTE: If you have collected any data prior to this approval date, the data must be discarded.

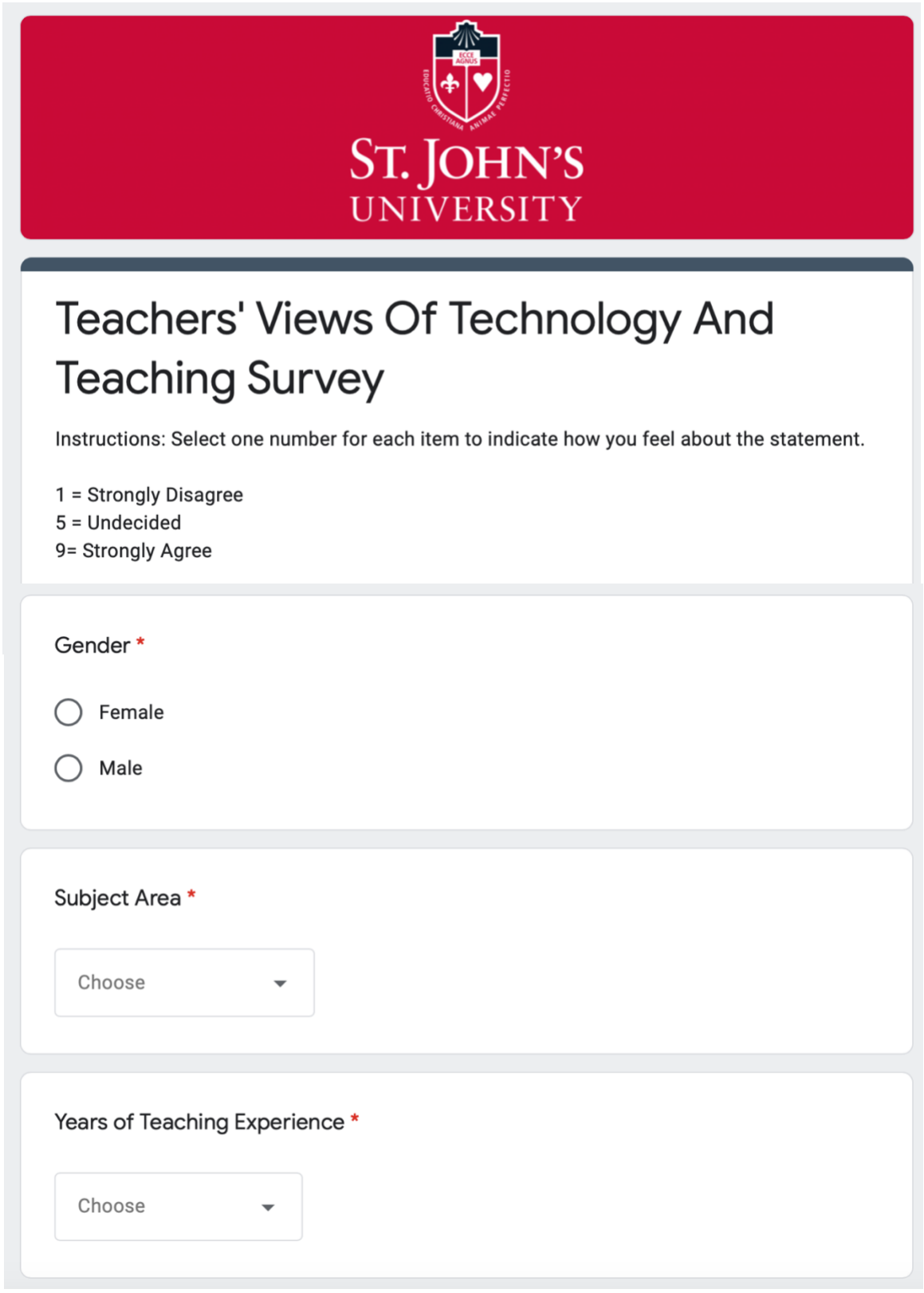
Selected Category: 7. Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies.

Sincerely,

Raymond DiGiuseppe, PhD, ABPP
Chair, Institutional Review Board
Professor of Psychology

Marie Nitopi, Ed.D.
IRB Coordinator

APPENDIX B



ST. JOHN'S UNIVERSITY

Teachers' Views Of Technology And Teaching Survey

Instructions: Select one number for each item to indicate how you feel about the statement.

1 = Strongly Disagree
5 = Undecided
9= Strongly Agree

Gender *

- Female
- Male

Subject Area *

Choose

Years of Teaching Experience *

Choose

1. Technology is a valuable tool that can be used to improve the quality of education. *

	1	2	3	4	5	6	7	8	9	
Strongly Disagree	○	○	○	○	○	○	○	○	○	Strongly Agree

2. Teachers should know how to use technology. *

	1	2	3	4	5	6	7	8	9	
Strongly Disagree	○	○	○	○	○	○	○	○	○	Strongly Agree

3. Computers in my classroom make me a better teacher. *

	1	2	3	4	5	6	7	8	9	
Strongly Disagree	○	○	○	○	○	○	○	○	○	Strongly Agree

4. I enjoy having computers in my classroom. *

	1	2	3	4	5	6	7	8	9	
Strongly Disagree	○	○	○	○	○	○	○	○	○	Strongly Agree

5. Computers help me individualize instruction to many of my students. *

	1	2	3	4	5	6	7	8	9	
Strongly Disagree	○	○	○	○	○	○	○	○	○	Strongly Agree

6. I'm not afraid to let my students know I am still learning, too. *

	1	2	3	4	5	6	7	8	9	
Strongly Disagree	○	○	○	○	○	○	○	○	○	Strongly Agree

7. I can get most materials that I need using a computer. *

	1	2	3	4	5	6	7	8	9	
Strongly Disagree	○	○	○	○	○	○	○	○	○	Strongly Agree

8. I enjoy using new tools for instruction. *

	1	2	3	4	5	6	7	8	9	
Strongly Disagree	○	○	○	○	○	○	○	○	○	Strongly Agree

9. My students enjoy using new tools for instruction. *

	1	2	3	4	5	6	7	8	9	
Strongly Disagree	○	○	○	○	○	○	○	○	○	Strongly Agree

10. I believe that my students enjoy using computers for instructional purposes. *

	1	2	3	4	5	6	7	8	9	
Strongly Disagree	○	○	○	○	○	○	○	○	○	Strongly Agree

11. My level of comfort with technology made the COVID-19 school closure manageable in March. *

	1	2	3	4	5	6	7	8	9	
Strongly Disagree	○	○	○	○	○	○	○	○	○	Strongly Agree

12. My students were prepared to quickly shift to a distanced format due to COVID-19 because I often used technology in the classroom prior to the school closure. *

	1	2	3	4	5	6	7	8	9	
Strongly Disagree	○	○	○	○	○	○	○	○	○	Strongly Agree

13. I am more comfortable with technology this school year due to hybrid learning. *

	1	2	3	4	5	6	7	8	9	
Strongly Disagree	○	○	○	○	○	○	○	○	○	Strongly Agree

Submit

REFERENCES

Abbitt, J. T. (2011). An investigation of the relationship between self-efficacy beliefs about technology integration and Technological Pedagogical Content Knowledge (TPACK) among preservice teachers. *Journal of Digital Learning in Teacher Education*, *27*(4), 134–143. https/doi.org/10.1080/21532974.2011.10784670

Atiles, J. T., Gresham, T. M., & Washburn, I. (2017). Values and beliefs regarding discipline practices: How school culture impacts teacher responses to student misbehavior. *Educational Research Quarterly*, *40*(3), 3–24.

Baek, J.-H., Jones, E., Bulger, S., & Taliaferro, A. (2018). Physical education teacher perceptions of technology-related learning experiences: A qualitative investigation. *Journal of Teaching in Physical Education*, *37*(2), 175–185. https://journals.humankinetics.com/doi/10.1123/jtpe.2017-0180

Bakia, M., Mitchell, K., & Yang, E. (2007). *State strategies and practices for educational technology: Volume 1- examining the enhancing education through technology program*. U.S. Department of Education.

Balkar, B. (2015). Defining an Empowering School Culture (ESC): Teacher perceptions. *Issues in Educational Research*, *25*(3), 205–225.

Ball, T. (February, 2018). Top 5 technological advances of the 21st century. *Computer Business Review*. https://www.cbronline.com/list/top-5-technological-advances-21st-century

Bandura, A. (1971). *Social learning theory*. Prentice-Hall.

Bandura, A. (1978). The self system in reciprocal determinism. *American Psychologist*, *33*(4), 344-348. https://doi.org/10.1037/0003-066X.33.4.344

Benton-Borghi, B. H. (2013). A universally designed for learning (UDL) infused technological pedagogical content knowledge (TPACK) practitioners' model essential for teacher preparation in the 21st century. *Journal of Educational Computing Research*, *48*(2), 245–265. https://doi.org/10.2190/EC.48.2.g

Bower, H. A., & Parsons, E. R. C. (2016). Teacher identity and reform: Intersections within school culture. *The Urban Review*, *48*(5), 743–765. http://link.springer.com/10.1007/s11256-016-0376-7

Brucato, J. (2005). *Creating a learning environment: An educational leader's guide to managing school culture*. Scarecrow Education.

Cansoy, R., & Parlar, H. (2017). Examining the relationship between school culture and teacher leadership. *International Online Journal of Educational Sciences*, 9(2), 310-322. https://doi.org/10.15345/iojes.2017.02.001

CAST. (2018). *Universal design for learning guidelines version 2.2*. http://udlguidelines.cast.org

Christensen, R. R. (2002). Effects of technology integration education on the attitudes of teachers and their students. *Journal of Research on Technology in Education, 34*(4), 411-433. https://doi.org/10.1080/15391523.2002.10782359

Collins, J. (2001). *Good to great: Why some companies make the leap... And others don't*. HarperCollins.

Courduff, J., Szapkiw, A., & Wendt, J. L. (2016). Grounded in what works: Exemplary practice in special education teachers' technology integration. *Journal of Special Education Technology*, *31*(1), 26–38. https://doi.org/10.1177/0162643416633333

Crane, T. Wilson, Murizio, A., Bealkowski, S., Bruett, K., & Couch, J. (2003). *Learning*

for the 21st Century: A report and mile guide for 21st century skills. Partnership for 21st Century Skills. Retrieved from http://www.21stcenturyskills.org

Creswell, J. (2019). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research* (6th ed.). Pearson.

Deal, T. E. (1985). The symbolism of effective schools. *The Elementary School Journal*, *85*(5), 601–620. https://doi.org/10.1086/461424

Demir, K. (2015). The effect of organizational trust on the culture of teacher leadership in primary schools. *Educational Sciences: Theory & Practice*, *15*(3).

Demirda . S. (2016). The relationship between faculty members' school culture and burnout. *International Journal of Educational Research*, *7*(3), 15.

Digital Learning Now. (2014). *2014 digital learning report card*.

Dimock, M. (January, 2019). Defining generations: Where millennials end and generation Z begins. *Pew Research Center*. Retrieved from http://tony-silva.com/eslefl/miscstudent/downloadpagearticles/defgenerations-pew.pdf

Doherty, K. M., & Orlofsky, G. F. (2001). Student survey says: Schools are probably not using educational technology as wisely or... *Education Week*, *20*(35), 45.

Donovan, J. (2020). What is a Chromebook and should you buy one? *Digital Trends*. https://www.digitaltrends.com/computing/what-is-a-chromebook/

Downes, J. M., & Bishop, P. A. (2015). The intersection between 1:1 laptop implementation and the characteristics of effective middle level schools. *RMLE Online*, *38*(7), 1–16. https://doi.org/10.1080/19404476.2015.11462120

Dwyer, D. C., Ringstaff, C., & Sandholtz, J. (1990). *The evolution of teachers'*

instructional beliefs and practices in high-access-to-technology classrooms. Paper presented at the Annual Meeting of the Educational Research Association, Boston, United States. https://files.eric.ed.gov/fulltext/ED325074.pdf

E n, Ç. (2016). Analysis on the relationship between trust culture and prejudices in primary schools. *Eurasian Journal of Educational Research*, *16*(63), 153–168.

International Society for Technology in Education. (n.d.). *Essential conditions*. https://www.iste.org/standards/essential-conditions

Fenton, D. (2017). Recommendations for professional development necessary for iPad integration. *Educational Media International*, *54*(3), 165–184. https://doi.org/10.1080/09523987.2017.1384150

Battelle for Kids. (2019). *Framework for 21st Century Learning*. http://static.battelleforkids.org/documents/p21/P21_Framework_Brief.pdf

Frazier, D. K., & Trekles, A. M. (2018). Elementary 1:1 iPad implementation: Successes and struggles during the first year. *Journal of Educational Technology Systems*, *46*(4), 463–484. https://doi.org/10.1177/0047239517737965

Fullan, M. (2007). *The New Meaning of Educational Change* (4th ed.). Teachers College Press.

Gauvreau, A. N., Lohmann, M. J., & Hovey, K. A. (2019). Using a universal design for learning framework to provide multiple means of representation in the early childhood classroom. *The Journal of Special Education Apprenticeship*, *8*(1), 13. https://scholarworks.lib.csusb.edu/josea/vol8/iss1/3

Glover, I., Hepplestone, S., Parkin, H. J., Rodger, H., & Irwin, B. (2016). Pedagogy first:

Realising technology enhanced learning by focusing on teaching practice. *British Journal of Educational Technology*, *47*(5), 993–1002. tfh. https://jerome.stjohns.edu/login?url=https://search.ebscohost.com/login.aspx?direct=true&db=tfh&AN=117418184&site=ehost-live

Gruenert, S. (2008). School culture, school climate: They are not the same thing. *Principal*, *87*(4), 56–59.

Hallerman, S., Lewis, C., & Dresbach, B. (2019). *What is a 21st-century education?* Battelle for Kids.

Hamilton, E. R., Rosenberg, J. M., & Akcaoglu, M. (2016). The Substitution Augmentation Modification Redefinition (SAMR) Model: A Critical Review and Suggestions for its Use. *TechTrends*, *60*(5), 433–441. https://doi.org/10.1007/s11528-016-0091-y

Hongboontri, C., & Keawkhong, N. (2014). School culture: Teachers' beliefs, behaviors, and instructional practices. *Australian Journal of Teacher Education*, *39*(5).

Hoy, W. K. (1990). Organizational climate and culture: A conceptual analysis of the school workplace. *Journal of Educational and Psychological Consultation*, *1*(2), 149–168.

Huberman, M. (1988). Teacher careers and school improvement. *Journal of Curriculum Studies*, *20*(2), 119–132.

Hutchison, A., Beschorner, B., & Schmidt-Crawford, D. (2012). Exploring the use of the iPad for literacy learning. *The Reading Teacher*, *66*(1), 15–23.

Hutchison, A., & Reinking, D. (2011). Teachers' Perceptions of Integrating Information

and Communication Technologies into Literacy Instruction: A National Survey in the United States. *Reading Research Quarterly*, *46*(4), 312–333. eric. https://jerome.stjohns.edu/login?url=https://search.ebscohost.com/login.aspx?direct=true&db=eric&AN=EJ960847&site=ehost-live

ISTE. (2020). *About ISTE*. https://www.iste.org/about/about-iste

Januszewski, A., Molenda, M., & Association for Educational Communications and Technology (Eds.). (2008). *Educational technology: A definition with commentary*. Lawrence Erlbaum Associates.

Joo, Y., Park, S., & Lim, E. (2018). Factors influencing preservice teachers' intention to use technology: TPACK, teacher self-efficacy, and technology acceptance model. *Journal of Educational Technology and Society*, *21*(3), 48–59. Retrieved from https://www.jstor.org/stable/26458506

Katzenmayer, M., & Moller, G. (2001). *Awakening the Sleeping Giant: Helping Teachers Develop as Leaders.* (2nd ed.) Corwin.

Knowles, M. S. (2014). *The adult learner: The definitive classic in adult education and human resource development* (8th ed.). Routledge.

Koehler, M. J., Mishra, P., Kereluik, K., Shin, T. S., & Graham, C. R. (2014). The technological pedagogical content Knowledge framework. In J. M. Spector, M. D. Merrill, J. Elen, & M. J. Bishop (Eds.), *Handbook of Research on Educational Communications and Technology* (pp. 101–111). Springer New York. https://doi.org/10.1007/978-1-4614-3185-5_9

Labin, S. N. (2014). Developing common measures in evaluation capacity building: An

iterative science and practice process. *American Journal of Evaluation*, *35*(1), 107–115.

Lewis, M. (2016). Professional learning facilitators in 1:1 program implementation: Technology coaches or school librarians? *School Libraries Worldwide*, *22*(2), 12. https://doi.org/10.14265.22.2.02

Love, D. (2016). A change in school culture boosts student achievement. *Principal*, *96*(2), 56–57.

Lucas, M. (2018). External barriers affecting the successful implementation of mobile educational interventions. *Computers in Human Behavior*, 107 (2020), 105509. https://doi.org/10.1016/j.chb.2018.05.001

Lumpe, A. T., & Chambers, E. (2001). Assessing teachers' context beliefs about technology use. *Journal of Research on Technology in Education*, *34*(1), 93–107. https://doi.org/10.1080/15391523.2001.10782337

MacNeil, A. J., Prater, D. L., & Busch, S. (2009). The effects of school culture and climate on student achievement. *International Journal of Leadership in Education*, *12*(1), 73–84.

McCabe, M., & Skinner, R. A. (2003). Analyzing the tech effect researchers examine whether technology has an impact on student achievement. *Education Week*, *22*(35), 50-52.

Melton-Shutt, A. (2004). *School culture in Kentucky elementary schools: Examining the path to proficiency.* [Unpublished doctoral dissertation]. University of Louisville, KY and Western Kentucky University.

Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A

framework for teacher knowledge. *Teachers College Record*, *108*(6), 1017–1054. https://doi.org/10.1111/j.1467-9620.2006.00684.x

National Center for Education Statistics. (2008). *Number and internet access of instructional computers and rooms in public schools, by selected school characteristics: Selected years, 1995 through 2008*. U.S. Department of Education.

Neuhaus, B., Oreopoulous, P., & Kane, T. (2018). How do we know if ed tech even works? *Education Week*.

New York State Education Department. (2019). *Smart Schools Bond Act*.

Ohlson, M. (2009). Instructional leadership and school culture. *Florida Journal of Educational Administration & Policy*, *2*(2), 23.

Ohlson, M., Swanson, A., Adams-Manning, A., & Byrd, A. (2016). A culture of success—Examining school culture and student outcomes via a performance framework. *Journal of Education and Learning*, *5*(1), 114.

Peterson, K. D., & Deal, T. E. (2016). *Shaping school culture*. John Wiley & Sons.

Prensky, M. (2005). Listen to the Natives. *Educational Leadership*, *63*(4), 8–13. http://cesa7ita2009.pbworks.com/f/Listen+to+the+Natives.pdf

Puentedura, R. R. (2010). SAMR and TPACK: Intro to advanced practice. 48.

Puentedura, R. R. (2014). Building transformation: An introduction to the SAMR model. 23.

Rhodes, V., Stevens, D., & Hemmings, A. (2011). Creating positive culture in a new urban high school. *The High School Journal*, *94*(3), 82–94.

Russell, M., Bebell, D., & Higgins, J. (2004). Laptop learning: A comparison of teaching

and learning in upper elementary classrooms equipped with shared carts of laptops and permanent 1:1 laptops. *Journal of Educational Computing Research*, *30*(4), 313–330.

Sauers, N. J., & McLeod, S. (2018a). Teachers' technology competency and technology integration in 1:1 schools. *Journal of Educational Computing Research*, *56*(6), 892–910.

Schein, E. H. (2017). *Organizational culture and leadership*. 458

Sundell, K., Castellano, M., Overman, L. T., & Aliaga, O. A. (2012). The role of school culture in improving student achievement in POS. *Techniques: Connecting Education and Careers*, *87*(1), 28–31.

Sykora, C. (2014). Plan a successful 1:1 technology initiative. *International Society for Technology in Education*, 4.

Thapa, A., & Guffey, S. (2012). School climate research summary: August 2012. *National School Climate Center*, 21.

Purdue Online. (n.d.). *The evolution of technology in the classroom*. Retrieved March 20, 2020, from https://online.purdue.edu/blog/evolution-technology-classroom

Tichnor-Wagner, A., Harrison, C., & Cohen-Vogel, L. (2016). Cultures of learning in effective high schools. *Educational Administration Quarterly*, *52*(4), 602–642.

Trotter, A. (1998). A Question of effectiveness. *Education Week*, *18*(5), 6. Retrieved from https://www.edweek.org/education/a-question-of-effectiveness/2017/07

U.S. Department of Education. (2017). *Reimagining the role of technology in education: 2017 national education technology plan update*. https://tech.ed.gov/netp/

Vongkulluksn, V. W., Xie, K., & Bowman, M. A. (2018). The role of value on teachers'

internalization of external barriers and externalization of personal beliefs for classroom technology integration. *Computers & Education*, *118*, 70–81.

Wagner, C. R. (2006). The school leader's tool for assessing and improving school culture. *Principal Leadership*, *7*(4), 41–44.

Wilcox, K. C., & Angelis, J. I. (2012). From "muddle school" to middle school: Building capacity to collaborate for higher-performing middle schools: High-performing middle level schools build capacity to support collaboration and student success. *Middle School Journal*, *43*(4), 40–48.

Williams, M. E. (2017). Technology integration support levels for in-service teachers. *Journal of Education and Practice*, *8*(7), 76–81. ERIC. https://eric.ed.gov/?id=EJ1137540

Yin, R. (2014). *Case study research design and methods*. Sage.

Vita

Name	*Marlee Rice*
Baccalaureate Degree	*Bachelor of Arts, St. Joseph's College, Patchogue, Major: Child Study and Speech Communications*
Date Graduated	*May, 2012*
Other Degrees and Certificates	*Master of Arts, State University of New York at Stony Brook, Stony Brook, Major: Liberal Studies* *Advanced Certificate in Educational Leadership (2017)*
Date Graduated	*May, 2014*