A CAUSAL-COMPARATIVE INVESTIGATION OF THE EFFECT OF MIDDLE SCHOOL TEACHERS' PERCEPTIONS OF STUDENTS' SOCIOECONOMIC STATUS ON THEIR ATTITUDES TOWARD TECHNOLOGY

by

Catherine Rose

Liberty University

A Dissertation Presented in Partial Fulfillment

Of the Requirements for the Degree

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APPROVED BY:

Treg Hopkins, Ed.D., Committee Chair

Nathan Street, Ed.D., Committee Member

ABSTRACT

This quantitative causal-comparative study investigated the effect of middle school teachers' perceptions of students' socioeconomic status on their attitudes toward technology. The study was based on the theory of social constructivism and the will, skill, and tool model of technology integration to investigate teachers' attitudes toward technology. This study advanced the body of knowledge by examining the connection between pedagogical beliefs and teachers' attitudes toward technology, the use of technology with students from lower socioeconomic backgrounds, and the need for more research on technology use by teachers at the middle school level. The research question exploring the possibility of a difference in teachers' attitudes toward technology among middle school teachers who minimally, somewhat, and predominantly serve students from low socioeconomic backgrounds, as determined by the state and United States Department of Education, was measured by the Teachers' Attitudes Toward Computers-Information Computer Technology Questionnaire (TAC/TAICT) using responses from 126 middle school teachers in Virginia. The researcher collected data through digital completion of the questionnaire and analyzed it to determine significant differences. A one-way ANOVA did not show significant differences in overall attitudes among the three groups.

Keywords: technology integration, teachers' attitudes, teacher beliefs, middle school, socioeconomic status

Dedication

I want to dedicate this dissertation to my daughter, Courtney, and my parents, Garland and Rose Mapp. Courtney has supported this entire process, encouraging me when I needed it and celebrating with me when I hit specific milestones. She understood when I had to work on my manuscript and allowed me the time to do so. She is my strength and my greatest cheerleader.

My parents were always strong supporters of education and encouraged me to continue learning all the time. My dad passed away in 2014, but I know he would have been proud of me for completing this journey. My mom was with me at the beginning of this program and encouraged me along the way. She passed away in 2022, and I am sad that she did not get to see me complete this dissertation, but I know she was proud of me regardless.

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I want to thank Dr. Treg Hopkins for serving as my chair. Dr. Hopkins was very encouraging and always gave good advice to help me forge ahead. When my mom passed away, and I lost my motivation for a time, he was instrumental in helping me complete small tasks until I was strong enough to fully commit to writing again. His leadership helped me to feel confident to finish this degree.

I also like to acknowledge Dr. Nathan Street. When I first met Dr. Street, I was working on my first draft of chapter two. This is the first time I have had such a dedicated reader who would provide excellent feedback and suggestions on my writing. He was also instrumental in helping me craft my topic and narrow it down to a workable idea. I am thankful for his guidance and continued support throughout this process.

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List of Abbreviations

Teachers' Attitudes Toward Computers-Information Computer Technology Questionnaire (TAC-TAICT)

United States Department of Education (USDOE)

Will, Skill, Tool Model (WST)

Will, Skill, Tool, Pedagogy Model (WSTP)

Socioeconomic Status (SES)

Zone Proximal Development (ZPD)

CHAPTER ONE: INTRODUCTION

Overview

This quantitative, causal-comparative study aimed to determine if a difference exists in teachers' attitudes toward technology integration in the classroom among middle school teachers in schools with high/mid-high, mid-low, and low percentages of students from low socioeconomic backgrounds in a mid-Atlantic state. Chapter One provides background on digital growth and the call for more educational technology in K-12 schools, teachers' resistance to technology integration, the digital bind because of economic disparity, and the pedagogical differences in teachers who work with students from low socioeconomic backgrounds. The background includes an overview of the theoretical framework for the study, the problem statement exploring the literature on the topic, the significance and purpose of the study, and concludes with the research question and related terms.

Background

Users create approximately 2.5 quintillion bytes of digital data daily and perform nearly 3.5 billion Google searches (Seed Scientific, 2020). This massive amount of new information arriving each day will continue to expand as designers develop technological innovations and online activity becomes as commonplace as other everyday activities. For those born after 1997, Generation Z, the technology concept involves smartphones, Wi-Fi, and the ability to always connect to the world (Dimock, 2019). For example, 45% of teenage children report being online constantly, indicating that most of their lives are digital (Anderson & Jiang, 2018). Society has advocated for digitally-prepared graduates, yet the inequality in socioeconomic status for many families has caused a significant digital divide in many areas. The United States Department of Education (2017) has developed goals for both students and teachers that focus on preparing

students with 21st-century skills that will allow them to be successful in a global society. This task has proven challenging as 40% of students from low-income backgrounds need to start using digital tools at home for educational purposes (Ball et al., 2020). This issue often translates to decreased technology integration in schools with higher populations of students from low socioeconomic backgrounds (Kormos, 2022). Furthermore, the inconsistencies in teachers' attitudes toward technology have made universal acceptance of technology in the classroom nearly impossible (Harrell & Bynum, 2018; Tondeur et al., 2017). The pedagogical disparity among schools based on socioeconomic factors coupled with the challenges teachers encounter regarding their teaching preferences and attitudes towards technology have added to the complexity of this issue.

Historical Overview

Today, technology in various forms has become commonplace, even a necessity for some. Whereas more than twenty years ago, people were beginning to feel the power of the internet, today, technology has permeated nearly every aspect of humanity, from paying bills to entertainment and socializing. Students constantly use technology to communicate, search for information, and share their unique identities (Carstens et al., 2021; Dolan, 2017). It is no wonder, then, that this same explosion of technology use should also occur in K-12 education in the United States. Since the National Education Technology Plan was adopted, educational technology in the United States has evolved from debates about its inclusion in the curriculum to discussions about ensuring that all students have regular access to digital learning products (United States Department of Education, 2017). In 2019, 45% of schools reported having one-to-one technology, and 34% reported allowing students to carry their computers throughout the school day (National Center for Educational Statistics, n.d.). This issue became even more

essential when schools closed due to the COVID-19 pandemic sending close to 1.5 billion learners home and forcing teachers and students to embrace digital learning for nearly 18 months (Gudmundsdottir & Hathaway, 2020). In recent years, children ages 3 to 18 could access computers and the Internet 97% of the time (USDOE, 2021). With statistics like these and the increased focus on digital learning, computers and information technology in K-12 education are essential to students already immersed in their daily lives.

However, classroom teachers have yet to completely embrace a positive attitude toward technology. Many educators recognize the importance of technology use but have been reluctant to implement these tools in their classrooms (Harrell & Bynum, 2018). Barriers, such as school culture and support, amount of content, time, self-efficacy, learning outcomes, and distractions, have prevented many teachers from accepting technology into their classrooms (Francom, 2020; Luo & Murray, 2018; Pamuk, 2022; Selcuk et al., 2021; Tondeur et al., 2017; Varier et al., 2017; Vongkulluksn et al., 2018). This reluctance has become even more pervasive for teachers who perceive their students' socioeconomic status as a barrier to learning due to outside challenges, lack of background knowledge, and difficulty with complex learning tasks (Gray et al., 2010; Guerra & Wubbena, 2017; Hohlfield et al., 2017; Kormos & Julio, 2020; Luo & Murray, 2018; Tondeur et al., 2017). Because the teachers are the connection students have to the classroom learning tools, they are the catalysts for educational technology.

Society-at-Large

The issue of technology integration in education and teachers' attitudes toward technology affect all stakeholders in education and society. Students who graduate from high school are expected to enter the workforce, military, or higher education. Their skills in digital tools are becoming essential to be successful in these areas (USDOE, 2017). Benefits of

technology integration, such as increased engagement, improved communication and organization, and more vital critical thinking skills (Christensen & Knezek, 2017; Lawrence et al., 2018; Li & Ngan, 2009; Varier et al., 2017). When students become proficient in these skills, society benefits because students have the potential to become productive citizens in their communities.

This issue also affects society due to the digital divide, which still exists in many areas, especially education. Robinson et al. (2018) found that while digital experiences did increase GPAs for students from low socioeconomic backgrounds, the concern originated in the presence of the *digital bind,* which involved unrealistic digital expectations that did not match the available resources for these students. Furthermore, Ball et al. (2020) showed that students from low socioeconomic backgrounds were in an unbreakable cycle because they had limited access to current digital tools and exhibited negative responses to performance expectations due to their lack of skills with technology; therefore, many educators perceived them as unwilling to learn or unresponsive to learning tasks. This digital divide perpetuates the pattern of students from low socioeconomic backgrounds needing to graduate from high school with the necessary skills to succeed in a technological world.

The pedagogical attitudes of teachers in schools with higher populations of students from low socioeconomic backgrounds affect society because learning for students in these schools is affected by different life experiences than for students in schools serving low populations of students from low socioeconomic backgrounds (Arnett-Hartwick & Harpel, 2020; Flint et al., 2019; Francom, 2020). Teachers in these schools tended to instruct, assess, and grade based on their perceptions of their students' ability to learn and their needs outside of the classroom (Guerra & Wubbena, 2017; Masko, 2018; Westphal et al., 2016; Williams et al., 2017). Some

teachers also possessed deficit attitudes toward these students leading to lower expectations, more identification for special education services, and negative stereotypical perceptions about what these students could achieve (Dolan, 2017; Glock & Kleen, 2020). Many of these teachers emphasized providing compassion, emotional support, and physical needs rather than academic ones (Masko, 2018; Williams et al., 2017). While teachers perceived this focus as a primary goal, the reality is that these students did not always maintain access to rigorous instruction and expectations as their peers in schools with students from high socioeconomic backgrounds, often due to their teachers' perceptions of them.

Theoretical Background

One theory that frames the current study is Vygotsky's (1986) theory of social constructivism, which purports that students will develop knowledge through their own experiences and worldview and learn more effectively when they work together in a cooperative learning environment. Teachers prioritize the learning process over the outcomes, and students feel safe in their learning environment, can take risks, and are more engaged (Flint et al., 2019). When students' cultures are honored, the students will often feel safer exploring new ideas and experiencing learning growth (Hirtle, 1996). Research has shown that when teachers apply social constructivist beliefs to their instruction, they employ more student-centered activities and are more likely to possess positive attitudes toward technology (Francom, 2020; Hsu, 2016; Li & Ngan, 2009). However, research has also shown that while teachers may have claimed to possess constructivist beliefs, they did not always reflect these beliefs in their pedagogical decisions and often harbored negative attitudes towards technology and resisted technology integration (Admiraal et al., 2017; Caleon et al., 2018; Hong et al., 2019). The theory of social constructivism was relevant to the current study because the research examined teachers'

perceptions about how students they believed to originate from different socioeconomic backgrounds constructed knowledge and how those beliefs connected to their attitudes toward technology.

Another theoretical model which frames the current study is the will, skill, tool, and pedagogy model (Knezek & Christensen, 2016; Knezek et al., 2003), which states that teachers' attitudes towards technology (will), their ability to understand and use technology (skill), their access to the necessary digital tools (tool), and their teaching style as it relates to integrating technology to increase student learning and engagement (pedagogy). Research has shown that the factors of the will, skill, and tool (WST) and revised will, skill, tool, and pedagogy (WSTP) models are valid and reliable predictors of teachers' integration of technology (Chalasani & Varalakshmi, 2020; Diamantis, 2022; Farjon et al., 2018, 2019; Guggemos & Seufert, 2021; Petko, 2012; Rubach & Lazarides, 2021; Schmitz et al., 2022). However, Olugbara and Letseka (2020) noted that while other researchers have found that teachers' attitudes towards technology (will) were the most significant predictors, their investigation with pre-service teachers found that skill most often predicted technology integration. The WST/WSTP model was relevant to the current study because the research investigated how teachers' perceptions of their students' socioeconomic status influenced their attitudes (will) toward technology.

Problem Statement

Teachers' attitudes towards technology in the classroom are even more critical today than ever. However, the connection between teachers' attitudes or perceptions and behavior has a complicated history because while teachers' attitudes can influence their decisions to integrate technology, choice of digital or non-digital instructional materials, and delivery of instruction, this relationship has not been easily explained or confirmed (Francom, 2020; Önalan & Kurt,

2020; Tondeur et al., 2017; Turgut & Aslan, 2021; Vongkulluksn et al., 2018). While some researchers have discovered a clear relationship between teachers' attitudes and technology integration (Vongkulluksn et al., 2018; Wang, 2021; Xu & Zhu, 2020), others have found the opposite (Cheng et al., 2021; Francom, 2020).

Today, students and families from nearly all socioeconomic backgrounds increasingly use technology for entertainment, business, and education (Dolan, 2017). However, teachers of students from lower socioeconomic backgrounds possess different pedagogical beliefs and practices due to their perceptions of their students' abilities, observations of the challenges students experience outside of the classroom, and the perceived support learners need from teachers and staff (Cavendish et al., 2021; Dolan, 2017; Glock & Kleen, 2020; Hohlfield et al., 2017; Varier et al., 2017). Furthermore, research has demonstrated that teachers in schools with higher populations of students from low socioeconomic backgrounds used technology less frequently than teachers in schools with lower populations of these students but did not always connect these choices to their perceptions about these specific students (Backfisch et al., 2021; Glock & Kleen, 2020; Kormos & Julio, 2020).

While there are previous studies on factors affecting teachers' perceptions of technology, such as leadership, lack of suitable technology tools, insufficient professional development, low confidence in technology skills, lack of teacher input in technology decisions, and general teacher perceptions of the effectiveness of technology integration, few studies exist regarding how teachers' perceptions of students' socioeconomic status affect these decisions and attitudes. (Admiraal et al., 2017; Carver, 2016; Kwon et al., 2019). Furthermore, in most of the studies on teachers' attitudes toward technology, the focus was either on elementary teachers, high school teachers, a combination of middle and high school teachers, or a group of teachers spanning all

K-12 levels rather than specifically investigating middle school teachers alone (Spiteri & Chang-Rundgren, 2020; Moodley et al., 2020; Xie et al., 2021; Xu & Zhu, 2020). Researchers have suggested that studies focus on middle school teachers' perceptions of technology (Georgiu, 2019; Jung et al., 2019; Labonte & Smith, 2022; Leem & Sung, 2019). Future research regarding teachers' attitudes toward technology based on the culture in schools with higher populations of students from low socioeconomic backgrounds has also been suggested (Ames et al., 2021; Diamantis, 2022; Francom, 2020; Kormos, 2022; Kormos & Julio, 2020; Schmitz et al., 2022). Thus, the problem is that the body of literature has not fully addressed the effect of teachers' perceptions of students' socioeconomic status on their attitudes toward technology at the middle school level.

Purpose Statement

The purpose of this quantitative, causal-comparative study was to investigate if a difference exists in teachers' attitudes toward technology integration in the classroom among middle school teachers in schools with high/mid-high, mid-low, and low percentages of students from low socioeconomic backgrounds in a mid-Atlantic state. The independent variable was the school setting based on the percentages of students from low socioeconomic backgrounds as determined by the state and United States guidelines (United States Department of Education, 2021; Virginia Department of Education, 2021a). The study consisted of three groups of middle school teachers representing the independent variable of the school setting: teachers who minimally, somewhat, and predominantly serve students from low socioeconomic backgrounds as determined by the state department of education. Using state and United States Department of Education requirements, schools were identified as serving high/mid-high (75.1% – 100%; 50.1% -75%), mid-low (25.1% - 50%), or low (25% or less) populations of students from low

socioeconomic backgrounds based on the percentages of students in the school who were homeless at any point during the school year or qualified for free or reduced-price meals, Medicaid, or Temporary Assistance for Needy Families (TANF) (United States Department of Education, 2021; Virginia Department of Education, 2021a). The dependent variable was the attitude toward technology integration, which involved the influence of perspective on the deliberate practice of incorporating digital tools in instructional delivery and student activity, such that it became a natural and organic element of daily classroom practice (de Koster et al., 2017; Ertmer & Ottenbreit-Leftwich, 2010; Pajares, 1992; Vanderlinde & van Braak, 2010). The population sample consisted of teachers from multiple middle schools with students from varying socioeconomic backgrounds within Virginia.

Significance of the Study

This study extended previous research in several ways. First, the need for future research on the connection between teachers' pedagogical and social constructivist beliefs and their attitudes toward technology has been noted (Cheng et al., 2021; Kim et al., 2013; Lam et al., 2021). Cheng et al. (2021) stated that constructivist beliefs were not a strong predictor of technology integration; however, the study was conducted in Taiwan and advocated for future studies in other countries. Kim et al. (2013) found that when teachers embraced a student-centered approach, they were more likely to integrate technology and have positive attitudes toward technology; however, their beliefs and behavior did not always correlate. Lam et al. (2021) noted that digital learning satisfied many of the needs of teachers with constructivist beliefs; however, the study was conducted in Hong Kong and advocated for more studies in different areas. More research is needed to confirm or contradict these findings in all these areas.

Secondly, a need for future research on attitudes toward technology exists among teachers of students from low socioeconomic backgrounds (Dolan, 2016; Hohlfield et al., 2017; Kormos, 2022). Dolan (2016) professes that the digital divide is worsening, calling for more research in schools with higher populations of students from low socioeconomic backgrounds to understand how to increase technology integration. Hohlfield et al. (2017) noted that in multiple years from 2008 to 2014, teachers in schools with higher populations of students originating from low SES backgrounds used technology less (21.6 % to 31.4%) than teachers in schools with low populations of students from low SES backgrounds (34.7% to 43.3%); however, much time has passed since the last collection of data to determine if this phenomenon remains accurate. Kormos (2022) found that a lack of digital resources in students' homes in one state influenced teachers' desire to integrate technology, but also that collaboration among teachers in a social constructivist environment helped them become more confident in their use of technology; this study called for more research in other states in schools with higher populations of students from low socioeconomic backgrounds.

This study was important for middle school teachers and administrators as they sought to plan and participate in professional development regarding technology integration. Dogan et al. (2021) especially found variances in the data on technology integration among school levels. More research is needed at the middle school level to add to the body of literature in this area. Furthermore, Kormos (2022) implied that by acknowledging the digital gap for many students, administrators and teachers can identify specific focus areas to enhance the use of technology in their schools. By understanding how middle school teachers perceive technology in particular school settings, administrators can offer professional learning opportunities to help meet the needs of teachers and students.

Research Question

RQ: Is there a difference in teachers' attitudes toward technology scores among middle school teachers who, according to state and United States Department of Education requirements, minimally, somewhat, and predominantly serve students from low socioeconomic backgrounds?

Definitions

1. *Attitude:* Ajzen (1988) defined attitude as "a disposition to respond favorably or unfavorably to an object, person, institution, or event" (p. 4).

2. *Beliefs:* Beliefs are core ideas accepted by individuals that help them make decisions, influence perceptions, affect behavior, represent what they hold as truth, and rarely change in adults (Pajares, 1992).

3. *Digital Divide:* Digital divide represents the need for equal access to digital tools such as hardware, software, and internet connectivity, mainly in individual homes (Huffman, 2018).

4. *Socioeconomic Status:* Socioeconomic status is represented by family income, parental education, and access to resources and often affects perceptions, behavior, and social standing (Pace et al., 2017).

5. *Technology:* Technology involves any computer (desktop or laptop), projector, software, interactive whiteboard, document camera, network services, learning management system, or online learning tools (Gray et al., 2010)

CHAPTER TWO: LITERATURE REVIEW

Overview

This literature review presents information on the benefits and barriers related to technology integration, teachers' beliefs about educational technology, unique contexts related to school levels, teachers' assumptions based on their perceptions of students' socioeconomic status, and how these elements collectively influence teachers' attitudes toward technology. The chapter begins with the theoretical framework. The first theory that frames this study is Vygotsky's (1986) theory of social constructivism. Additionally, the will, skill, tool model (WST), formulated by Knezek et al. (2003), provides a foundation for the current research. A thorough review of the literature related to technology integration and teachers' perceptions of students' socioeconomic status completes the chapter, which ends with a summary and determination of a gap in the literature indicating a need for the current study.

Theoretical Framework

Two theories frame a study on the effect of teachers' perceptions of students' socioeconomic statuses on their attitudes toward technology. First, social constructivism (Vygotsky, 1986) provides a basis for the teacher's instructional role and a foundation for effective student learning based on social interaction and knowledge development based on one's life experiences. Second, Knezek et al. (2003) theorized that the will, skill, and tool model comprised three factors that influence teachers' intent to integrate technology in the classroom: "Will (attitude) of the teacher, Skill (technology competency), and Technology Tools (access to technology tools)" (p. 10). Both theories are significant to an investigation of the effect of teachers' perceptions of their students' socioeconomic status on their attitudes toward technology because they propose effective learning strategies and provide a possible explanation for the

connection between teachers' perceptions of their students' socioeconomic backgrounds and their willingness to integrate technology in their classrooms.

Social Constructivism

Constructivism states that learning is most effective when students develop knowledge based on their life experiences, ideas, and worldview and is a combination of both the learning environment and what students bring to it (Adams, 2006; Kim, 2001; Vygotsky, 1986). Based on the philosophy of Dewey (1934/2005), constructivism suggests that learning is directly related to one's unique experiences. Constructivism focuses on how students create knowledge and their thought processes, positioning learners in control of academic experiences as they develop their knowledge base more prominently than the content (Adams, 2006; Jacobsen, 1991). Learners become empowered as they begin to understand their world and direct their learning rather than obtaining it elsewhere (Hirtle, 1996; Kanselaar, 2002). Social constructivists include these constructs but add the importance of social interaction in the learning process, recognizing the need to understand the life experiences of others and reconcile these with their realities (Adams, 2006; Vygotsky, 1986). Kim (2001) noted that social interaction, combined with the elements of the environment in which individuals live, provides the most significant possibility for learning. Vygotsky (1986), the premier theorist of social constructivism, proposed that when students collaborate with the support of an adult, they will learn more effectively because the intersection of social interaction and culture provides powerful opportunities to gain knowledge. Language becomes the connection between the cultural experience and the introduction of new knowledge and allows students to make sense of their world, shape their learning, and determine how they can be productive members of their society (Hirtle, 1996; Mayer, 2008; Terwell, 1999). His identification of the zone of proximal development (ZPD) essentially redefined the role of

teachers in the learning process, placing them in a mentor position as they listen, observe, and aid students at their learning levels (Adams, 2006; Vygotsky, 1986). He believed the learning process was more important than the outcome as students communicated with others to create new knowledge in safe and supported spaces designed by teachers (Adams, 2006; Vygotsky, 1986). Flint et al. (2019) found that when social interaction was a part of the learning environment, students felt safer and were more engaged in the process. Social constructivists recognize the crucial connection between the individual student and the group dynamic in the learning process.

Social constructivist teachers' beliefs often lead to more small-group assignments and student-centered instruction (Tondeur et al., 2017). When considering technology, researchers found that social constructivism and student-centered instruction were predictors of teachers' intent to integrate digital tools (Francom, 2020; Hilton & Canciello, 2018; Hsu, 2016). Francom (2020) determined that high school teachers with constructivist beliefs were more likely to implement technology into their lessons ($F = 6.16$, $p = .002$) than elementary or middle school teachers. Furthermore, Hsu (2016) found that 75% of all teachers with constructivist beliefs also possessed high self-efficacy and positive attitudes toward technology integration. As teachers increased technology integration, they tended to shift to student-centered instruction and social learning, increasing their positive perceptions about their students' motivation and overall learning (Flint et al., 2019; Francom, 2020; Tondeur et al., 2017).

Social constructivism applies to the current study in two ways. First, when teachers applied social constructivist beliefs to their instruction, many adapted their activities to meet the perceived individual needs of their students, allowing for cooperative learning, conversation, and the integration of a variety of technology as part of the learning process (Flint et al., 2019;

Francom, 2020; Tondeur et al., 2017). Serrano-Corkin et al. (2019) also found that when teachers described how students learned best (i.e., manipulatives, modeling, relevancy), their beliefs aligned with constructivist teaching pedagogy. However, some teachers professed to maintain social constructivist views but needed to reflect this in their pedagogy (Admiraal et al., 2017; Caleon et al., 2018). Per social constructivism, teachers were listeners, observers, and mentors throughout the learning process as their students created knowledge based on their unique perspective of the world, which could be affected by their socioeconomic background (Adams, 2006; Flint et al., 2019; Francom, 2020; Jacobsen, 1991; Tondeur et al., 2017; Vygotsky, 1986). One hypothesis would be that teachers' perceptions of their students' socioeconomic status would motivate them to adapt their instruction and implementation of technology to meet the needs of their students. Second, when teachers apply social constructivism to instructional planning, they will collaborate with their colleagues to learn and become more intentional about making choices regarding their pedagogy as it relates to technology.

Will, Skill, and Tool Model

The will, skill, and tool model (WST) theorizes that three factors influence the differences in teachers' acceptance of technology integration: will (teachers' attitudes), skill (teachers' technology-related abilities), and tool (accessibility of necessary hardware and software) (Chalasani & Varalakshmi, 2020; Farjon et al., 2018, 2019; Knezek et al., 2003; Olugbara & Letseka, 2020; Schmitz et al., 2022). The model postulates that teachers often possess high levels of at least one of these components to predict an acceptance of technology integration (Knezek et al., 2003). Knezek et al. (2003) initially tested the WST model with in-service teachers and confirmed its reliability with 70 to 84% of the variance. Furthermore, Farjon et al. (2019) tested the WST model with pre-service teachers and found a 60% explanation of the

variance of technology integration. Previous studies have found that teachers' will (attitudes), skill (ability), and access to tools (digital hardware and software) affect their intent to integrate technology (Agyei & Voogt, 2011; Diamantis, 2022; Petko, 2012; Rubach & Lazarides, 2021; Schmitz et al., 2022; Tondeur et al., 2017). Knezek and Christensen (2015, 2016) noted that the factors of will, skill, and tool demonstrated technology integration predictability values of 29%, 28%, and 9%, respectively; however, they added a new construct of pedagogy with a predictability factor of 30% to account for teachers' perceptions of the value technology would have for their students' learning. The construct values indicate that the WST and the revised WSTP models are strong models to determine teachers' intent to integrate technology. While the WST/WSTP model can be applied across grade levels and disciplines, it is focused on the teachers' technology integration rather than the students' acceptance (Tondeur et al., 2021).

Diamantis (2022) established that for teachers to proceed with technology integration, they often believe that teaching with digital tools would make their job easier, more effective, engaging, and reflective of higher student growth. When teachers faced the decision regarding technology integration, higher levels of positive beliefs (i.e., *will*) regarding the value of digital tools ($0.24 \geq r \leq 0.51$) often influenced their choices. When the cost was deemed too high, they sometimes chose not to integrate ($-0.31 \geq r \leq -0.18$) (Rubach & Lazarides, 2021). Regarding the influence of skill, Diamantis (2022) revealed that two out of three teachers worried about their lack of abilities and the extra time required for them to prepare lessons and activities using technology. Furthermore, Knezek and Christensen (2016) showed skill to correlate with the choice to integrate technology ($r = .549$, $p < .0005$). The availability of effective digital tools has also been shown to influence 65% to 76% of teachers' decisions to integrate (Diamantis, 2022). Buchner and Hofmann (2022) demonstrated that the constructs of will, skill, and tool all

increased teachers' intent to integrate [will t (43) =7.99, $p < .001$, $d = 2.38$; skill t (43) = 2.90, $p < .01$, $d = .87$; tool t (43) = 2.98, $p < .01$, $d = .89$]. When Knezek and Christensen (2016) included pedagogy as the fourth construct, they determined that it demonstrated the most significant effect on technology integration (ß = .35; $R^2 = .34$); however, teachers' attitudes naturally influence their pedagogy (Watkins & Mortimore, 1999). The WST/WSTP model explains teachers' intent to integrate technology across all four constructs.

Because this study focused on how teachers' perceptions of their students' socioeconomic backgrounds influenced their attitudes toward and intent to integrate technology, the "will" construct of the WST/WSTP model was the focus. The construct of *will* applied to this study because while skill and tool barriers are easy to address through professional development and infrastructure improvements, the internal challenges of teachers' beliefs and attitudes are more difficult to understand and change (Rubach & Lazarides, 2021; Schmitz et al., 2022; Tondeur et al., 2021). When analyzing the full WSTP model, Farjon et al. (2019) determined that will was the most substantial measure of effect on integration ($\beta_{ATI} = .66$, *SE*. =0.16, $p < .001$); however, when will was analyzed individually, it still demonstrated a significant effect ($R^2 = .56$), indicating that as a stand-alone construct, will (attitude) can account for the variation in teachers' decisions to integrate. Knezek et al. (2003) revealed that a regression analysis of the construct of will also represented 40% of the variance. However, even though Knezek and Christensen (2016) found pedagogy to be an essential construct in their revised WSTP model, Cheng et al. (2021) determined that neither constructivist nor traditional pedagogical attitudes contributed to a solid intent to integrate technology ($b = -.007$; $b = -.047$, $p < .05$); therefore, the construct of will remained the most critical focus for this study.

Theoretical Connection

Social constructivism theory supports the need for a study on the effect of teachers' perceptions of their students' socioeconomic status on their pedagogy as it relates to technology integration. Hsu (2016) demonstrated that 91% of teachers with constructivist beliefs projected positive attitudes toward technology integration, and Li and Ngan (2009) determined that teachers applying constructivist pedagogy believed that technology increased student motivation (40%). When teachers were allowed to collaborate with technology, student learning increased by 40% (Li & Ngan, 2009). However, Hong et al. (2019) found that while teachers possessed constructivist beliefs (M = 3.47, SD = .73), they lacked the knowledge to implement technology effectively (M = 3.22, SD = .71). Hsu (2016) determined that 75% of teachers with more than three years' experience lacked the training to integrate technology rendering any connection between social constructivism and technology integration nonexistent. Furthermore, Schmitz et al. (2022) noted that while teachers claimed to hold social constructivist beliefs, they used technology more for themselves (M = 2.24, SD = 1.11) rather than for their students' self-directed learning purposes (M = 1.64, SD = 0.98).

However, the data on the connection between social constructivism and technology integration are inconsistent. The importance of social collaboration with technology among teachers and students is a common theme in the research (Carhill-Poza, 2019). Carhill-Poza (2019) showed that teachers in flipped learning environments in which technology was a primary component liked that students could converse about crucial concepts to enhance their learning. However, Hong et al. (2019) noted that digital knowledge and social constructivist beliefs were not significant predictors of creating robust learning environments (β = .064, p = .197), and Judson (2006) demonstrated that no significant correlation existed between constructivist beliefs,

teaching practices, and attitudes about technology (r = .151, p = .410; r =.157, p = .392). While some researchers demonstrated a clear connection between constructivist beliefs and technology integration, the proposed study investigating the relationship between teachers' pedagogical perceptions and technology is necessary to add to the knowledge.

The construct of will as part of the WST/WSTP model also applies to this study because while some studies demonstrated that *will* was the strongest predictor of technology integration, others showed that it was much weaker than other constructs (Agyei & Voogt, 2011; Bowman et al., 2020; Drossel et al., 2017; Farjon et al., 2019; Guggemos & Seufert, 2021; Knezek & Christensen, 2016; Knezek et al., 2003; Olugbara & Letseka, 2020; Schmitz et al., 2022). For example, while Farjon et al. (2019) found will to be the prime measure for the intent to integrate (β_{ATI} = .66, SE = .16, p < .001), Olugbara and Letseka (2020) concluded that it was the lowest predictor of integration (β = .13, p < .05). Makki et al. (2018) also demonstrated that while comfort with computer features was a significant determinant of teachers' intent to integrate (β = 0.438, p < .001), anxiety (β = 0.096, p < .05) or general computer attitudes (β = 0.180, p < .05) did not produce any significant effect. Petko (2012) found a significant correlation between teachers' beliefs that students need technology skills (r = .43, p < .001) and technology integration (r = .40, p < .001). Furthermore, when adding students' characteristics to the equation, Wall (2018) determined that 100% of teachers who perceived their students originated from low socioeconomic backgrounds reported that these perceptions caused them to reflect and rethink their teaching to meet their students' needs and use whatever digital tools were necessary to do so. However, Guerra and Wubbena (2017) noted that more than half of the teachers who perceived students originated from low socioeconomic families chose to adopt deficit beliefs instead of abundant beliefs regarding their students' abilities. These deficit beliefs, defined by

Gorski (2008) as "defining students by their weaknesses rather than their strengths," often led to negative attitudes toward technology integration due to student challenges teachers perceived (p. 34). These discrepancies in findings call for more research on the construct of will as a determinant of teachers' intent to integrate technology.

Related Literature

The literature on teachers' attitudes, perceptions of students' socioeconomic status, and technology integration includes several different layers of information. First, teachers have reported multiple benefits and challenges related to technology integration (Carver, 2016; Christensen & Knezek, 2017; Francom, 2020; Kimmons & Hall, 2016; Lawrence et al., 2018; Luo & Murray, 2018; Njiku et al., 2019; Tondeur et al., 2017; Varier et al., 2017; Vongkulluksn et al., 2018). Second, teachers' beliefs and attitudes about pedagogy and technology, the utility of technology in the workplace, and the unique culture created due to school-level differences can affect their intent to integrate technology (Carver, 2016; Christensen & Knezek, 2017; Dogan et al., 2021; Dolan, 2016; Downes & Bishop, 2015; Francom, 2020; Kimmons & Hall, 2016; Kwon et al., 2019; Lawrence et al., 2018; Luo & Murray, 2018; Njiku et al., 2019; Tondeur et al., 2017; Varier et al., 2017; Vongkulluksn et al., 2018). Finally, teachers' perceptions of students' socioeconomic backgrounds affect their pedagogical beliefs, assumptions regarding students' challenges, and their instructional choices and behaviors (Arnett-Hartwick & Harpel, 2020; Biag, 2016; Cavendish et al., 2021; Dolan, 2016; Flint et al., 2019; Francom, 2020; Guerra & Wubbena, 2017; Hohlfield et al., 2017; Keefer, 2017; Kormos & Julio, 2020; Kraft et al., 2015; Masko, 2018; Tondeur et al., 2017; Varier et al., 2017; Westphal et al., 2016; Williams et al., 2017). All these components contribute to the complexity of assessing teachers' attitudes toward technology based on students' socioeconomic status.

Benefits and Challenges Related to Technology Integration

The implementation of educational technology often depends on teachers' attitudes and encompasses factors beyond accessibility (Carver, 2016; Luo & Murray, 2018; Njiku et al., 2019). The perceived significance and challenges of technology may influence teachers' decisions about technology integration. Teachers believe that the importance of technology for students includes feedback, 21st-century skills like communication and student organization, engagement, student ownership, increased measurable outcomes, and critical thinking (Carver, 2016; Christensen & Knezek, 2017; Kimmons & Hall, 2016; Luo & Murray, 2018; Tondeur et al., 2017; Varier et al., 2017). Research has identified teachers' perceptions of challenges in two categories: school-level issues and pedagogical beliefs (Carver, 2016; Francom, 2020; Luo & Murray, 2018; Tondeur et al., 2017; Varier et al., 2017; Vongkulluksn et al., 2018).

Benefits of Technology Integration for Students

Teachers perceived several ways technology integration could be significantly valuable for student learning outcomes. Hilton and Canciello (2018) found that many teachers felt that technology had created positive learning experiences for students ($M = 5.36$), while Nikolopoulou et al. (2021) observed that 62.2% of teachers felt that technology offered a variety of new and exciting options for both teaching and learning. Varier et al. (2017) noted that one of the nine recurrent themes in teachers' responses on the benefits of technology was the opportunity for immediate teacher-to-student and student-to-student feedback. Ames et al. (2021) noted that teachers described technology's quick and individualized feedback. The ease and accessibility of online tools allowed teachers to quickly share formative assessments throughout the learning process and allowed students to collaborate with their peers regardless of their location (Ames et al., 2021; Christensen & Knezek, 2017; Varier et al., 2017). While elementary,

middle, and high school teachers noted several differences, all agreed that technology would improve student collaboration and communication (Christensen & Knezek, 2017; Hilton & Canciello, 2018). Another recurrent theme was that digital tools provided more personalization of assignments and the ability for teachers to easily differentiate (Hilton & Canciello, 2018; Regan et al., 2019; Walan, 2020; Woltran et al., 2022). Technology aided students with management tasks and content mastery. Lawrence et al. (2018) reported that teachers agreed that when applying technology, students were more organized (47.1%), more likely to ask peers for help (52.9%), and more likely to ask a teacher for help (23.5%). Christensen and Knezek (2017) found that all teachers surveyed agreed that technology improved student organization. These essential skills were noted by teachers as a critical goal in preparing students for the future (Regan et al., 2019; Woltran et al., 2022). Nikolopoulou et al. (2021) demonstrated that 76.9% of teachers reported that technology was essential because it helped them teach students 21st-century skills. Feedback, communication, collaboration, individualization, and organization were distinct benefits of consistent technology integration.

Student engagement and motivation have been identified as two more benefits of technology (Alswilem, 2019; Aslan et al., 2019; Cain et al., 2021; Carver, 2016; Downes & Bishop, 2015; Hilton & Canciello, 2018; Lawrence et al., 2018; Regan et al., 2019; Tondeur et al., 2017; Varier et al., 2017; Walan, 2020). Alswilem (2019) reported that 89.5% of teachers reported that integrating technology improved student focus and motivation. Regan et al. (2019) also noted that teachers spoke explicitly about the motivational benefits of technology for their students with disabilities or those who were struggling due to external circumstances, while Nikolopoulou et al. (2021) observed that 79.9% of teachers reported that technology was helpful for their special education students. Aslan et al. (2019) found that students reported fewer

minutes of boredom (.4 versus 7.0) when teachers introduced technology. Carver (2016) determined that 59% of teacher respondents reported that technology implementation increased student engagement and motivation. Lawrence et al. (2018) discovered that 64.7% of teachers strongly agreed that students were less distracted when integrating technology. However, Varier et al. (2017) also noted that teachers believed that engagement may have been a temporary result of the newness of technology in the classroom. Cain et al. (2021) also indicated that teachers using podcasts, for example, were clear that technology was more successful as a tool of engagement rather than assessment. Engagement was a substantial benefit of technology for teachers and students.

Critical thinking and increased learning growth were also noted as potential benefits of technology integration. Li and Ngan (2009) revealed that 60% of teachers reported that critical thinking was a positive outcome of technology implementation. Carver (2016) determined that 23% of teachers reported higher levels of student understanding. Lawrence et al. (2018) found that 46.8% of teachers agreed that some improvement in learning occurred when they integrated technology. Anwar and Setyaningrum (2021) established that when technology was a part of the learning process, assessment scores improved from 66.9 to 79.2. Georgiu (2019) showed that science units taught using digital tools led to higher post-test scores than those taught without them. In another study, 94.6% of teachers stated that technology offered them more options for varied instruction to meet their students' needs (Alswilem, 2019). Furthermore, Kimmons and Hall (2016) reported that measurable learning outcomes were the most significant benefits to teachers (M = .89, SD = .22). Christensen and Knezek (2017) determined that regardless of the school level, most teachers believed that the possibilities (F1) and benefits (F2) of integrating technology outweighed any potential barriers (F4) (F1: M = 4.26, SD = .60, p = .0005; F2: M =

3.58, *SD* = .64, *p* = .0005; F4: *M* = 3.36, *SD* = .69, *p* = .0005). Learning growth was a benefit of technology integration reported by teachers and students.

Challenges of Technology Integration

Teachers also perceived several challenges to successful technology integration at the school and teacher levels. School culture and characteristics presented challenges because teachers believed that technology was not valued by all stakeholders or not accessible to all students (Kormos & Julio, 2020; Tondeur et al., 2017). Kormos and Julio (2020) noted that 16% of teachers in rural schools with perceptions that students originated from low socioeconomic backgrounds disagreed or strongly disagreed that internet access was satisfactory compared with 10% of suburban and urban teachers, indicating that the school setting can often be a barrier to technology integration. The lack of school support from administration, IT professionals, and families was also noted as a challenge to technology integration (Carver, 2016; Dolan, 2016; Hébert et al., 2021; Hill & Valdez-Garcia, 2020; Tondeur et al., 2017; Vongkulluksn et al., 2018). For example, Hébert et al. (2021) noted that 46% of teachers said that lack of support was a barrier to integration. In addition, Hill and Valdez-Garcia (2020) observed that 62.1% of teachers reported similar concerns. Vongkulluksn et al. (2018) found that the correlation between perceived and actual support from school leadership and technology integration was significant (r = .32; r = .19, respectively). The amount of content available and restrictions on desired content were also listed as barriers to technology integration (Carver, 2016; Varier et al., 2017). Carver (2016) reported that 26% of teachers listed instructional challenges when integrating technology. Recurrent themes also focused on too much district control and parental restrictions (Varier et al., 2017). Lack of internet or equipment access at school or home was also a barrier (Alswilem, 2019; Carver, 2016; Christensen & Knezek, 2017; Dolan, 2016; Hébert et al., 2021;

Regan et al., 2019; Varier et al., 2017; Woltran et al., 2022). Both Alswilem (2019) and Hébert et al. (2021) reported similar findings regarding teachers' perceptions of access as a barrier to technology integration (70.2%; 70%, respectively). Carver (2016) reported that 62% of respondents listed equipment and online availability as challenges to integration. Time to learn about technology, prepare lessons using it, or the time constraints of testing and other instructional requirements were identified as the most significant challenges to integration (Alswilem, 2019; Carver, 2016; Cruz et al., 2021; Dolan, 2016; Francom, 2020; González-Carriedo & Harrell, 2018; Hill & Valdez-Garcia, 2020; Pamuk, 2022; Regan et al., 2019; Tondeur et al., 2017). Francom (2020) noted that 60% of participants reported that time was the most significant barrier to effective technology integration. Similarly, Basarmak and Hamutoglu (2020) indicated that time was a deterrent to integrating technology ($\beta = .45$, $p < .0001$). Furthermore, Alswilem (2019) reported that 68% of teachers stated that time was a barrier to integration, with Hill and Valdez-Garcia (2020) finding similar results, with 66.7% of teachers communicating similar feelings.

At the teacher level, instructional concerns, such as students not being prepared to effectively use the technology, cheating, general classroom management, and students' poor writing skills online were listed as potential barriers (Carver, 2016; Hill & Valdez-Garcia, 2020; Luo & Murray, 2018; Pamuk, 2022; Tondeur et al., 2017). In one study, 66.7% of teachers reported that classroom management was more difficult with technology, causing them to avoid it (Hill & Valdez-Garcia, 2020). Carver (2016) revealed that 25% of respondents noted instructional concerns as a challenge to technology integration. Luo and Murray (2018) discovered that four out of five teachers said that students' focus decreased with technology, causing teachers to be wary of applying it to their instruction. Other researchers mirrored this

consensus, stating that teachers reported a common theme of students being more distracted and off-task with technology (Carhill-Poza, 2019; Pamuk, 2022; Serrano-Corkin et al., 2019). Labonte and Smith (2022) observed that students were less engaged in collaborative learning with technology causing teachers to resist using it. Furthermore, in contrast with previous research, beliefs about the connection between learning outcomes and technology were listed as barriers to integration (Tondeur et al., 2017; Vongkulluksn et al., 2018). Vongkulluksn et al. (2018) determined that teachers' perceptions about the value of learning from technology would affect their intent to integrate ($b = 6.47$, $p < 0.001$). If teachers believed that technology would hinder student learning, it influenced their choice to avoid it. Adding to the complexity of this issue, however, Francom (2020) showed that only 14% to 17.5% of teachers listed their instructional pedagogy as a potential barrier. The barriers to technology interaction, as reported by teachers, could prevent them from perceiving the potential benefits; however, the research demonstrated some conflicting data.

Teachers' Beliefs and Attitudes

The definition and influence of teachers' beliefs and attitudes on their pedagogical choices have not been unanimously accepted nor clarified (Ertmer, 2005; Pajares, 1992; Palermo & Thomson, 2019; Prawat, 1992). Because teachers understand an aspect of teaching does not mean that they will believe in its value or accept it as an element of their pedagogy, thus creating a clear distinction between knowledge and beliefs. Pajares (1992) noted, "Belief is based on evaluation and judgment; knowledge is based on objective fact" (p. 313). Furthermore, Ajzen (1988) defined attitude as "a disposition to respond favorably or unfavorably to an object, person, institution, or event" (p. 4). Henderson and Corry (2021) reported that teachers felt strongly about their instructional beliefs and were hesitant to change if they believed a particular

strategy was beneficial to students, which often caused them to avoid innovations like technology. The research on teachers' beliefs and attitudes about technology integration in education has experienced a complex and contradictory history involving the relationship between perceptions, instructional goals, and behavior (Carver, 2016; Dolan, 2016; Downes & Bishop, 2015; Francom, 2020; Kimmons & Hall, 2016; Lawrence et al., 2018; Luo & Murray, 2018; Njiku et al., 2019; Tondeur et al., 2017; Varier et al., 2017; Vongkulluksn et al., 2018). Furthermore, the utility of technology has led teachers to either question its worth or fully embrace it in multiple aspects of their work and lives (Backfisch et al., 2020, 2021; Carver, 2016; Chen, 2008; Çoklar & Yurdakul, 2017; Francom, 2020 & Vongkulluksn et al., 2018). Finally, the differences in beliefs and attitudes regarding technology integration based on the school level and teachers' perceptions of students' unique socioeconomic backgrounds complicate the issue even further (Christensen & Knezek, 2017; Dogan et al., 2021; Francom, 2020; Luo & Murray, 2018; Varier et al., 2017; Westphal et al., 2016).

Teachers' Attitudes Toward Technology in Education

The correlation between teachers' attitudes toward technology in education is complex, unique to individuals, and cannot be explained as a simple cause-and-effect relationship (Kimmons & Hall, 2016; Tondeur et al., 2017; Yildiz Durak, 2021;). Researchers cannot agree on whether teachers' attitudes or beliefs influenced their technology integration (Francom, 2020; Jung et al., 2019; Önalan & Kurt, 2020; Vongkulluksn et al., 2018; Xie et al., 2021; Yildiz Durak, 2021). While Vongkulluksn et al. (2018) discovered a significant correlation between teachers' attitudes and technology integration ($r = .50$), and Xie et al. (2021) noted a similar correlation between technology integration and ability beliefs ($r = .294$, $p < .001$) or value beliefs ($r = .227$, $p < .001$), Francom (2020) found only 15.6% of teachers agreed that their attitudes

affected their opinions on technology integration. Yildiz Durak (2021) also demonstrated that there was no correlation between Technological Pedagogical Content Knowledge (TPACK) and teachers' attitudes toward technology integration (r = -.127, p < .05). Jung et al. (2019) mirrored these data, indicating that both at the elementary and secondary level, pedagogical beliefs did not affect their intent to use technology (R^2 = -.011). To further complicate the debate, Tondeur et al. (2017) uncovered a mutual relationship between teachers' attitudes and technology integration that would evolve; however, Kimmons and Hall (2016) noted that teachers were critical of change and not likely to change their attitudes related to technology over time (Wilks' λ = .88, p = .16, observed power = .67). Önalan and Kurt (2020) reported that while teachers possessed positive attitudes towards computers, 38.6% still noted uncertainty as to their value in the classroom. Only 52.9% agreed with the educational value of computers. Furthermore, research has demonstrated that teachers' positive or negative attitudes toward technology influence their motivation to integrate, and conflicts arise when teachers' and students' attitudes are not complementary (Cheng et al., 2021, 2022; Kim et al., 2013; Wu et al., 2019). Cheng et al. (2021) concluded that teachers' beliefs and attitudes regarding their interest (r = .72) and perceived usefulness (r = .78) correlated with their intention to integrate technology (p < .05). Ertmer et al. (2006) determined that value beliefs and attitudes were crucial factors in teachers' decisions to integrate technology (M = 4.84, SD = .37). Cheng et al. (2022) revealed that technology use had a significant correlation (p <.05) with competency beliefs (r = .64), positive-value beliefs (r =.72), and student-centered beliefs (r =.58). Continuing the research, Kwon et al. (2019) demonstrated that teachers' beliefs correlated positively with their perceptions regarding ease of technology use (r = .744, p <.01). Kim et al. (2013) noted a correlation between teachers' attitudes toward lesson design (r = .692) and technology use (r = .882) indicating that attitudes

would affect teachers' intention to integrate technology. Wu et al. (2019) found that attitudes and beliefs had the most substantial influence on teachers' intent to integrate ($\beta = 0.662$, $SE = .02$, $p < .001$).

When examining teachers' attitudes as part of the WST/WSTP model, the research is conflicting on the strength of the will construct. While Knezek et al. (2003) determined that teachers typically first possess a strong positive attitude toward technology before the other factors can be considered, Agyei and Voogt (2011) noted that only 1% of the variance of technology adoption could be attributed to the construct of will. Furthermore, Schmitz et al. (2022) indicated that will ($M = 1.80$, $SD = 0.61$) was not as important as tool accessibility ($M = 2.42$, $SD = 0.77$) for teachers' choices regarding technology integration. However, Chiu (2017) found that attitude (or will) had the most considerable effect on the intention to integrate technology ($\beta = .40$). Semerci and Aydin (2018) concluded that teachers' will toward technology was strong ($M = 3.94$) indicating a positive view toward integration.

Conflicting research also exists regarding the influence of instructional goals on the intent to integrate. These goals, related to teachers' pedagogy, reflect what they believe to be the most effective tools and strategies for teaching and learning (Cheng et al., 2021; Tondeur et al., 2017). Some studies have noted that teachers' primary motivation to integrate technology is directly related to their instructional goals, objectives, and performance outcomes (Dolan, 2016; González-Carriedo & Harrell, 2018; Kimmons & Hall, 2016, 2018; Vongkulluksn et al., 2018). Kimmons and Hall (2018) reported that student learning outcomes ($M = .54$) and a precise translation into teaching practice ($M = .58$) would influence their choice to use a specific digital tool. Teachers often desired technology that enhanced critical thinking, overall learning, and collaboration (Lawrence et al., 2018; Varier et al., 2017). Petko (2012) also noted a significant

correlation between the constructivist teaching style and the use of digital tools in the classroom ($r = 0.25$, $p < .001$). However, Carver (2016) established that instructional goals, such as differentiation and quality content, were only considered one-quarter of the time. Cheng et al. (2021) also noted that while value ($b = .568$) and competence beliefs ($b = .331$) were strong predictors of technology integration, constructivist or traditional pedagogical beliefs ($b = -.007$; $b = -.047$) were not significant. Teachers believed that students always being connected to technology created off-task behavior and decreased their ability to interact socially (Chalasani & Varalakshmi, 2020; Downes & Bishop, 2015; Luo & Murray, 2018). Luo and Murray (2018) noted that all teachers interviewed expressed frustration with students' lack of social skills and their level of direction when using technology. Furthermore, Chalasani and Varalakshmi (2020) showed that regardless of the school setting, 83% of teachers believed that students would not attend their lessons when technology was a part of the instructional method. The relationship between teachers' attitudes and their intent to integrate technology is a complex issue that requires more research.

Attitudes Toward Utility of Technology in Work/Life

Teachers make many decisions to accomplish daily goals for their students and themselves. Defined as utility value by Hulleman et al. (2010), choices are often categorized by the degree to which they are "useful or relevant for other tasks or aspects of an individual's life" (p. 881). Utility value was an essential consideration in teachers' decisions to integrate technology because their perceptions of the usefulness of technology often correlated to their level of technology integration (Backfisch et al., 2020, 2021; Çoklar & Yurdakul, 2017; Leem & Sung, 2019; Vongkulluksn et al., 2018). Leem and Sung (2019) demonstrated that immediacy (43.25%), interest (10.03%), and interactivity (6.65%) represented the most robust variance

explanations of teachers' perceptions of the perceived usefulness of technology (R^2 = 0.14, F =40.83, p < .01). These results were significant because they suggested that when teachers felt that technology was quick, exciting, and improved communication, they were more inclined to integrate it. Conversely, when technology proved to be unstable (5.08%) or inconvenient (4.41%), challenging to use (R^2 = 0.13, F = 118.79, p < .01), teachers resisted it (Leem & Sung, 2019). Vongkulluksn et al. (2018) reported that utility value beliefs correlated with both quantity (r = .37, p < .001) and quality (r = .50, p < .001) of technology integration. Backfisch et al. (2020) discovered a significant relationship between utility value and technology integration (F (1, 89) = 7.83, p < .001, n^2 = 0.150). Furthermore, the utility-value components of flexibility (M = .81, SD = *.27)* and efficiency (M = .78, SD, .3) noted by Kimmons and Hall (2016) and autonomy (β = .286) and competence support (β = .205) found by Mäkiniemi (2019) all led to higher technology use. Another aspect of utility value was often found in teachers' self-efficacy regarding technology integration. Mäkiniemi (2019) observed that self-efficacy, the understanding of the potential of technology and how to use it, led to greater technology use in teachers (β = .311, f^2 = .112). Selcuk et al. (2021) demonstrated similar data with teachers' skills having the strongest effect on their intent to integrate (r = .418, SE = .027). Kwon et al. (2019) revealed that self-efficacy correlated positively with ease of technology use (r = .589, p < .01) and negatively with challenges they perceived (r = -.611, p < .01), while Selcuk et al. (2021) observed that teachers' skills directly affected their perceptions of the usefulness of technology (r = .38, SE = .024). Hill and Valdez-Garcia (2020) garnered similar results, with 68.5% of teachers reporting that a lack of technical knowledge would prevent them from integrating digital tools and content, while Pamuk (2022) noted that lack of knowledge was a deterrent to teachers' integration of technology. Furthermore, Serrano-Corkin et al. (2019) stated that a lack of

confidence would deter teachers from integrating technology. However, if teachers were not trained in effective technology use and provided with resources, their self-efficacy did not improve (Bowman et al., 2020; Harrell & Bynum, 2018). Bowman et al. (2020) showed that effective professional development correlated with an increase in both value ($r = .566$, $p < .01$) and ability ($r = .303$, $p < .01$) beliefs toward technology integration. Semerci and Aydin (2018) determined that teachers who had no professional development in technology reported significantly higher levels of anxiety toward computers than those who had participated in four to six hours of training [no professional development: ($M = 2.18$, $SD = .88$); four to six hours of professional development: ($M = 1.67$, $SD = .64$)]. Unfortunately, Rotermund et al. (2017) observed that while 67% of teachers requested professional development on technology integration, 59% received eight or fewer hours of training. The literature has demonstrated the connection between utility value and technology integration.

The reality is that external barriers, such as time, cost, access, training, and other external factors, can often affect the utility-value teachers perceive regarding technology integration (Carver, 2016; Chen, 2008; Çoklar & Yurdakul, 2017; Dolan, 2016; Francom, 2020; Tondeur et al., 2017). Francom (2020) reported that teachers listed time (58.8%), access (34.6%), and training/support (41%) as the most critical barriers that affected their perceptions of the utility value of technology. Furthermore, Carver (2016) noted that 80% of teachers reported that lack of availability affected their perceptions of the utility value of technology. In a study by Çoklar and Yurdakul (2017), all teachers stated that time and access would prevent them from having a positive utility value belief toward technology. The literature indicated utility value, especially for middle school teachers, was crucial in technology integration levels.

Differences in Technology Integration Attitudes Based on School Levels

Teachers at the elementary, middle, and high school levels possess unique characteristics that enable them to nurture and instruct their students successfully. Middle school teachers are exceptional because they work with students who find it a difficult transition from elementary to (Herman et al., 2020). Students visit multiple teachers with whom they spend less of their day, and the relationships they develop with them and the learning engagement teachers provide are essential to their success (Herman et al., 2020). Positivity, humor, willingness to work as part of an instructional team, and a commitment to the personalization of learning were just some attributes of a successful middle school teacher (Connors et al., 1992). Unfortunately, most teacher preparatory programs are not specialized in the middle years and often combine them with high school teachers' programs (Dickinson & McEwin, 1997). Because the middle school years are so different for students, understanding the technology integration perceptions of the teachers that work with these students is crucial to helping them create positive, engaging, and effective learning environments.

The unique differences in school levels influence teachers' attitudes regarding technology integration. Research has demonstrated conflicting data demonstrating that while some elementary teachers perceived less access and support for technology use than their middle and high school colleagues, other elementary teachers reported increased access to technology resources and support (Dogan et al., 2021; Francom, 2020). While Dogan et al. (2021) demonstrated that elementary teachers felt less support for technology integration ($F = 32.92$, $p < .001$.), Francom (2020) reported just the opposite, with elementary teachers feeling a stronger sense of support for integration [F (12, 1485) = 8.98, $p < .001$]. Furthermore, Francom (2020) observed that secondary teachers were more inclined to integrate technology [F (12, 1483) = 6.16, $p < .002$] than elementary teachers. Other researchers have concluded that their lower self-

efficacy levels less impeded elementary teachers than middle or high school teachers causing them to be more willing to try even if they felt unsure of themselves (Christensen & Knezek, 2017; Dogan et al., 2021). For middle school teachers specifically, Christensen and Knezek (2017) revealed that their technology use was lower than elementary and high school teachers (elementary: $M = 4.45$, middle: $M = 4.41$, high: $M = 4.68$). Conversely, Dogan et al. (2021) observed that for perceptions of technology use, no statistical differences existed between elementary and middle school teachers. Yet, the results suggested that high school teachers had lower positivity about the benefits of technology for their students. In both possibilities, when integrating technology (elementary: $M = 4.38$; middle: $M = 4.17$; high $M = 4.16$) and benefits (elementary: $M = 3.66$; middle: $M = 3.51$; high $M = 3.50$), elementary teachers demonstrated higher proclivities toward technology integration, and middle and high school teachers were almost equal in their responses (Christensen & Knezek, 2017). Elementary teachers seemed to be more influenced by the support they received from school leadership, while secondary teachers were more inclined to be led by curriculum needs and self-efficacy (Jung et al., 2019). Elementary teachers employed technology for more instructional activities ($p < .001$) (Dogan et al., 2021). In contrast, middle and high school teachers perceived technology to be more effective for online websites, research, planning, and managing projects ($p < .001$) (Dogan et al., 2021).

At the secondary level, teachers expressed concerns regarding students' ability to remain focused and engaged in self-directed learning when using technology (Luo & Murray, 2018). Furthermore, across all domains, high school teachers had lower mean scores on all items related to technology use, suggesting that teachers at this level did not believe in the effect of technology in their classes (Dogan et al., 2021). However, in contrast to all the previous studies, Carhill-

Poza (2019) noted that regardless of grade levels, all teachers surveyed were more inclined to integrate technology if they felt their students would experience academic improvement. These variances in the data for teachers' attitudes regarding technology integration at different school levels indicate a need for further exploration of how these characteristics affect teachers' intent to implement technology in their pedagogy (Christensen & Knezek, 2017; Dogan et al., 2021). The literature on school levels lacks specific data on middle school teachers as a unique population as many studies separated teachers into groups of elementary or secondary, and this study focused on middle school teachers to determine their attitudes toward technology integration.

Students' Socioeconomic Status

When students enter school, they bring their unique experiences. Teachers must contend with students' home circumstances, past educational experiences, and reactions to incidents in their communities while attempting to educate them. Teachers' perceptions of their students' socioeconomic status can influence their pedagogical attitudes, perceptions regarding students' challenges, and their instructional practice regarding technology integration (Guerra & Wubbena, 2017; Kormos & Julio, 2020; Tondeur et al., 2017; Westphal et al., 2016).

Teachers' Pedagogical Attitudes

Teachers' pedagogical attitudes are often influenced by school characteristics, such as their perceptions of students' socioeconomic status (Guerra & Wubbena, 2017; Kormos & Julio, 2020; Tondeur et al., 2017). Research has demonstrated that when controlling for other differences, teachers' perceptions of their students' socioeconomic statuses influenced their judgments on assessments and technology (Kormos & Julio, 2020; Westphal et al., 2016). For example, Kormos and Julio (2020) reported that 63% of teachers in suburban schools where they

perceived their students originated from high socioeconomic backgrounds found summative assessments effective, while only 31% of urban teachers shared these perceptions indicating a clear difference in pedagogical attitudes based on the school setting. Furthermore, perceptions about students' lack of technology access in students' homes influenced teachers' pedagogical decisions about integration (Dolan, 2016; Kormos, 2018, 2022; Kormos & Julio, 2020). Compared to the national average of 75% of families accessing the internet at home, 49% of families making less than $25,000 report having access (Dolan, 2016). Kormos (2022) reported that internet access at home was either a moderate (*N*=138; 38%) or extreme challenge (*N*=84; 23%) that would lead teachers to avoid technology integration in schools where they perceived their students originated from low socioeconomic backgrounds. Kormos (2018) observed that fewer teachers in urban schools (*M* = 3.21), where teachers perceived lower socioeconomic backgrounds, believed their students had access to technology compared to teachers in suburban schools (*M* = 3.50). Furthermore, only 39% of urban teachers found technology effective, compared to 56% of suburban teachers and 53% of rural teachers (Kormos, 2018).

However, the research on the relationship between teachers' perceptions of students' ability to learn and their perceptions of students' socioeconomic status is conflicting. Guerra and Wubbena (2017) reported that teachers believed students had inadequate skills to learn (47%) when they perceived that they originated from low socioeconomic backgrounds; however, Biag (2016) discovered that teachers believed all students could learn regardless of their socioeconomic status. Interestingly, almost contradicting his research, Biag (2016) also observed that teachers' common negative stereotypes of their students they perceived to be from low socioeconomic backgrounds impeded parents' involvement in their children's education leading to insufficient academic achievement. Based on their perceptions of their students'

socioeconomic status, teachers believed that progress was more important than mastery, and adaptations to the curriculum were often necessary to meet the needs of their students (Cavendish et al., 2021; Guerra & Wubbena, 2017). Cavendish et al. (2021) noted one recurrent theme in teachers' responses regarding students they perceived to originate from lower socioeconomic backgrounds related to the importance of student growth as the primary goal. Guerra and Wubbena (2017) reported that 100% of teachers surveyed indicated that they felt it necessary to adjust their lessons and activities to meet the unique needs of those students they perceived to be from lower socioeconomic backgrounds. The literature demonstrated that students' socioeconomic status often influenced teachers' pedagogical attitudes.

Perceptions of Students' Challenges

Teachers observed many challenges for their students when they perceived that they originated from low socioeconomic backgrounds. First, teachers believed that their students were not receiving basic needs, such as food and medical attention, causing many to struggle socially and academically (Biag, 2016; Keefer, 2017; Kraft et al., 2015; Oakes et al., 2021; Serrano-Corkin et al., 2019). Furthermore, the perception of the prevalence of violence in their students' communities and the challenges accompanying these characteristics were recurrent themes in teachers' interview responses (Keefer, 2017; Kraft et al., 2015; Serrano-Corkin et al., 2019). Second, teachers assumed that parents they believed to be in lower socioeconomic situations did not respect the importance of education nor provide financial or academic support for their children (Biag, 2016; Cavendish et al., 2021; Keefer, 2017; Kraft et al., 2015). This particular challenge led teachers to believe that students they perceived to be from low socioeconomic backgrounds experienced difficulty learning, inadequate study skills, low motivation, or deficits in educational benchmarks (Guerra & Wubbena, 2017; Keefer, 2017; Kraft et al., 2015; Serrano-

Corkin et al., 2019). Guerra and Wubbena (2017) found that rather than their teaching, 47% of teachers attributed academic challenges to home environment issues or lack of resources, and 48% stated that the parents were the cause of their students' lack of achievement. Keefer (2017) noted that all teachers surveyed used deficit, negative language when referring to the abilities of those students they believed to originate from lower socioeconomic backgrounds. Third, teachers believed that students they believed to be from low socioeconomic backgrounds experienced challenges with low self-esteem due to poor past academic performances, a lack of confidence in their abilities, and a propensity to give up easily (Arnett-Hartwick & Harpel, 2020; Flint et al., 2019; Kraft et al., 2015). This perception led some teachers to believe that their students lacked motivation or did not want to learn (Flint et al., 2019; Guerra & Wubbena, 2017; Serrano-Corkin et al., 2019). Guerra and Wubbena (2017) observed that 37% of teachers reported that students they believed to be from low socioeconomic backgrounds had poor behaviors and attitudes in the classroom.

Finally, teachers believed that the students they perceived to be from low socioeconomic backgrounds lacked access to technology or the Internet both inside and outside of school or the skills to use digital devices (Hohlfield et al., 2017; Keefer, 2017; Oakes et al., 2021). Research has shown that districts are often inequitable in their distribution of funds and technology, often favoring predominantly white and/or more affluent schools (Oakes et al., 2021; Virginia Board of Education, 2019). Oakes et al. (2021) described one high-poverty school that lacked functional computers, so students had to complete state assessments on a rotating basis. Hohlfield et al. (2017) also noted the differences in laptop access for students in schools with students from high or low socioeconomic backgrounds (high-low: elementary - 22.4-16.8; middle - 25.1-11.2; high – 13.3-11.4). These data results are significant for the current study

because if middle school teachers perceive their students originate from low socioeconomic backgrounds, they may assume that they do not maintain access to or the skills necessary to use technology effectively, thus influencing their attitudes toward integration. However, Dolan (2016) concluded that this was an unfabricated assumption and that students from low socioeconomic backgrounds accessed and utilized technology in different ways than their teachers expected, such as communicating via instant messaging, reading fan fiction, and playing electronic games. Woltran et al. (2022) observed that teachers reported that they had difficulty communicating digitally with their students they perceived to be from low socioeconomic backgrounds due to a lack of Internet access or equipment at home. The challenges teachers perceived their students they believed to originate from lower socioeconomic backgrounds faced influenced their attitudes toward them and their use of technology.

Pedagogical Practice

Watkins and Mortimore (1999) defined pedagogy as "any conscious activity by one person designed to enhance learning in another" (p. 17). Teachers' pedagogical practices often looked different when teachers perceived that their students originated from low socioeconomic backgrounds. Westphal et al. (2016) revealed that teachers graded students they perceived to be from low socioeconomic backgrounds 5% lower than similar students from higher socioeconomic backgrounds. Teachers also claimed to incorporate their students' experiences into their instruction to help with understanding and making connections (Guerra & Wubbena, 2017; Serrano-Corkin et al., 2019; Williams et al., 2017). Serrano-Corkin et al. (2019) observed that teachers often tried innovative teaching methods, such as using rap music to teach math concepts, to overcome obstacles for students they believed to originate from lower socioeconomic backgrounds. Williams et al. (2017) noted that 100% of students remarked that

when teachers were aware of their life experiences and incorporated them into instruction, they were more likely to succeed. However, Guerra and Wubbena (2017) discovered that while 98% of teachers reported integrating students' experiences into their instruction for relevancy, observers noted that none of the teachers in the study did so. Kormos and Julio (2020) revealed that teachers in suburban schools, where they felt students were from affluent backgrounds, used class websites (M = 3.67) and online assessments (M = 2.78) more often than teachers in urban schools (class websites: M = 2.91; online assessments: M = 2.13), where they felt that students were from lower socioeconomic backgrounds. The pedagogical practices differed when teachers perceived that their students originated from low socioeconomic backgrounds.

To further complicate the school context issue, the United States Department of Health and Human Services (2022) noted that rural families are more likely (small rural = 64%; large rural = 22%) to hail from overall lower socioeconomic statuses. These figures are important because some research has shown that teachers in rural and urban schools are similar in their perceptions of their students' socioeconomic backgrounds and use of technology. Kormos (2018) noted similar results in teachers who said they had never used an online learning management system (urban = 58%, rural = 51%, suburban = 42%) and in the use of daily or weekly online assessments (urban = 17%, rural = 18%, suburban = 22%). Teachers in these schools often implemented technology for low-risk activities, like document sharing (M = 3.86), rather than for higher-order, creative activities like blogging (M = 1.52), social networking (M = 1.39), or creating podcasts (M = 1.28) (Kormos, 2022). Conversely, Wang (2013) observed that in rural schools, teachers used technology much less than their urban counterparts (M = 3.93; M = 4.23). More research is required due to the conflicting data on differences in technology use for teachers in urban, rural, and suburban schools.

Teachers reported through recurrent theme responses that when they believed that their students originated from lower socioeconomic backgrounds, they were more than instructors and often were tasked with providing for students' emotional and physical needs before they could begin teaching them (Kraft et al., 2015; Masko, 2018; Williams et al., 2017). Masko (2018) noted that nearly all teachers stated that caring for their students was their most important concern. Compassion was listed as a requirement when teaching students from low socioeconomic backgrounds; however, this quality was individual to the teachers based on how they perceived the needs of their students (Cavendish et al., 2021; Masko, 2018; Williams et al., 2017). Williams et al. (2017) noted that 83% of students from low socioeconomic backgrounds reported that their caring teachers made a difference in their success, and 67% of students said they were more likely to achieve when they felt their teachers understood their poverty. Developing strong relationships with students was paramount for teachers; however, this practice often resulted in an inability to require students to maintain high academic standards (Biag, 2016; Guerra & Wubbena, 2017; Masko, 2018). Guerra and Wubbena (2017) reported that 98% of teachers stated that strong teacher-student relationships positively affected student achievement. However, Masko (2018) reported that even though teachers believed that positive school relationships would lead to academic improvement, the student achievement rate was 14% on state tests suggesting that the focus on building relationships took precedence over rigorous expectations and did not produce positive learning outcomes. The effect of pedagogical practice and teachers' perceptions regarding students' socioeconomic status on their attitudes toward technology integration is a complex issue that requires more research.

Summary

As a result of the expanding role of technology in students' personal lives, school leaders often seek to ensure that education reflects technology implementation as well (Barton & Dexter, 2020; Perotta, 2013). Currently, teachers' intent to integrate technology is a pervasive topic of discussion; however, no definitive process for this practice exists due to individuals' attitudes about educational technology. Furthermore, teachers' perceptions of the socioeconomic status of the families served by their school, the assumed challenges students experience, and the school level can influence pedagogy. These perceptions are also affected by whether teachers possess social constructivist beliefs, defined as acknowledging that students learn more effectively in social environments where they can create individualized knowledge. The construct of will (attitude) as a component of the will, skill, tool, and pedagogy model is also a substantial factor in teachers' decisions to integrate technology. These complex factors all combine to affect teachers' pedagogical attitudes and influence their behavior.

While many researchers have investigated teachers' attitudes regarding benefits and barriers related to technology integration, few studies have investigated the effect of middle school teachers' perceptions of students' socioeconomic status on their attitudes toward technology integration. Future research is necessary to examine how middle school teachers' perceptions of their students' socioeconomic status influence their attitudes and their pedagogy as it relates to technology integration (Ames et al., 2021; Georgiu, 2019; Jung et al., 2019; Kormos & Julio, 2020; Labonte & Smith, 2022; Leem & Sung, 2019; Luo & Murray, 2018; Varier et al., 2017; Vongkulluksn et al., 2018). By examining the effect of middle school teachers' perceptions of their students from both high and low socioeconomic statuses on their

pedagogy and intentions to integrate technology, educational leaders can offer the necessary support to provide teachers with effective strategies related to technology integration.

CHAPTER THREE: METHODS

Overview

To provide an understanding of how teachers' perceptions of students' socioeconomic status affect their attitudes and beliefs regarding technology integration, a quantitative, non-experimental, causal-comparative study was implemented to address one research question and its corresponding null hypothesis. This chapter describes the methods applied in the study to address the research question. The research design, participants, settings, instrumentation, procedures, and data analysis are all described.

Design

This study applied a quantitative, causal-comparative research design. Causal-comparative research is non-experimental and seeks to compare differences in a specific dependent variable between two or more groups sharing characteristics of an independent variable (Cresswell & Cresswell, 2018; Gall et al., 2007; Schenker & Rumrill, 2004). Typically, causal-comparative design compares two groups but may feature more groups depending on the independent variable (Gall et al., 2007). In many cases, causal-comparative design is considered ex post facto research because it relies on independent and dependent variables that are already present and involve no manipulation of conditions (Gall et al., 2007; Thompson & Panacek, 2007). Furthermore, because causal-comparative studies involve observing naturally occurring differences, researchers cannot draw strong cause-and-effect conclusions between the independent and dependent variables (Gall et al., 2007; Schenker & Rumrill, 2004). Causal-comparative research includes both categorical and continuous variables. The independent variables are categorical because they represent specific groups to which participants are

assigned, while the dependent variables are continuous because they measure the level of difference in the groups (Gall et al., 2007; Schenker & Rumrill, 2004; Warner, 2013).

The causal-comparative design was appropriate for this study for several reasons. First, this study was non-experimental, meaning that no manipulation of either variable occurred (Gall et al., 2007; Schenker & Rumrill, 2004). The teachers responded to questions about their attitudes toward technology in the classroom, but no treatment or program was unique to either group. Second, this ex post facto (i.e., after the fact) research study consisted of groups that were formed based on pre-existing characteristics (i.e., teachers in specific schools based on percentages of students from low socioeconomic backgrounds) and drew results from teachers' current attitudes regarding technology integration without interference from the researcher (Gall et al., 2007). Third, this study employed both categorical and continuous variables. Categorical variables represented the pre-existing groups where participants shared characteristics (Warner, 2013). Continuous variables represented the degree of differences between the three groups based on specific responses (Warner, 2013). The independent variable, school setting, was categorical and was composed of three groups: teachers who, according to the state department of education requirements, minimally, somewhat, and predominantly served students from low socioeconomic backgrounds. The dependent variable was continuous and represented the teachers' attitudes toward technology integration.

Research Question

RQ: Is there a difference in teachers' attitudes toward technology scores among middle school teachers who, according to state and United States Department of Education requirements, minimally, somewhat, and predominantly serve students from low socioeconomic backgrounds?

Hypothesis

The null hypothesis for this study was:

H_0: There is no difference in teachers' attitudes toward technology scores among middle school teachers who, according to state and United States Department of Education requirements, minimally, somewhat, and predominantly serve students from low socioeconomic backgrounds as measured by the Teachers' Attitudes Toward Information Communications Technology Questionnaire.

Participants and Setting

Gall et al. (2007) define a population as "the larger group that [researchers] wish to learn about," while the sample is "the smaller group they actually study" (p. 166). This section will present the following: a description of the population, the participants, the sampling technique, and the sample size. The section concludes with a description of the setting.

Population

The participants for this study were drawn from a convenience sample population of middle school teachers from across the Commonwealth of Virginia. These districts included 34 schools and approximately 25,239 students, of which 0%-24% were English language learners and 14.3% - 94.9% were classified as economically disadvantaged based on their eligibility for TANF, free/reduced meals, or Medicaid (Virginia Department of Education, n.d.).

Participants

For this study, the number of participants sampled for the one-way ANOVA was 126, which met the required minimum when assuming a medium effect size. Gall et al. (2007) note that the minimum sample size for a one-way ANOVA with three groups when assuming a medium effect size, $\alpha = .05$, and statistical power of .7 is 126, so this sample met that

requirement. This study used convenience sampling, which Gall et al. (2007) define as "a sample that suits the purposes of the study and that is convenient" (p. 175). As this state is closest to the researcher and this study focuses on middle school teachers, all teachers in the 34 middle schools in this state were considered for the convenience sample, with school populations ranging from middle-upper-income suburbs and rural communities to lower-income inner cities and rural communities. As this was a quantitative, causal-comparative study, there was no treatment or control group as the independent variable was a naturally occurring phenomenon, thus creating naturally occurring groups (Gall et al., 2007). Including all 34 middle schools in the various regions reduced the possibility of individual school cultures affecting the responses. The sample participants were emailed a letter explaining the research project, a consent form to complete, and a survey questionnaire to record their responses. The demographics responses indicated that 103 identified as female, 21 identified as male, 0 identified as non-binary, and two preferred not to say. For the age range question, four answered < 25 years, 40 answered 25 – 40 years, and 82 answered > 40 years. For the years of teaching experience question, 19 answered 0 – 3 years, 25 answered 4 – 10 years, 35 answered 11 – 20 years, and 47 answered > 20 years (See Table 1).

Table 1

Sample Demographics

Demographics	*n*	%
Gender		
Male	21	16.7
Female	103	81.7
Non-binary	0	0
Prefer not to say	2	1.6
Age		
< 25 years	4	3.2
25 – 40 years	40	31.7
> 40 years	82	65.1
Years of Teaching Experience		
0 – 3 years	19	15.1
4 – 10 years	25	19.8
11- 20 years	35	27.8
> 20 years	47	37.3
Total	126	100

Setting

While the overall setting for the study was the middle schools in Virginia, participants completed the survey online in their school and district. A brief profile of each district is presented in Tables 2a, 2b, and 2c. The number of participants from each region is shown in

table 2d. Teachers identified their schools on the survey. Individual schools were categorized by the percentage of students from high/mid-high, mid-low, or low socioeconomic backgrounds based on the state and United States Department of Education guidelines. Using state and United States Department of Education requirements, schools were identified as having high/mid-high (75.1% - 100%/50.1% – 75%), mid-low (25.1% - 50%), and low (25% or less) populations of students from low socioeconomic backgrounds based on the percentages of students in the school who were homeless or qualified for Medicaid, free/reduced priced meals, or TANF (United States Department of Education, 2021; Virginia Department of Education, 2021a). Each group was given the pseudonyms A, B, C, etc. Each school was given the corresponding pseudonyms A1, A2, B1, B2, etc., to identify them and place individual teachers in group one (schools with 75.1% -100% & 50.1% - 75% of students from low socioeconomic backgrounds), group two (schools with 25.1% - 50% of students from low socioeconomic backgrounds), or group three (schools with 25% or lower percentages of students from low socioeconomic backgrounds).

Table 2a

Group 1 School Profiles

Code	% of Low SES	% of ELL	N Teachers
A1	94.9	5.1	6
A2	56.6	28.4	19
A3	54.1	7.2	5
A4	63.6	44.6	7
A5	55.9	26	4
A6	57.4	8.2	1
A7	52	2.7	3
A8	61.1	0	2
A9	71.30	24	5
A10	51.7	2.1	2
A11	59.2	0.5	1
A12	52	0.6	1
A13	50.5	3.6	2
A14	59.6	12.0	2

Note. ELL = English Language Learner; SES = Socioeconomic Status; (Virginia Department of Education, n.d.).

Table 2b

Group 2 School Profiles

Code	% of Low SES	% of ELL	N Teachers
B1	44.8	19.1	4
B2	47.5	22.1	4
B3	45.9	2.1	2
B4	46.3	0	2
B5	46.9	0.9	2
B6	40.2	1.1	3
B7	47.9	2.9	2
B8	48.7	0	3
B9	38.5	0.4	2
B10	26	11.2	6
B11	27.3	7.7	5
B12	25.2	1.2	4
B13	26	1.8	4
B14	44.1	1.2	1
B15	42	0.5	1
B16	47.9	0.7	1

Note. ELL = English Language Learner; SES = Socioeconomic Status; (Virginia Department of Education, n.d.).

Table 2c

Group 3 School Profiles

Code	% of Low SES	% of ELL	N Teachers
C1	14.3	4.5	4
C2	14.9	3.3	13
C3	22.4	.9	1
C4	18.3	12.1	2

Note. ELL = English Language Learner; SES = Socioeconomic Status; (Virginia Department of Education, n.d.).

Table 2d

Number of Participants by Region

Region	N Teachers
A	95
B	6
C	5
D	2
E	4
F	1
G	11
H	2

Instrumentation

This study administered the Teachers' Attitudes Toward Computers 6.1 (TAC-updated to Teachers' Attitudes Toward ICT-TAICT) questionnaire (Christensen & Knezek, 1996, 2009; Shattuck et al., 2011). See Appendix A for the instrument. The author granted permission to administer the test and include it in the appendix. See Appendix B for the permission statement.

Teachers' Attitudes Toward Computers-ICT

The purpose of this instrument was to measure teachers' attitudes toward technology using nine factors: interest, comfort, accommodation, interaction (E-mail), concern, utility, perception, absorption, and significance (Christensen & Knezek, 1996, 2000, 2009). The original instrument was created as part of a study conducted by Christensen and Knezek (1996) to investigate the effects of technology integration on teachers' attitudes. The TAC originally consisted of 284 items, including 32 Likert and Semantic Differential scales (Christensen & Knezek, 1996). Christensen and Knezek (1996) noted that these items were drawn from 14 validated computer attitude survey instruments. Because it was impractical for busy teachers to complete all 14 of these scales, Christensen and Knezek (1996) used their well-validated items to construct a less-redundant, more comprehensive, and less time-consuming instrument to measure teachers' attitudes toward technology and computers. This instrument was appropriate for this study because it measured teachers' attitudes toward various technology uses and in different scenarios. Woodrow (1992) indicated that teachers with positive attitudes toward technology would be more inclined to integrate it regularly, so this instrument can help identify those perceptions.

The TAC/TAICT has been administered in numerous studies to assess both preservice and practicing teachers' attitudes toward computers and technology integration (Agyei & Voogt,

2011; Ansyari, 2015; Christensen, 2002; Eickelmann & Vennemann, 2017; Farjon et al., 2019; González-Carriedo & Harrell, 2018; Lee & Lee, 2014). This study administered the TAC/TAICT 6.1, which has been updated to Teachers' Attitudes toward ICT (TAICT). The instrument consisted of 51 questions in nine sections. Sections one, two, three, four, five, six, eight, and nine used a five-point Likert scale that ranged from Strongly Agree to Strongly Disagree. Responses were converted to points as follows: Strongly Agree = 5, Agree = 4, Undecided= 3, Disagree = 2, and Strongly Disagree = 1. Section seven employed a semantic differential scale (one to seven) to rate technology-related affective emotions. Responses were calculated using one to seven points based on the participants' choices. The instrument was administered via an online version of the instrument (See Appendix A for the instrument). The instrument required approximately 15 minutes to complete. The instrument results auto-populated to a Google Sheet, and the researcher moved each response to a new spreadsheet to categorize them into three groups.

A combined possible score on the TAC/TAICT ranged from 51 to 265. A score of 51 points was the lowest, indicating a negative attitude toward computers and technology, while a score of 265 was the highest, indicating a positive attitude toward computers and technology. Scoring the TAC/TAICT also involved averaging the numeric values to produce scale scores; however, because scales two, three, and five represented negative wording, they were reversed before combining with the other scores. For example, most items with a Strongly Agree choice expressed positive attitudes toward computers and technology; however, on item 2.1 ("I get a sinking feeling when I think of trying to use technology"), a response of Strongly Agree represented a negative attitude. To achieve the correct score, items on subscales two, three, and five were reversed so a response of Strongly Agree on these scales would be coded as Strongly

Disagree (Knezek et al., 2015).

Scale one measured interest in computers; scale two measured comfort or anxiety using computers; scale three measured avoidance of computers (accommodation); scale four measured attitudes toward the use of email (interaction); scale five measured attitudes toward concerns with computers in education; scale six measured the utility of computers in work and life; scale seven measured emotional response to computers (perception); scale eight measured excitement about computers (absorption); scale nine measured importance of computers in education (significance) (Christensen & Knezek, 2009; Shattuck et al., 2011). Table 3 displays the subscale composite scores and validity and reliability information (Christensen & Knezek, 2009). The mean scores for each scale were added and divided by nine to achieve each participant's overall score. To categorize the overall mean scores, five intervals were created by dividing the range of one to five (i.e., 4) by 5 to get a difference in each interval of .80 or .79. See Table 5 for the interval descriptions (Hill, 2020; Yimer & Feza, 2019).

Because scale seven (perception) was the only construct that included scores from one to seven, a conversion was needed to create a standard scale of one to five (Lewis & Sauro, 2020). The scores were converted using the following equation: $X_5 = (X_7 - 1)\,(4/6) + 1$, where X_5 represents the converted score, and X_7 represents the original score (Lewis & Sauro, 2020). Table 4 displays the converted score values for scale seven.

Table 3

Composite Scores, Validity, and Reliability of TAC-TAICT

Scale	No. of Questions	Composite Score	Alpha	Factor Analysis Validity
1: Interest	5	5-20	.90	.70-.79
2: Comfort	5	5-20	.94	.77-.93
3: Accommodation	5	5-20	.88	.90-.94
4: Interaction (Email)	5	5-20	.94	.61-.82
5: Concern	8	8-40	.89	.83-.87
6: Utility	8	8-40	.90	.77-.85
7: Perception	5	5-35	.96	.82-.93
8: Absorption	5	5-20	.89	.75-.88
9: Significance	5	5-20	.84	.72-.86

Table 4

Converted Score Values for TAC/TAICT Scale Seven: Perception

Original Score	Converted Score
7	5.00
6	4.33
5	3.67
4	3.00
3	2.33
2	1.67
1	1

Table 5

Intervals for Overall Mean Scores on the TAC/TAICT

Interval	Overall Mean Score	Difference
Very Low	1.00 – 1.80	.80
Somewhat Low	1.81 – 2.60	.79
Neutral	2.61 – 3.40	.79
Somewhat High	3.41 – 4.20	.79
Very High	4.21 – 5.00	.79

Procedures

Approval for conducting the current study was from Liberty University Institutional Review Board (see Appendix C). Each district was contacted and provided approval for teachers to be contacted via email to participate in the study. Freedom of Information Act requests were sent to school districts asking for the email addresses of all middle school teachers in the district only for those districts that did not display them on their websites. After requests were granted, teachers were recruited via email with a survey link (See Appendix F). The first page of the survey included a brief description of the study and the time involved. The second page of the survey included the informed consent form (See Appendix D). TAC-TAICT survey questions were imported into a Google Form (See Appendix E) and emailed to teachers. Teachers completed and submitted the survey anonymously, only including their school's name for coding purposes. The researcher gathered all electronic data from the survey responses. The researcher exported the survey scores into a Google spreadsheet and coded them based on group characteristics. Scores were then imported into SPSS for analysis (See the Data Analysis for results). At all stages of data collection, all information that could identify the participants was protected. Data was stored securely, and only the researcher had access to records. Data was stored on a password-protected computer and external hard drive. When not being utilized, the external hard drive was stored in a locked filing cabinet. The data will be retained for five years after the completion of this research study.

Data Analysis

A one-way ANOVA was conducted from data collected using the TAC-TAICT on the independent variable effect of the school setting (high/mid-high; mid-low; low populations of students from low socioeconomic backgrounds) on teachers' attitudes toward computers and

technology integration. The independent variable was categorical and was composed of three groups: teachers who, as determined by the state and United States Department of Education, work in schools with high/mid-high (75.1% - 100%; 50.1% - 75%), mid-low (25.1% - 50%), and low (25% or less) populations of students from low socioeconomic backgrounds. The dependent variable was continuous and represented the teachers' attitudes toward technology integration. Gall et al. (2007) noted that the ANOVA is appropriate for studies involving three groups when comparing "the amount of between-group variance in individuals' scores with the amount of within-groups variance" (p. 318). Because this study investigated the differences in teachers' attitudes toward technology among three groups of middle school teachers based on school setting (i.e., schools with different percentages of students from low socioeconomic backgrounds), the one-way ANOVA was appropriate for this study.

Data were screened for missing data points, skipped questions, and inaccuracies in responses. A box and whisker plot was constructed to screen the data for extreme outliers. The Kolmogorov-Smirnov assumption test was conducted to test the assumption of normality as the number of participants was greater than 50 (Warner, 2013). Shapiro-Wilk test for the assumption of normality was also run. Levene's Test of Homogeneity of Variance was used to test the assumption of equal variance. In keeping with Warner (2013) and Gall et al. (2007), the sample size of 126 met the minimum requirements when assuming a medium effect size with 0.7 statistical power, $\alpha = 0.05$. The null hypothesis was rejected at the 95% confidence level.

CHAPTER FOUR: FINDINGS

Overview

The purpose of this quantitative, causal-comparative study was to investigate if a difference exists in teachers' attitudes toward technology integration in the classroom among middle school teachers in schools with high/mid-high, mid-low, and low percentages of students from low socioeconomic backgrounds in a mid-Atlantic state. This chapter presents the research study's results, including the research question, null hypothesis, descriptive data, and results.

Research Question

RQ: Is there a difference in teachers' attitudes toward technology scores among middle school teachers who, according to state and United States Department of Education requirements, minimally, somewhat, and predominantly serve students from low socioeconomic backgrounds?

Null Hypothesis(es)

H_0: There is no difference in teachers' attitudes toward technology scores among middle school teachers who, according to state and United States Department of Education requirements, minimally, somewhat, and predominantly serve students from low socioeconomic backgrounds as measured by the Teachers' Attitudes Toward Information Communications Technology Questionnaire.

Descriptive Statistics

The data collection was finalized on March 24, 2023. Of the 2099 teachers who were recruited, 128 responded to the survey. The researcher reviewed the data, determined that two of the respondents were outside of the state, and eliminated those results from the analysis, leaving a total of 126 responses.

The Teachers' Attitudes towards Computers-ICT scores were employed to calculate the variables of interest from the three groups. The overall means and standard deviation of the overall attitudes for Group 1 (high/mid-high % of students from low SES) *M* = 3.79, *SD* = .39; Group 2 (mid-low % of students from low SES) *M* = 3.85, *SD* = .55; Group 3 (low % of students from low SES) *M* = 3.89, *SD* = .39 (See Table 6). The most significant difference was between Group 3 (low % of students from low SES) *M* = 3.89, *SD* = .389 and Group 1 (high/mid-high % of students from low SES) *M*= 3.79, *SD* = .389, a difference of .10. Table 7 provides the individual scale mean scores for each group.

Table 6

Descriptive Statistics based on % of Students from Low SES

Group (% of Low SES)	N	*M*	*SD*
1 (High/Mid-High)	60	3.79	.39
2 (Mid-Low)	46	3.85	.55
3 (Low)	20	3.89	.39

Table 7

Individual Scale Mean Scores for Each Group

School Setting	High/ Mid-High		Mid-Low		Low		Total	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Interest	4.06	.53	4.00	.74	4.18	.60	4.06	.62
Comfort	3.81	.85	3.87	.89	4.23	.56	3.90	.84
Email	3.05	.74	3.02	.90	2.99	.56	3.03	.77
Accommodation	4.64	.41	4.58	.44	4.67	.37	4.62	.42
Concern	3.20	.70	3.21	.84	3.31	.80	3.22	.76
Utility	4.10	.53	4.13	.59	4.15	.49	4.12	.54
Perception	3.63	.56	4.34	.71	3.69	.43	3.90	.69
Absorption	3.31	.77	3.25	.96	3.41	.67	3.30	.82
Significance	4.35	.48	4.26	.53	4.44	.43	4.33	.49

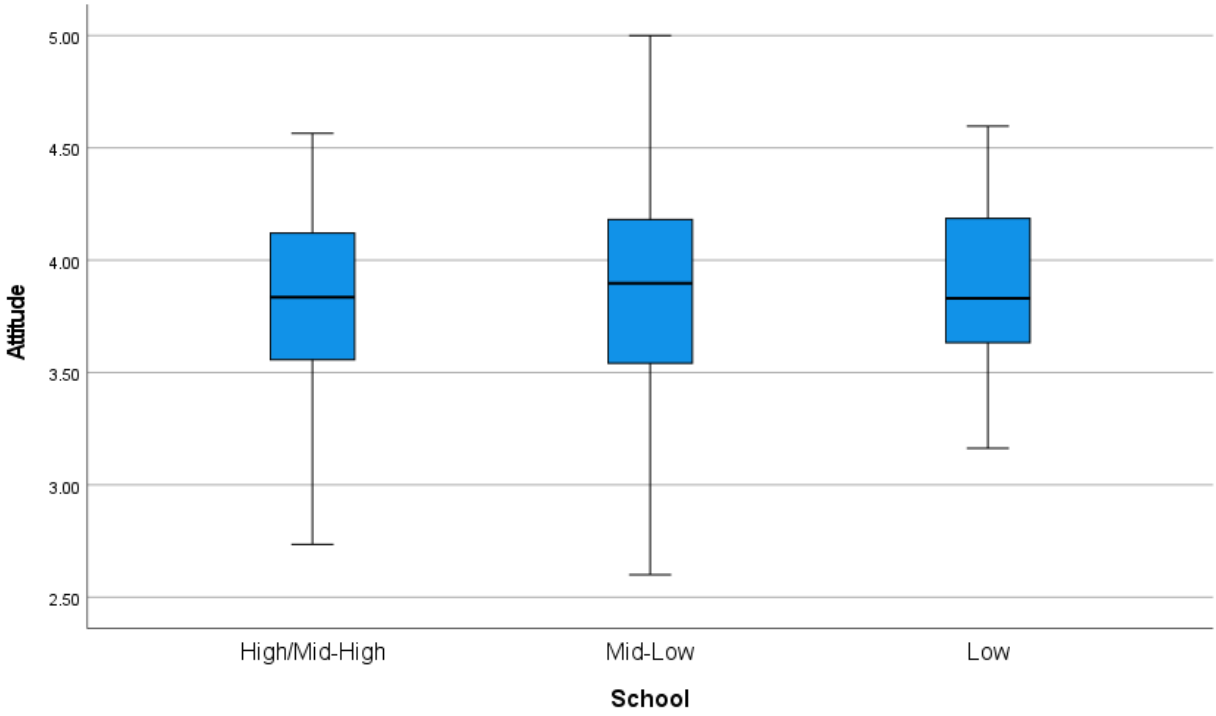
Results

Hypothesis

The null hypothesis states that there is no difference in teachers' attitudes toward technology scores among middle school teachers who, according to state and United States Department of Education requirements, minimally, somewhat, and predominantly serve students from low socioeconomic backgrounds as measured by the Teachers' Attitudes Toward Information Communications Technology Questionnaire. Preliminary data screening was conducted on the dependent variable of teachers' attitudes toward technology. The data had no outliers, as assessed by inspection of a boxplot. (See Figure 1).

Figure 1

Box and Whisker Plot for Teachers' Attitudes toward Technology



A one-way ANOVA was performed to compare teachers' attitudes toward technology scores among middle school teachers who, according to state and United States Department of Education requirements, minimally, somewhat, and predominantly serve students from low socioeconomic backgrounds (See Table 10). Participants were categorized per three groups: High/Mid-High % of students from low SES backgrounds (n = 60), mid-low % of students from low SES backgrounds (n = 46), and low % of students from low SES backgrounds (n = 20). Assumption testing using SPSS revealed a tenable normal distribution (p > .05) as assessed via the Kolmogorov-Smirnov test for normality (See Table 8). The Kolmogorov-Smirnov test was appropriate because the sample size was greater than 50 (Warner, 2013). For the overall attitude score, homogeneity of variances was tenable, as assessed via Levene's test for equality of variances (p = .106) (See Table 9).

Table 8

Kolmogorov-Smirnov and Shapiro-Wilk Test for Normality

	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	*df*	Sig.	Statistic	*df*	Sig.
High/Mid-High	.68	60	.200*	.983	60	.578
Mid-Low	.060	46	.200*	.984	46	.782
Low	.141	20	.200*	.960	20	.548

*This is a lower bound of the true significance. $p > .05$

Table 9

Levene's Test for Homogeneity of Variances (Overall)

	Levene Statistic	*df1*	*df2*	Sig.
Based on *m*	2.290	2	123	.106

The mean score increased from the high/mid-high group ($M = 3.79$, $SD = .39$), to mid-low ($M = 3.85$, $SD = .55$), to low ($M = 3.89$, $SD = .39$) in that order, but the differences between these groups were not statistically significant. The one-way ANOVA for the total scores resulted in no significant differences in teachers' overall attitudes toward technology scores among middle school teachers who, according to state and United States Department of Education requirements, minimally, somewhat, and predominantly serve students from low socioeconomic backgrounds, $F(2, 123) = .455$, $p = .636$ (See Table 10); thus, the post hoc tests were not conducted for the overall scores. The group means on the overall scores were not statistically significant with a medium effect size applied ($p > .05$; $\eta_p^2 = .007$; $\alpha = .05$), and, therefore, the result is a failure to reject the null hypothesis (See Table 11).

Table 10

One-Way ANOVA on Overall Score

	Sum of Squares	*df*	Mean Square	*F*	Sig.
Between Groups	.187	2	.094	.455	.636
Within Groups	25.30	123	.206		
Total	25.490	125			

Table 11

Tests of Between-Subjects Effects

Dependent Variable: Attitude

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	.187[a]	2	.094	.455	.636	.007
Intercept	1506.927	1	1506.927	7325.313	<.001	.983
Group	.187	2	.094	.455	.636	.007
Error	25.303	123	.206			
Total	1875.022	126				
Corrected Total	25.490	125				

a. R^2 = .007 (Adjusted R^2 = -.009)

CHAPTER FIVE: CONCLUSIONS

Overview

This quantitative, causal-comparative study investigated if a difference exists in teachers' attitudes toward technology integration in the classroom among middle school teachers in schools with high/mid-high, mid-low, and low percentages of students from low socioeconomic backgrounds in a mid-Atlantic state as measured by the Teachers' Attitudes Toward Information Communications Technology Questionnaire. Participants included middle school teachers from across the state. Those who agreed to participate completed the TAC-TAICT questionnaire online. A one-way ANOVA was conducted to compare the means of teachers from three groups: teachers who, according to the state department of education requirements, minimally, somewhat, and predominantly serve students from low socioeconomic backgrounds. The following chapter discusses the statistical analysis results, implications of the study, limitations, and recommendations for future research.

Discussion

The purpose of this causal-comparative study was to investigate if a difference exists in teachers' attitudes toward technology integration in the classroom among middle school teachers in schools with high/mid-high, mid-low, and low percentages of students from low socioeconomic backgrounds in a mid-Atlantic state as measured by the Teachers' Attitudes Toward Information Communications Technology Questionnaire. The null hypothesis stated that there is no difference in teachers' attitudes toward technology scores among middle school teachers who, according to state and United States Department of Education requirements, minimally, somewhat, and predominantly serve students from low socioeconomic backgrounds as measured by the Teachers' Attitudes Toward Information Communications Technology

Questionnaire. Data analysis indicated no statistically significant differences in overall teachers' attitudes among the three groups. The data analysis failed to reject the null hypothesis.

The current research on teachers' attitudes toward technology integration is complex and often contradictory, citing benefits and challenges. Studies found that teachers could see the benefits of technology, such as positive learning outcomes, organization, more robust interactions, more engagement, and increased student motivation and focus (Alswilem, 2019; Cain et al., 2021; Hilton & Canciello, 2018; Lawrence et al., 2018; Nikolopoulou et al., 2021; Walan, 2020). However, teachers also noted challenges to integrating technology that contradicted previous benefits. Classroom management issues, lack of student focus, instability, teacher self-efficacy, and lack of training were all noted as challenges to integration (Alswilem, 2019; Chalasani & Varalakshmi, 2020; Hébert et al., 2021; Hill & Valdez-Garcia, 2020; Leem & Sung, 2019).

The research was also contradictory on whether teachers' attitudes influenced their will to integrate technology. While Vongkulluksn et al. (2018) identified a significant correlation between teachers' attitudes and technology integration (r = .50), and Xie et al. (2021) discovered a similar correlation between technology integration and ability beliefs (r = .294, p < .001) or value beliefs (r =.227, p < .001), Francom (2020) surveyed only 15.6% of teachers who agreed their attitudes affected their opinions on technology integration. Furthermore, Schmitz et al. (2022) noted that will (M = 1.80, SD = 0.61) was not as important as tool accessibility (M = 2.42, SD = 0.77) for teachers' choices regarding technology integration, and Jung et al.'s results (2019) mirrored these data indicating that both at the elementary and secondary level, pedagogical beliefs did not affect their intent to apply technology (R^2 = -.011).

Finally, school culture and characteristics presented challenges because teachers believed that not all stakeholders valued technology or that it was inaccessible to all students (Kormos & Julio, 2020; Tondeur et al., 2017). Kormos and Julio (2020) noted that 16% of teachers in rural schools with perceptions that students originated from low socioeconomic backgrounds disagreed or strongly disagreed that internet access was satisfactory compared with 10% of suburban and urban teachers, indicating that the school setting can often present barriers to technology integration. Kormos (2018) also discovered that fewer teachers in urban schools (M = 3.21), where teachers perceived lower socioeconomic backgrounds, believed their students had access to technology compared to teachers in suburban schools (M = 3.50). Furthermore, only 39% of urban teachers found technology effective, compared to 56% of suburban teachers and 53% of rural teachers (Kormos, 2018). Woltran et al. (2022) surveyed teachers that reported they had difficulty communicating digitally with their students they perceived to be from low socioeconomic backgrounds due to a lack of internet access or equipment at home.

The results of this study contradicted the current research on teachers' attitudes toward technology based on their perceptions of their students' socioeconomic backgrounds. The data for teachers' overall attitudes toward technology were not statistically significant among the three groups (High/Mid-High: M = 3.79; Mid-Low: M = 3.85; Low: M = 3.89; p = .636). This data indicated that all three groups exhibited a somewhat high positivity toward computers based on the TAC-TAICT (See Table 5). While the high/mid-high group did score the lowest on the overall scale, the difference was not statistically significant. These results contradicted the previous research that found that teachers in schools with higher populations of students from low SES backgrounds made different instructional choices, such as rejecting the choice to integrate technology, than their colleagues in schools with lower populations of students from

low SES backgrounds (Kormos, 2018, 2022; Kormos & Julio, 2020; Woltran et al., 2022). However, the influence of teachers' will and social constructivist beliefs on the intent to integrate technology were supported by this study as all three groups scored somewhat high on the survey.

Implications

This study addressed the gap in the literature that dealt explicitly with middle school teachers' attitudes toward technology based on their perceptions of their students' SES backgrounds and the digital gap that exists for these families (Dogan et al., 2021; Francom, 2020; Kormos, 2022). The lack of significant differences revealed among the three groups on overall attitudes toward technology indicates a need to understand the differences in teachers' attitudes toward technology integration not only among school levels but also in school culture and characteristics. This study can initiate conversations about the pedagogical differences among teachers based on their school setting. School leaders need to understand why teachers make specific instructional choices so they can provide appropriate and relevant professional learning regarding technology integration.

Previous studies demonstrated that teachers who perceived their students originated from lower SES backgrounds integrated technology less frequently and possessed different pedagogical beliefs and practices, including a proclivity toward student-centered instruction, than teachers who perceived their students originated from higher SES backgrounds (Backfisch et al., 2021; Cavendish et al., 2021; Dolan, 2017; Glock & Kleen, 2020; Kormos & Julio, 2020). This research contradicted these studies, indicating a need for deeper investigations surrounding teachers' pedagogical beliefs involving technology and their perceptions of their students' SES.

Previous research also noted a contradiction in the connection between constructivist teaching beliefs and integrating technology (Flint et al., 2019; Francom, 2020; Hong et al.,

2019). While Flint et al. (2019) and Francom (2020) determined that constructivist pedagogy was a predictor of technology integration, Hong et al. (2019) contradicted those findings. While this study was not designed to investigate teachers' constructivist beliefs, previous research has connected social constructivism with the need to adapt pedagogy (including technology integration) when teachers perceive their students originate from lower SES backgrounds. The results from this study potentially infer that because the scores for these teachers were relatively high, constructivism and technology integration are correlated when teachers believe that their students originate from low SES backgrounds.

Research also noted a contradiction in the construct of *will* as a predictor of technology integration. While Farjon et al. (2019) determined that will was the most significant predictor of intent to integrate technology, Olugbara and Letseka (2020) identified will as the least significant predictor. Because all three groups scored relatively high on their overall attitude score, this study supported the previous research that will was a significant predictor of intent to integrate technology; however, more research is necessary.

Data from this study yielded mixed results in overall attitude. Because the overall mean attitude scores were differentiated only slightly (High/Mid-High: $M = 3.79$; Mid-Low: $M = 3.85$; Low: $M = 3.89$), the results indicate a need to further investigate teachers' motivations for accepting or rejecting technology integration.

Limitations

This research study is subject to several limitations beginning with the participants. First, participants were recruited from one mid-Atlantic state, with 95 of the 126 participants from one region. This limitation threatened the study's external validity because while one may infer that these data could apply to teachers in other states, the combination of participant limitations and

an imbalance of responses from one region must be considered when interpreting these results. If I conducted this study again, I would specify regions to compare to fully understand the characteristics of those regions. Similarly, the number of participants (N = 126), the imbalance in the group sizes (Group 1: 60; Group 2: 46; Group 3: 20), the predominance of respondents over the age of 40 (82 of the 126), and the prevalence of female participants (N = 103) over male participants (N = 21) presented a second limitation because the sample may not have provided an accurate depiction of the teacher population. If I investigated this topic again, I would focus on specific gender or age comparisons in the population sample to eliminate this limitation. This study could be replicated to include other states, regions, or districts with specific guidelines on the number and gender of participants per group to ensure a balance in the data results.

Another limitation involved the survey and recruitment method. Participant recruitment was conducted via email, so confirmation that all potential participants read the invitation or understood the consent document was impossible. The results do not account for participants who may have declined to respond due to district research policies. This study could be replicated through district research departments to facilitate a higher response rate. Participants completed the survey online, so confirmation that participants understood all the questions or answered honestly was impossible due to self-reporting. The survey also did not define the parameters of technology or socioeconomic status so teachers would understand what was being asked of them, which may have influenced responses. If I replicated this study, I would include definitions of technology (i.e., one-to-one devices, use of learning management systems, and educational applications) or ask teachers what technology they had available to them so I would understand the basis for their responses. I would also define socioeconomic status as part of the

survey so that teachers would be aware of how that student characteristic applied to the current study.

Finally, the Likert style of question responses may have altered the results as the choices between “Strongly Agree/Agree” and “Strongly Disagree/Disagree” cannot be quantified. The study could be replicated with a different questionnaire that includes more quantifiable answer choices. These limitations must be considered when interpreting the results of this study.

Recommendations for Future Research

Based on the literature review and the results from this study, future research is needed to fully understand teachers’ attitudes toward technology based on their perceptions of students’ socioeconomic backgrounds. Since this study only focused on one mid-Atlantic state, future research should expand this study to include other districts, regions, states, and countries. Future studies could also compare specific regions within a state to determine if their unique characteristics influence teachers’ attitudes toward technology. Furthermore, this study did not investigate differences in attitudes toward technology due to gender, race, age, or years of experience, so future research could investigate those factors as possible motivators for teachers’ intent to integrate technology. Similarly, there is a need for future studies in how teachers’ effectiveness in the classroom influences their perception of their students’ SES backgrounds and their attitude toward technology.

Another opportunity for future research is the design. Because this was a quantitative study comprising one questionnaire, the only results were numeric and attributed to specific responses. Future research could be performed through qualitative or mixed methods designs involving focus groups, case studies, and interviews to determine what factors motivate teachers in different school settings by analyzing emergent themes in the data. Studies with these designs

would allow researchers to interview teachers about their experiences in schools with high populations of students from low SES backgrounds and their opinions on technology integration, as well as observe them using technology or other instructional tools with these students. Future research could also investigate this research question with other instruments that pose alternative questions or response types. Another avenue would be to research the influence of teachers' perceptions of their students' SES backgrounds on the specific correlation between their beliefs about constructivism and technology integration. Finally, because this study only examined the overall mean attitude score on the TAC-TAICT, future research could investigate teachers' scores on the individual questionnaire variables based on their perceptions of their students' characteristics and backgrounds.

The results of this study did not include overall statistically significant differences in middle school teachers' attitudes toward technology based on their perceptions of students' socioeconomic backgrounds. This study addressed a gap in the literature relating specifically to middle school teachers and their attitudes toward technology based on perceptions of students' socioeconomic backgrounds.

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APPENDIX A: TAC-TAICT Instrument 6.1

Teachers' Attitudes Toward ICT

This questionnaire is derived from well-validated portions of several attitudinal surveys that have been used with teachers in the past. We will use your responses to help develop a profile of how teachers view technology. Please complete all items even if you feel that some are redundant. This should require about 10 minutes of your time. Usually, it is best to respond with your first impression, without giving a question much thought. Your answers will remain confidential.

ID: _____ **Group:_____**	Use the ID assigned to you or the last four digits of your social security #

Part 1

Instructions: Select one level of agreement for each statement to indicate how you feel.

SD = Strongly Disagree, D = Disagree, U = Undecided, A = Agree, SA = Strongly Agree

		SD	D	U	A	SA
1.	I think that working with technology would be enjoyable and stimulating. (186)	①	②	③	④	⑤
2.	I want to learn a lot about technology. (103)	①	②	③	④	⑤
3.	The challenge of learning about technology is exciting. (211)	①	②	③	④	⑤
4.	I like learning with technology. (181)	①	②	③	④	⑤
5.	I can learn many things when I use technology. (9)	①	②	③	④	⑤

Part 2

Instructions: Select one level of agreement for each statement to indicate how you feel.

SD = Strongly Disagree, D = Disagree, U = Undecided, A = Agree, SA = Strongly Agree

		SD	D	U	A	SA
1.	I get a sinking feeling when I think of trying to use technology. (263)	①	②	③	④	⑤
2.	Working with technology makes me feel tense and uncomfortable. (230)	①	②	③	④	⑤
3.	Working with technology makes me nervous. (17)	①	②	③	④	⑤
4.	Technology intimidates me. (227)	①	②	③	④	⑤

5.	Using technology is very frustrating. (18)	①	②	③	④	⑤

Part 3

Instructions: Select one level of agreement for each statement to indicate how you feel.

SD = Strongly Disagree, D = Disagree, U = Undecided, A = Agree, SA = Strongly Agree

		SD	D	U	A	SA
1.	If I had technology at my disposal, I would try to get rid of it. (150)	①	②	③	④	⑤
2.	Studying about technology is a waste of time. (192)	①	②	③	④	⑤
3.	I can't think of any way that I will use technology in my career. (74)	①	②	③	④	⑤
4.	I will probably never learn to use technology. (154)	①	②	③	④	⑤
5.	I see technology as something I will rarely use in my daily life. (123)	①	②	③	④	⑤

Part 4

Instructions: Select one level of agreement for each statement to indicate how you feel.

SD = Strongly Disagree, D = Disagree, U = Undecided, A = Agree, SA = Strongly Agree

		SD	D	U	A	SA
1.	The use of Electronic mail (E-mail) makes the student feel more involved. (282)	①	②	③	④	⑤
2.	The use of E-mail helps provide a better learning experience. (284)	①	②	③	④	⑤
3.	The use of E-mail makes a class more interesting. (281)	①	②	③	④	⑤
4.	The use of E-mail helps the student learn more. (283)	①	②	③	④	⑤
5.	The use of E-mail increases motivation for class. (280)	①	②	③	④	⑤

Part 5

Instructions: Select one level of agreement for each statement to indicate how you feel.

SD = Strongly Disagree, D = Disagree, U = Undecided, A = Agree, SA = Strongly Agree

		SD	D	U	A	SA
1.	Technology is changing the world too rapidly. (142)	①	②	③	④	⑤
2.	I am afraid that if I begin to use technology I will become dependent upon it. (215)	①	②	③	④	⑤

3.	Technology dehumanizes society by treating everyone as a number. (138)	①	②	③	④	⑤
4.	Our country relies too much on technology. (135)	①	②	③	④	⑤
5.	Technology isolates people by inhibiting normal social interactions among users. (144)	①	②	③	④	⑤
6.	Use of technology in education almost always reduces the personal treatment of students. (176)	①	②	③	④	⑤
7.	Technology has the potential to control our lives. (134)	①	②	③	④	⑤
8.	Working with technology makes me feel isolated from other people. (241)	①	②	③	④	⑤

Part 6

Instructions: Select one level of agreement for each statement to indicate how you feel.

SD = Strongly Disagree, D = Disagree, U = Undecided, A = Agree, SA = Strongly Agree

		SD	D	U	A	SA
1.	Technology could increase my productivity. (202)	①	②	③	④	⑤
2.	Technology can help me learn. (204)	①	②	③	④	⑤
3.	Technology is a necessary tool in both educational and work settings. (226)	①	②	③	④	⑤
4.	Technology can be useful instructional aids in almost all subject areas. (175)	①	②	③	④	⑤
5.	Technology improves the overall quality of life. (207)	①	②	③	④	⑤
6.	If there was technology in my classroom it would help me to be a better teacher. (163)	①	②	③	④	⑤
7.	Technology could enhance remedial instruction. (168)	①	②	③	④	⑤
8.	Technology will improve education. (162)	①	②	③	④	⑤

Part 7

Instructions: Choose one location between each adjective pair to indicate how you feel about computers.

Computers are:

1.	unpleasant	①	②	③	④	⑤	⑥	⑦	pleasant (44)
2.	suffocating	①	②	③	④	⑤	⑥	⑦	fresh (50)
3.	dull	①	②	③	④	⑤	⑥	⑦	exciting (49)
4.	unlikable	①	②	③	④	⑤	⑥	⑦	likable (41)
5.	uncomfortable	①	②	③	④	⑤	⑥	⑦	comfortable (46)

Part 8

Instructions: Select one level of agreement for each statement to indicate how you feel.
SD = Strongly Disagree, D = Disagree, U = Undecided, A = Agree, SA = Strongly Agree

		SD	D	U	A	SA
1.	I like to talk to others about technology. (98)	①	②	③	④	⑤
2.	It is fun to figure out how technology works. (193)	①	②	③	④	⑤
3.	If a problem is left unsolved in a technology class, I continue to think about it afterward. (85)	①	②	③	④	⑤
4.	I like reading about technology. (100)	①	②	③	④	⑤
5.	When there is a problem with technology that I can't immediately solve, I stick with it until I have the answer. (69)	①	②	③	④	⑤

Part 9

Instructions: Select one level of agreement for each statement to indicate how you feel.
SD = Strongly Disagree, D = Disagree, U = Undecided, A = Agree, SA = Strongly Agree

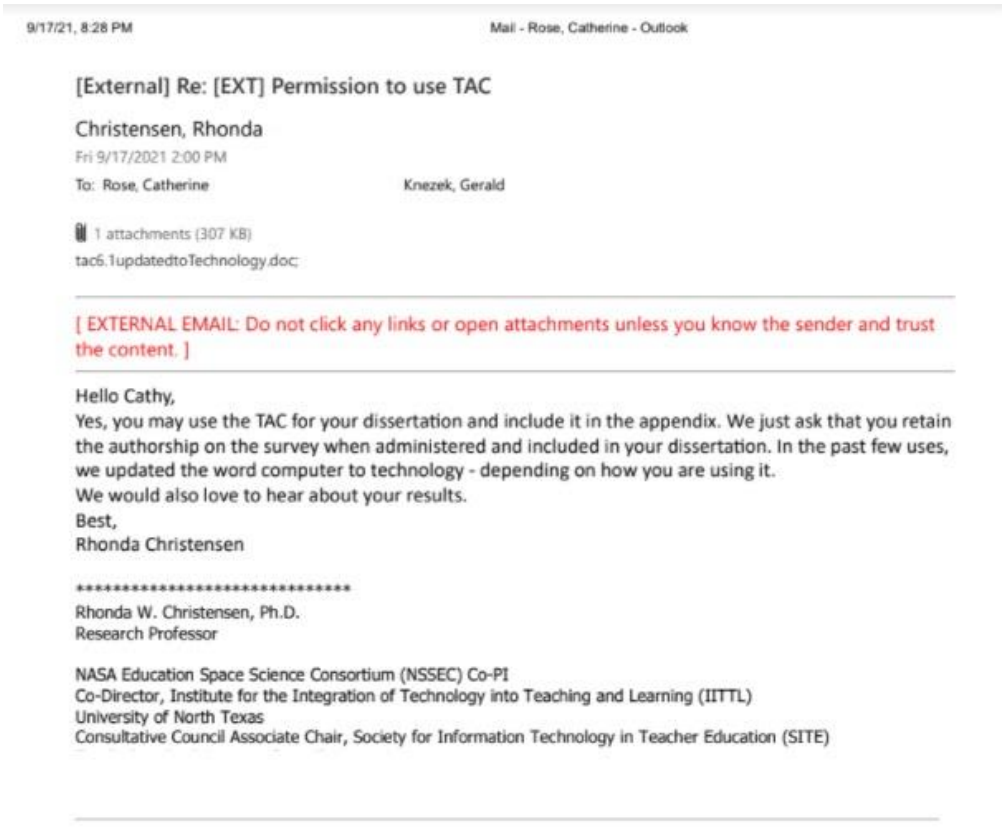
		SD	D	U	A	SA
1.	It is important for students to learn about technology in order to be informed citizens. (96)	①	②	③	④	⑤
2.	All students should have an opportunity to learn about technology at school. (95)	①	②	③	④	⑤
3.	Students should understand the role technology plays in society. (172)	①	②	③	④	⑤
4.	Having technology skills helps one get better jobs. (97)	①	②	③	④	⑤
5.	Technology could stimulate creativity in students. (199)	①	②	③	④	⑤

Thank you for your time.

TAC v 7.0 11/2017/TAICT 1.0/2017

Christensen, R., & Knezek, G. (1996). Constructing the teachers' attitudes toward computers (TAC) questionnaire. *Annual Meeting of the Southwest Educational Research Association* (pp. 1-39). ERIC.

APPENDIX B: Permission to Use and Publish Instrument



9/17/21, 8:28 PM Mail - Rose, Catherine - Outlook

[External] Re: [EXT] Permission to use TAC

Christensen, Rhonda
Fri 9/17/2021 2:00 PM
To: Rose, Catherine Knezek, Gerald

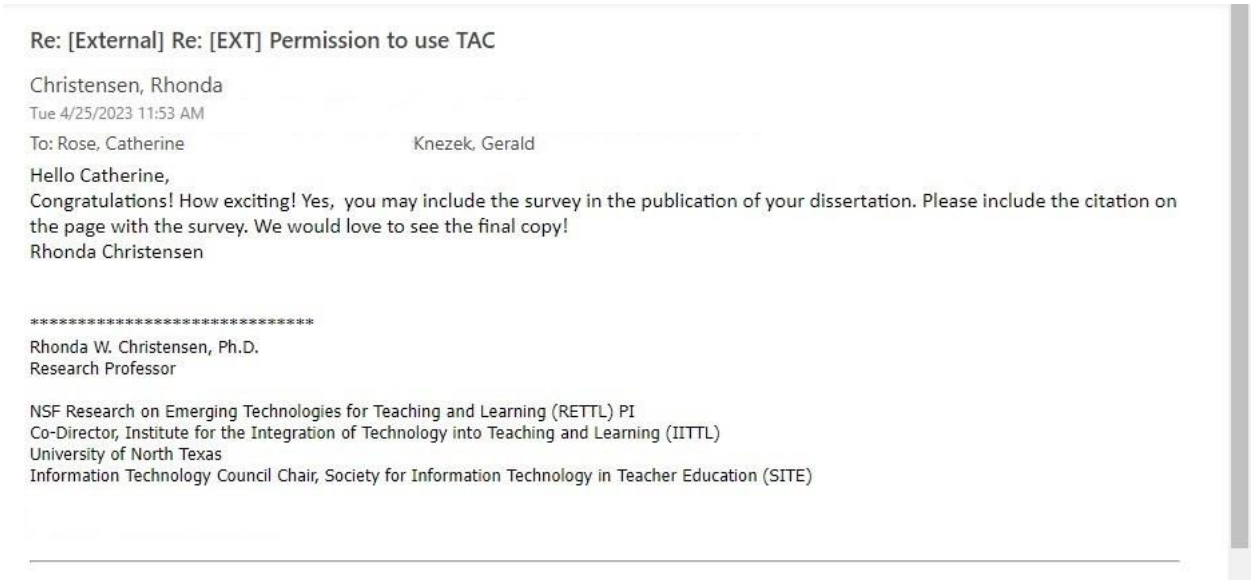
1 attachments (307 KB)
tac6.1updatedtoTechnology.doc;

[EXTERNAL EMAIL: Do not click any links or open attachments unless you know the sender and trust the content.]

Hello Cathy,
Yes, you may use the TAC for your dissertation and include it in the appendix. We just ask that you retain the authorship on the survey when administered and included in your dissertation. In the past few uses, we updated the word computer to technology - depending on how you are using it.
We would also love to hear about your results.
Best,
Rhonda Christensen

****
Rhonda W. Christensen, Ph.D.
Research Professor

NASA Education Space Science Consortium (NSSEC) Co-PI
Co-Director, Institute for the Integration of Technology into Teaching and Learning (IITTL)
University of North Texas
Consultative Council Associate Chair, Society for Information Technology in Teacher Education (SITE)



Re: [External] Re: [EXT] Permission to use TAC

Christensen, Rhonda
Tue 4/25/2023 11:53 AM
To: Rose, Catherine Knezek, Gerald

Hello Catherine,
Congratulations! How exciting! Yes, you may include the survey in the publication of your dissertation. Please include the citation on the page with the survey. We would love to see the final copy!
Rhonda Christensen

****
Rhonda W. Christensen, Ph.D.
Research Professor

NSF Research on Emerging Technologies for Teaching and Learning (RETTL) PI
Co-Director, Institute for the Integration of Technology into Teaching and Learning (IITTL)
University of North Texas
Information Technology Council Chair, Society for Information Technology in Teacher Education (SITE)

APPENDIX C: IRB Approval

LIBERTY UNIVERSITY.
INSTITUTIONAL REVIEW BOARD

December 8, 2022

Catherine Rose
Treg Hopkins

Re: IRB Exemption - IRB-FY22-23-477 A Causal-Comparative Investigation of the Effect of Middle School Teachers' Perceptions of Students' Socioeconomic Status on their Attitudes toward Technology

Dear Catherine Rose, Treg Hopkins,

The Liberty University Institutional Review Board (IRB) has reviewed your application in accordance with the Office for Human Research Protections (OHRP) and Food and Drug Administration (FDA) regulations and finds your study to be exempt from further IRB review. This means you may begin your research with the data safeguarding methods mentioned in your approved application, and no further IRB oversight is required.

Your study falls under the following exemption category, which identifies specific situations in which human participants research is exempt from the policy set forth in 45 CFR 46:104(d):

Category 2.(i). Research that only includes interactions involving educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior (including visual or auditory recording).
The information obtained is recorded by the investigator in such a manner that the identity of the human subjects cannot readily be ascertained, directly or through identifiers linked to the subjects.

Your stamped consent form(s) and final versions of your study documents can be found under the Attachments tab within the Submission Details section of your study on Cayuse IRB. Your stamped consent form(s) should be copied and used to gain the consent of your research participants. If you plan to provide your consent information electronically, the contents of the attached consent document(s) should be made available without alteration.

Please note that this exemption only applies to your current research application, and any modifications to your protocol must be reported to the Liberty University IRB for verification of continued exemption status. You may report these changes by completing a modification submission through your Cayuse IRB account.

If you have any questions about this exemption or need assistance in determining whether possible modifications to your protocol would change your exemption status, please email us at irb@liberty.edu.

Sincerely,
G. Michele Baker, MA, CIP
Administrative Chair of Institutional Research
Research Ethics Office

APPENDIX D: Informed Consent Form

Consent

Title of the Project: A Causal-Comparative Investigation of the Effect of Middle School Teachers' Perceptions of Students' Socioeconomic Status on their Attitudes toward Technology

Principal Investigator: Catherine Rose, Doctoral Candidate, School of Education, Liberty University

Invitation to be Part of a Research Study

You are invited to participate in a research study. To participate, you must be a current middle school teacher in the Commonwealth of Virginia. Taking part in this research project is voluntary.

Please take time to read this entire form and ask questions before deciding whether to take part in this research.

What is the study about and why is it being done?

The purpose of the study is to investigate if a difference exists in teachers' attitudes toward technology integration in the classroom among middle school teachers in schools with high, medium, and low populations of students from low socioeconomic backgrounds in a mid-Atlantic state.

What will happen if you take part in this study?

If you agree to be in this study, I will ask you to do the following:

1. Answer the online demographic portion of the survey (estimated time: five minutes).
2. Complete the Teachers' Attitudes Toward Computers-Information and Communication Technology (TAC-TAICT) in Google Form format (estimated time: 20 minutes)

How could you or others benefit from this study?

Participants should not expect to receive any direct benefits.

Benefits to society include an awareness of teachers' perceptions of instructional technology in schools with a different population of students from low socioeconomic backgrounds to prepare teachers to work in various schools.

What risks might you experience from being in this study?

The expected risks from participating in this study are minimal, which means they are equal to the risks you would encounter in everyday life.

How will personal information be protected?

The records of this study will be kept private. Research records will be stored securely, and only the researchers will have access to the records.

- Participant responses will be anonymous.

- Data will be stored on a password-locked computer and an external hard drive and may be used in future presentations. After five years, all electronic records will be deleted.

Is study participation voluntary?

Participation in this study is voluntary. Your decision whether to participate will not affect your current or future relations with Liberty University. If you decide to participate, you are free to not answer any question or withdraw at any time prior to submitting the survey without affecting those relationships.

What should you do if you decide to withdraw from the study?

If you choose to withdraw from the study, please exit the survey and close your internet browser. Your responses will not be recorded or included in the study.

Whom do you contact if you have questions or concerns about the study?

The researchers conducting this study is Catherine Rose. You may ask any questions you have now. If you have questions later, **you are encouraged** to contact her at
You may also contact the researcher's faculty sponsor, Dr. Treg Hopkins at

Whom do you contact if you have questions about your rights as a research participant?

If you have any questions or concerns regarding this study and would like to talk to someone other than the researchers, **you are encouraged** to contact the IRB. Our physical address is

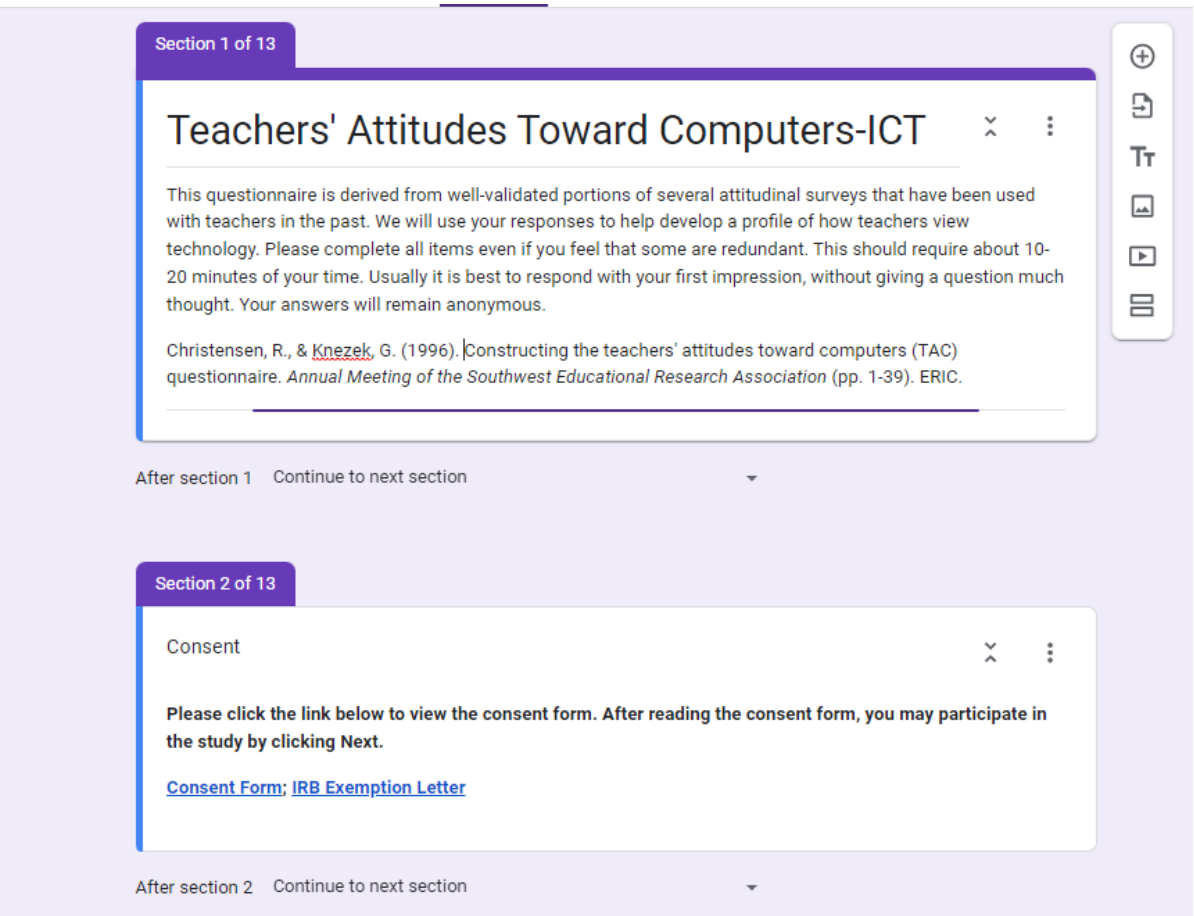
our phone number is and our email address is

Disclaimer: The Institutional Review Board (IRB) is tasked with ensuring that human subjects research will be conducted in an ethical manner as defined and required by federal regulations. The topics covered and viewpoints expressed or alluded to by student and faculty researchers are those of the researchers and do not necessarily reflect the official policies or positions of Liberty University.

Your Consent

Before agreeing to be part of the research, please be sure that you understand what the study is about. You can print a copy of the document for your records. If you have any questions about the study later, you can contact the researchers using the information provided above.

APPENDIX E: Web Form



Link to Web Form of Survey

APPENDIX F: Participant Recruitment Letter

Dear Middle School Teacher:

As a graduate student in the School of Education at Liberty University, I am conducting research as part of the requirements for a doctoral degree. The purpose of my research is to investigate if a difference exists in teachers' attitudes toward technology integration in the classroom among middle school teachers in schools with high, medium, and low populations of students from low socioeconomic backgrounds in a mid-Atlantic state, and I am writing to invite eligible participants to join my study.

Each participant must be a current middle school teacher in the Commonwealth of Virginia. Participants, if willing, will be asked to:

1. Answer the demographic portion of the survey (estimated time: five minutes).
2. Complete the Teachers' Attitudes Toward Computers-Information and Communication Technology (TAC-TAICT) in Google Form format (estimated time: 20 minutes)

Participation will be completely anonymous, and no personal, identifying information will be collected.

To participate, please click here (or copy and paste the link into a new browser tab): https://docs.google.com/forms/d/e/1FAIpQLSe1_j2Dy5T2tIyQl855G_oy_i4nLNzgPOmHnfcKormAg82F5Q/viewform.

A consent document is provided as a link on the second page of the survey. The consent document contains additional information about my research. After you have read the consent form, you may click "Next." Doing so will indicate that you have read the consent information and would like to take part in the survey.

Sincerely,

Catherine Rose
Ph.D. Candidate
[redacted]