2022

Elementary Teacher Experiences Regarding Use of Technology in the Western Pacific Islands

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Abstract

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Project Study Submitted in Partial Fulfillment

of the Requirements for the Degree of

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Abstract

In the Western Pacific Islands School District (WPISD), technology standards were last developed and adopted in 2008. These standards have not been revisited or revised. The problem is that teachers are expected to use the latest educational technology, but technology standards are not current for preparing students for the 21st century workforce. The purpose of this basic qualitative inquiry was to explore how elementary teachers use current classroom technologies to address 21st century skills as mandated by the WPISD, despite having outdated technology standards. The Technological Pedagogical Content Knowledge (TPACK) framework guided the study in order to integrate pedagogy, content, and technology that targets 21st century skills. Twelve elementary teachers in grades K to 5 were interviewed via semi-structured questions using the basic inquiry method to analyze experiences regarding how they used educational technology. Data were open coded to determine the following themes: disconnect between standards and instructional practices, teacher awareness of future development needs, and preparation and timing. In response to findings, a white paper was developed to inform the district of findings and recommend that teachers would benefit from updated technology standards and consistent support in terms of adopting and implementing updated technology standards. This study contributes to positive social change by providing documentation to support the need to update standards that can guide teachers as they plan lessons that will ultimately prepare students for the 21st century workforce.

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Dedication

I dedicate this study to my children, Gracie, Leandro, and Kaya. Thank you for supporting me and cheering me on when I felt like quitting. You are my inspiration for pushing through and getting this doctoral degree completed. I hope I have set an excellent example of how hard work, perseverance, and dedication can achieve even the most challenging endeavor.

To my husband and best friend, Peter, who has been nothing but encouraging and loving throughout this journey, thank you for comforting and motivating me on my most difficult and frustrating days. Your patience, support, and encouraging words have wiped away all the tears I've shed throughout this doctoral degree.

Leonardo G. Ordonez and Salvacion D. Ordonez, my parents, thank you for loving me unconditionally and teaching me to work hard for things I aspire to achieve. I am blessed to have such amazing and supportive parents like you. The sacrifices you've made for me are beyond words. I am the person I am today because of the time and effort you have invested in me.

Acknowledgment

I am grateful to have had the opportunity to work with Dr. Amy White as my committee chairperson. Thank you, Dr. White, for working with me during the project study process. You have been honest, positive, and encouraging. Despite the super typhoon and a pandemic that I have endured, your feedback and comments helped me move forward and complete this study effectively. Thank you, Dr. Heather Caldwell, my second chairperson, for your patience, words of encouragement, and your feedback to help improve my work.

Table of Contents

Section 1: The Problem

Rapid technological advances in the field of education have influenced teaching, learning, district policies, classroom expectations, school infrastructures, as well as progressive professional development (Beriswill et al., 2016; Koehler et al., 2013; O'Neal et al., 2017). The Western Pacific Islands School District (pseudonym: WPISD) has invested millions of dollars to equip classrooms with projectors, iPads, Laptops, smart TVs, and online programs and curriculum to improve instruction and students' learning. However, the school district has not adopted a curriculum or technology standards for elementary schools since 2008 (WPISD Instructional Technology Director, personal communication, February 19, 2020). The rapid influences of technology have forced school districts to ensure that technology is up to date in order to aim digital competencies, which are highly demanded for up-and-coming professions (Starkey, 2020).

The Local Problem

Advancements in technology have led to changes in teacher expectations, lesson delivery, and district policies (O'Neal et al., 2017). School districts furnish classrooms with the latest educational technology, which has evolved since 2018, and provide training for teachers to better equip students with 21st century skills (Beriswill et al., 2016). Teachers practice their teaching skills in highly complex and dynamic classroom conditions, which prompt school districts to continually shift and evolve their understanding of effective teaching and learning with technology (Koehler et al., 2013). School districts should provide significant support to teachers from different disciplines

and consistent adoption of technology frameworks for programs to meet district goals (Nelson et al., 2019). This support can include investing in new technology, providing professional development, and consistent updates of technology standards to ensure that students are prepared for the 21st century. The school district for this study is located in the Pacific. The WPI consists of three islands that are under one government. In the WPISD, the problem is that teachers are expected to use the latest educational technology, but technology standards are not current for preparing students for the 21st century workforce.

The problem at the Western Pacific Islands (WPI) is that technology standards were adopted in 2008 and have not been updated. Without a plan to adopt updated technology standards and a curriculum in place, technology is not maximized to support teaching and learning. Additionally, the WPISD uses standards adopted in 2008 and does not follow International Society for Technology in Education (ISTE) standards, which are regularly updated.

The school district's mission is to provide optimum curriculum and instruction so that students become productive and contributing members to the global world. In order to address this mission, all classrooms are equipped with the latest technology, and teachers are provided necessary professional development. A digital citizenship and learning curriculum are needed to provide students with the proper skillsets to participate and excel in the digital world.

A strategic goal of the WPISD is to provide ongoing support systems so all staff will have the tools and skills to provide high-quality education. In order to meet this goal,

each student should be given the opportunity to develop positive social and emotional skills in caring, safe, and technology-enriched learning environments. About 75-100 elementary teachers (K-5) from nine elementary schools in the WPISD have completed the educational technology program. This program is currently on its tenth cohort of teachers who committed a year of professional training to gain the latest skills, knowledge, and educational technology trends. Although the WPISD provides training, students are using and encountering technology in unprecedented ways which involve targeting skills that are necessary for our future workforce.

There is a plethora of technology available to enhance teaching and learning. Baek and Sung (2020) said through a mixed-methods study, that preservice teachers' perceptions viewed their current technology courses and training as insufficient and not meeting their technology competency level. The training was insufficient because it did not provide teachers opportunities to improve teaching technology skills. Baek and Sung (2020) said consistency in terms of updating teacher education curricula and providing better opportunities for teachers to effectively teach using technology are significantly necessary. Gomez (2020) said participating K-12 Urban teachers' level of confidence in terms of using and applying instructional technology was a key implication that positively influenced teacher efficacy with technology integration. Teachers need clear guidance and training regarding how to integrate technology to meet technology standards.

Rationale

The rationale for exploring this research problem is to generate rich, accurate, and descriptive data that would be analyzed to explore WPISD elementary school teachers' experiences with how they use educational technology with outdated technology standards as they help prepare students for the 21st century workforce. Teachers are significant factors in terms of how technology is used and delivered in classrooms to benefit student achievement. This study can lead to insights regarding challenges and barriers that hinder WPISDs efforts to prepare students for the 21st century workforce.

Evidence of the Problem at the Local Level

In education, stakeholders are held accountable for ensuring that standards are introduced and addressed so that students have skill sets to succeed in the next level of their learning (Taubman, 2010). However, current technology standards in the WPISD are outdated and do not provide significant guidance for teachers to prepare students for the 21st century workforce. Rapid technology advancement affects standard development as fast as it impacts society (Jiang et al., 2018).

The WPISD has invested millions in federal funding to procure technology devices and improve school infrastructure while proper plans and curriculum are not in place. WPISD leaders formed a team of district leaders and school administrators to address a district priority standard that addresses the need to develop an updated curriculum to effectively teach technology to students. In addition to ensuring that schools have the latest technology, the school district has also invested in educational technology certification programs, which are offered annually to all public and private

schools throughout the WPISD. This certification program is a highly competitive opportunity for educators to improve their teaching practice with technology skills. At the end of the certification program, the expectation was that WPI teachers would employ practices learned in the program to implement technology use in their classrooms. The goal of this certification program is significant because digital learners are intuitive learners because they grew up with technological jargon and quickly adapted to technological advances.

Evidence of the Problem from the Professional Literature

The ISTE affirmed that technology has strongly transformed what is necessary for students to learn and how lessons are planned and delivered in educational settings throughout the world (Trust, 2018). ISTE developed National Education Technology Standards (NETS) to serve as a framework for technology's role in learning, teaching, and leading. NETS are widely known for supporting integrating technology in teaching and learning practices and have consistently been adopted worldwide as fundamental principles for exemplary technology-based instruction (Trust, 2018). During the development of education in the digital age, district leaders of education systems worldwide are challenged to revisit or rediscover learning institutions' purpose without society (Neimann et al., 2021). Additionally, critical pedagogical spaces are supported and motivated, where technology empowers strong delivery of quality learning, and all students learn necessary skills, social-emotional learning, and digital skills (Neimann et al., 2021).

Failure to provide and implement practices that support effective use of technology in teaching and learning practices within educational institutions may cause an increased loss and shortfall related to preparing students for the 21st century workforce. The 21st century learner has gained significant attention for changes needed in schools to meet demands of the rapid changes that education and society are experiencing (Hirschman & Wood, 2018). WPISD has not officially adopted the most current ISTE standards, which are a tool that educational institutions can greatly benefit from to find new ways of learning, skills, and innovative approaches to knowledge (Hirschman & Wood, 2018). The Technological Pedagogical and Content Knowledge (TPACK) framework was used as a guide to identify how teachers successfully integrate technology while technology standards provided are not current for preparing students for the 21st century workforce. The TPACK framework is a tool to help identify and analyze experiences of elementary teachers in the WPI and how they use the latest educational technology in their teaching.

Definition of Terms

21st Century Skills: Critical thinking, collaboration, communication, creativity and innovation, self-direction, making global and local connections, and using technology as a tool for learning (Wilcox et al., n.d.).

21st Century Workforce: Today's global world of information requires students to use and retrieve information ethically, carry out their perspectives, and make sense of information by sharing and using it in efficient ways (Rosyidah, 2017). This ensures that

students can successfully do well in a world where change is consistently constant and learning does not end.

Educational Technology: A dynamic system of study and moral action to specify and provide an interactive environment for learners' activity for their fast, easy, and durable education and learning in harmony with their interests and characteristics (Simonson, 2016). In this study, technology refers to educational technology tools that teachers have access to in their classrooms. The latest educational tool refers to those that have evolved within the past 5 years. These tools are iPads, laptops, smart TVs, and online tools and software. Educational technology can also be defined as interrelated components interacting together for a specific purpose (Simonson, 2016).

Educational Technology Standards: Standards used in specifying the content, interfaces, and metadata for educational technology environments, which have become increasingly important with developing and refining multimedia technology and e-learning (O'Dea, 2009).

Resources: Sources of supply and support (Merriam-Webster, 2003). Equipment, training, or professional development designed to help facilitate learning and knowledge acquisition.

Technological Pedagogical and Content Knowledge (TPACK): Framework for stakeholders to meld pedagogy, content, and technology as they implement technology standards with 2008 district adopted standards (Lisenbee & Ford, 2018).

Significance of the Study

Findings from the study will be presented to the WPISD commissioner, associate commissioner, school administrators, and faculty. Findings may be significant because the purpose of this qualitative basic inquiry is to explore how elementary teachers use current classroom technologies to address 21st century skills as mandated by the WPISD, despite having outdated technology standards. School district administrators could use findings to make decisions regarding how to allocate technology resources in all 19 schools.

Findings from this study could be used by school administrators and district leaders to determine appropriate support and professional development training to help teachers prepare students for the 21st century workforce. This study may help develop and highlight the need for a plan and practical updated technology curriculum so that technology invested by the district is maximized to support teaching and learning.

Although studies have been conducted regarding teacher perceptions and barriers with technology integration and preparing students for the 21st century workforce, this study is unique because no study related to this topic has ever been conducted in the WPISD. There has been no study to explore how elementary school teachers in the Pacific Islands use educational technology and outdated technology standards to prepare students for the 21st century workforce in the WPISD. This study will be significant for district leaders in the WPISD to make decisions that may support continued funding for school technology infrastructure, equipment, programs, and professional development.

This study is significant for district leaders in the WPISD. Findings from this research may provide a general understanding of the importance of supporting elementary students to prepare students for the 21st century workforce. Through this study, district leaders can identify the need to improve effectiveness of using educational technology classroom lessons and teacher delivery at the elementary level and develop an improvement plan based on its strengths and weaknesses.

Elementary school teachers may use this to help align their teaching with the growing demand on use of technology as well as focusing on technology standards and how they teach them. Findings may help strengthen their lessons and help them become more aware of the importance of including 21st century skills in their classes. This study may also help identify strengths, weaknesses, and patterns to help district leaders understand how to meet student and teacher needs when developing technology standards effectively.

Research Questions

Elementary school teachers' experiences regarding how they address 21st century skills despite having outdated technology standards have not been examined at the research site. The purpose of this qualitative basic inquiry was to explore how elementary teachers use current classroom technologies to address 21st century skills as mandated by the WPISD, despite having outdated technology standards. The following research questions guided this doctoral project study:

RQ1: What experiences do K-5 elementary teachers report when using current classroom technologies to address 21st century skills as mandated by WPISD, despite having outdated technology standards?

RQ2: What do K-5 elementary teachers report they need from the school district to effectively use current classroom technology more efficiently in terms of delivery of their curriculum?

Review of the Literature

Technology advancement has led to constant changes, and K-12 teachers are expected to plan lessons and equip students with 21st century skills. These skills are significant to understand teacher perceptions about the role of technology in their teaching and skills they need to teach their students to succeed in the 21st century workforce. These 21st century skills involve students' capacity to apply knowledge, analyze, reason, and effectively communicate to solve and interpret problems in different scenarios and situations (Joynes et al., 2019).

This literature review begins with a discussion of the conceptual framework, followed by a review of current literature related to the broader problem. This involves sources that confirm how teachers use educational technology and educational technology standards to prepare students for the 21st century workforce. I focus on how teachers use educational technology standards to plan and deliver lessons to support students' needs. The literature review is completed with a discussion of educational technology standards, school policymaking challenges involving using these standards in

classrooms effectively, teaching 21st century skills, technology integration barriers, development of digital age skills, and benefits of technology.

Conceptual Framework

The conceptual framework for this project study is the TPACK, which was advanced by Mishra and Koehler and built on Shulman's theory concerning the need for teachers to draw on pedagogical content knowledge (PCK). Shulman (1986) said mere content knowledge might be pedagogically useless as a teaching skill without implementing technology knowledge. Teachers must have content knowledge and teaching skills and deliver content to be practical (Shulman, 1986). Technology has become a significant part of the education field. Mishra and Koehler (2006) included technology knowledge and created the TPACK framework, which is used to understand and describe the significant knowledge that a teacher needs for effective pedagogical practice in a technology-enhanced learning environment (Mishra & Koehler, 2006).

The TPACK framework was used as a lens to analyze experiences of teachers who use 2008 adopted WPISD technology standards and how they help prepare students for the 21st century workforce. The TPACK framework is very fitting because this study involves focusing on teacher technology, pedagogy, and content knowledge. Kaplon-Schilis and Lyublinskaya (2020) said the TPACK framework assisted in evaluating teacher preparation programs to help prepare teachers to integrate technology in their classrooms. Additionally, Mishra and Koehler (2006) support TPACK and states that effective use of technology in classrooms require an intricate interplay in terms of

knowledge in content and pedagogy, technology and pedagogy, and content supported by technology.

Teacher training and professional development tend to emphasize the technical functions of technology (Ronan, 2018). The TPACK framework helps in terms of understanding teacher knowledge, pedagogical knowledge, and content knowledge necessary to effectively implement technology integration in the classroom to teach students 21st century skills. Three ways to apply the TPACK framework were to explore teachers' content knowledge, technology knowledge, and teachers' pedagogical knowledge (Gamble, 2021). This framework can inform and guide interview questions and by identifying themes that may emerge through K-5 elementary teacher responses. Additionally, the framework can guide the research questions involving teacher knowledge of technology and how they integrate it into their content.

Review of the Broader Problem

Databases used to search current literature were ERIC, Education Research Complete, Google Scholar, and SAGE Journals. Search terms used to find relevant articles were *teacher perceptions on technology use*, *educational technology standards*, *educational technology*, *21st century skills*, *21st century workforce*, *TPACK*, *pedagogy*, and *technology curriculum*.

Teacher Perceptions

Understanding teacher perceptions regarding use of technology in the classroom is vital because they control student learning. The practices, beliefs, and attitudes of the 21st century educator are significantly different from educators from the past because of

technology. Attitudes, beliefs, self-efficacy, and perceptions of teachers are significant traits needed to understand technology acceptance and integration. Technology is used to increase student engagement and improve implementation and integration of the curriculum (Dinc, 2019). The ways in which technology has influenced education significantly may change teacher perceptions and influence how they teach.

Li et al. (2018) said pedagogical readiness is as important as technological readiness for teachers to integrate technology in their teaching. Understanding teaching, curriculum, and technology standards is necessary for teachers to accept teaching technology. While Li et al. (2018) suggested that is essential to develop programs that help teachers understand innovative technology practices to meet digital learner needs, providing teacher training on using technology is vital (Edannur & Arokia, 2017). Edannur and Arokia (2017) said understanding perception can strengthen school leaders in their understanding of teacher knowledge, self-efficacy, and needs.

Educational Technology Standards

Education standards are necessary to define skills and knowledge that students must acquire to be prepared for schooling, college, work, and life. The No Child Left Behind (NCLB) Act of 2001 and Every Student Succeeds (ESSA) Act of 2015 were designed by the US federal government to ensure that schools were held accountable for student outcomes. The most widely used technology standards by educators worldwide are ISTE standards. The creation of ISTE technology standards serves as a guide to learning. ISTE standards provide schools with information for designing their classrooms to create a rich learning environment that effectively integrates technology. Educational

standards, including technology standards, play a vital role in ensuring students are prepared for the 21st century workforce. According to current ISTE standards for teachers, educators with skills established for the 21st century facilitate student learning, encourage creative thinking, and design learning experiences. Teachers who use ISTE standards provide relevance in terms of understanding the digital age and responsibilities of digital citizens and improving their professional and leadership skills.

Rapid technological progressions and aligned changes in the learning environment is the continuous challenge that stakeholders' face when confronted about providing an effective e-learning environment (Choudhury & Pattnaik, 2020). In e-learning environments, teaching and learning with technology offer various educational technologies to enhance students' learning (Lever-Duffy & McDonald, 2017). Additionally, a well-designed framework can reconcile different stakeholders' purposes and motivate the innovation of 21st century pedagogies and set standards for teachers' digital competence development and engage themselves to reflect on the process of understanding their skills and professional development goals (Caena & Redecker, 2019). Because of changes and district goals, leaders across the nation make changes at their schools. Teacher leaders also provide support and guidance to ease these changes. However, no matter the support provided, a framework that identifies the knowledge and behaviors, such as technology standards, is necessary to ensure student learning is aligned and is an empowered necessity (Crompton, 2018). School districts and stakeholders need a practical framework to keep up with rapid technological progressions. To offer an effective learning environment, which will also improve teacher ETSSE as discovered in

Simsek and Yazar's (2016) study, Jones (2020) discovered the importance of contributing to teacher professional development to improve technology integration.

Technology Advancement

Educational institutions need to be prepared to face the Fourth Industrial Revolution and its challenges (Raman et al., 2019). These challenges push district leaders and teachers to embrace change and develop educational programs and curriculum to cater to all digital natives (Raman et al., 2019), which forces teachers to address student needs and seek solutions through critical thinking problem-solving approaches (Masullo, 2017). Twenty-first century teaching and learning are continuously changing and advancing. Students in the 21st century have a vast amount of information at their fingertips, interact and collaborate easily (Halili, 2019), use mobile technology as a platform for learning (Suhail, 2019), and encouraged to be creative and innovative through augmented and virtual reality (Al-Azawi et al., 2019). However, despite these benefits of technological advancements, not all student needs are met equally.

Longitudinal research in Florida schools used descriptive statistics, internal consistency reliability, exploratory factor analysis, and longitudinal multi-level models to examine the trends in technology integration by socio-economic status in each school type (elementary, middle, and high) for over 7 years (Hohfelda et al., 2017). This research showed that Florida has improved on several indicators related to the digital divide in 21st century learning, but some essential differences exist. Low-socioeconomic students generally used software for computer-directed activities for drill and practice work, while high-socioeconomic are using more student-centered software, such as

creating or communicating with technology (Hohfelda et al., 2017). This finding concluded that access to technology is not the same for all educational institutions. School districts must address challenges to ensure that all students benefit from technology advancement. School districts promote technology-based teaching and provide resources for learning opportunities that target 21st century skills because of technology advancement. With technology advancement in schools, four early childhood development teachers and four parents of respective classes participated in semi-structured interview surveys and highly recommended technology use in the classroom to develop 21st century skills (Pirani & Hussain, 2019). These teachers and parents go on further by explaining that technology allows children accessibility to multiple resources, teaches them how to multi-task, develop communication skills, connect to the world, increases readiness to learn new concepts, provides motivation in reading through visual learning, and help understand complex concepts and retain information for a more extended time (Pirani & Hussain, 2019). This study provided a clear understanding of parents' and teachers' perspectives regarding technology integration based on their teaching and observation. The interviews and observations revealed how teachers' and parents' firsthand experiences of children, in their early years, use and benefit from technology (Pirani & Hussain, 2019).

Quality Learning Standards

Learning standards are concise, written descriptions of what students are expected to know and be able to do at a specific level in their schooling (Glossary of Education Reform, n.d). When preparing students to become globally competent and be successful

in the 21st century workforce, schools incorporate learning standards to ensure quality learning (Mullins & Woods, 2019). In the US, the common core state standards (CCSS), which are high-quality standards, were developed (Litkowski et al., 2020). In addition to CCSS, ISTE Standards, which focused on using technology to support learning, creative thinking, digital age activities and assessments, model digital citizenship, and professional growth and leadership for teachers, were developed (Trust, 2018). With the advances in technology and the growing access to the internet in and out of school, ISTE had to redesign its standards to meet the changes and shift from focusing on teaching with technology to using technology to learn, collaborate, lead, and empower students (Trust, 2018). Learning standards play a significant role in ensuring students are prepared for the next level in education.

School districts enforce learning and technology standards and ensure that teachers are provided professional development to deliver effective instruction. To explore technology integration learning activities, Jones and Dexter (2018) examined technology integrated learning activities. They collected weekly quantitative surveys for one year and a series of three individual qualitative interviews. They found that teachers' learning needs about technology integration were insufficiently supported through formal learning opportunities. Hence, teachers resorted to recreating their activities with informal and independent activities. A similar study on teacher digital competence, conducted in Spain, surveyed 142 teachers through a questionnaire concluded that digital teaching is a challenge, and similar to Jones' and Dexter's findings, teacher training is necessary to help teachers teach in an innovative era (Garzon Artacho et al., 2020). Both

studies confirmed that school districts should focus on strengthening practices consistent with technology standards by provided needed support to help teachers deliver effective instruction.

School district leaders are encouraged to provide professional development opportunities and supportive environments that enable teachers to explore technologies that tie within their content areas (Nelson et al., 2019). Additionally, some programs can encourage technology integration within teacher behaviors and competencies by promoting collaboration between technology faculty and content-specific coordinators to ensure that teachers receive effective and proper professional development relevant to their subjects (Nelson et al., 2019). Nelson et al. (2019) confirmed Simsek's and Yazar's (2017) and Jones' (2020) discovery on the importance of professional development to improve technology integration. In addition to that, a 3-year time-series survey was conducted in K-12 public schools in the North Midwestern to investigate teacher perceptions on barriers of technology integration, and results indicated that time was the most stable, persistent, and consistent barrier in technology integration (Francom, 2019). Much needed support and intentional professional development can help enforce learning standards and significantly improve instruction. Although Simsek and Yazar (2019) and Jones (2020) concluded that professional development is critical in technology integration, it is also essential to understand that teachers need time to learn tools and best practices to deliver instruction with technology (Francom, 2019) effectively.

Implementation of Educational Technologies

School districts pilot and implement educational technology and curriculum in many different content areas. Basic computer skills, tools, and programs are necessary skills. However, a common theme amongst school district mission statements includes educating and preparing students for a global economy, which requires 21st century knowledge and skills (Smith, 2020). Teachers use technology as something purposeful, connected to student learning, and relevant to real-world situations. To be intentional, school district stakeholders have a vested interest in providing a high-quality student experience to succeed and gain higher education. They are expected to provide a supportive, holistic, and coherent environment for student learning (Morgan, 2019). However, to effectively implement technology, teachers are supported, students are engaged, 21st century skills are acquired, and the curriculum is transformed (Huisman, 2019). Implementing technology in schools is needed to ensure that lessons are purposeful and connected to a real-world situation.

Technology Implementation in schools includes K-12 teachers and teachers across all content and all grade levels, such as STEM and art. In a mixed-methods study, Strycker (2020) conducted surveys and multiple case studies with 67 K-12 art teachers, of which 33 were elementary teachers and 34 were secondary teachers. This study revealed that art teachers from different regions in the same southern state used technology similar to other teachers in other studies. However, secondary art teachers were found to have their students produce more original media and have more interest in digital portfolios. Although K-12 teachers viewed programs as highly beneficial for their students, they

expressed that the technologies utilized were limited. In addition to art, integration of STEM in science and math is a trend that has been growing since the 1990s. Through a qualitative case study, two middle school teachers, two collaborating engineers, and STEM teacher educators produced real-world design challenges in a blended community of practice using selected digital technology assessed by tablet and mobile devices (Keir & Khalil, 2018). The participating teachers were asked to review their technology standards, curriculum, and pacing guides to plan and develop lessons that teachers intentionally develop to make challenges interdisciplinary and relevant to real-world events. The researchers found that teachers have different values on how they use and believe the purpose of digital technologies is based on time practice to adapt to their use. Kier and Khalil (2018) and Strycker (2020) conducted studies that show similarities in the benefits of technology integration in art and STEM, which is the practice of students creating digital products that are interdisciplinary. Teachers across all content areas need to explore and be provided with research-based practices to provide students with relevant learning opportunities.

Curriculum and Technology Challenges

Challenges in technology integration and curriculum are evident in school districts. Technology integration can be quite challenging for teachers because many believe that they are not fully prepared to integrate technology effectively in the classroom due to their attitudes and beliefs towards technology, learning experience in technology, competency of technology use, and access to the technology or tool (Farjon et al., 2019).

To explore the relationship among teacher self-efficacy, attitude toward instruction technology, and possible demographic variables, Ott (2017) collected data from 9-12 teachers and administrators working with technology at Minaret high school. He confirmed that modern-day classrooms go much deeper than merely purchasing and providing teachers and students' hardware. Teachers must have self-efficacy and attitudes that promote technology and support to build skills and create a vision of what technology integration looks like in the classroom (Ott, 2017). Technology and curriculum challenges are also evident in using early literacy technology (Voogt & McKenny, 2017). Focus group interviews were conducted to examine five Teacher Education Institutes (TEI) to effectively help students develop the TPACK needed to use technology for early literacy. The researchers found that TEIs are not preparing teachers to use technology for early literacy because teachers of TEIs claimed that they have weak knowledge and skills and limited opportunities to improve on developing and integrating TPACK in their curriculum (Voogt & McKenny, 2017). Voogt and McKenny's (2017) and Ott's (2017) studies confirmed that teachers need support and training to effectively integrate technology into their curriculum.

In addition to these challenges, teachers need a planning model and supporting materials to help prepare students for the 21st century. During the 20th century, the leading causes of education reform were changes in large societies that perceive the threat to America economically, politically, and maintaining national security. Education institutions meet the challenges and develop curricula such as STEM Education to prepare students to meet and address the country's challenges in the coming decades

(Daugherty & Carter, 2019). The National Education Technology Plan helps prepare teachers to move beyond isolated technology experiences and use a range of cutting-edge technology to improve teaching and learn for all students (Office of Educational Technology, 2017). Also, the ISTE Standards, a framework, was developed to innovate education and help educators worldwide prepare students to thrive in the 21st century workforce and society (Brooks-Young & International Society for Technology in Education, 2017). In 1998, ISTE standards for students were developed and published to help students keep up with the information super high-way (Sykora, 2015). Over the years, the ISTE standards were revised to meet the change in learning and teaching to ensure that educators and learners provide meaningful and impactful lessons. Technology advancement is deeply connected with the development of standards (Jiang et al., 2018). The constant rate of change that technology influences our society and educational institutions, forces school leaders to keep standards updated.

Barriers in Technology Integration

Technology has significantly changed many aspects of human life, but some barriers come with these changes. Several studies confirm the lack of knowledge and ability to integrate technology as an obstacle for many teachers (Dinc, 2019; Farjon et al., 2019; Ott, 2017). Fourteen educators, consisting of teachers, administrators, and technology support, participated in a qualitative multi-case study, and provided in-depth insights and reflections to explore how educators overcome second-order barriers (Durff & Carter, 2019). The researchers conducted a survey and interviewed three groups of educators. Each group consisted of two or three teachers, one administrator, and one

technology support from a rural school district. They confirmed that the team approach in integrating and implementing technology, including administrators, technology support personnel, and teachers resulted in the most vital technology integration (Durff & Carter, 2019). Teachers need support and training to gain skills in using technology so that they feel comfortable and successful.

Other barriers are also comparative between bigger and smaller schools. A 3-year time-series survey conducted in K-12 public schools to explore teachers' perceptions of how technology integration barriers change over time and how they may differ in small and large school districts found that time was the most common and persistent barrier to technology (Francom, 2020). Teachers in the bigger school districts reported that they lack time to plan and prepare technology-enhanced lessons. In contrast, teachers from smaller schools reported better access to technology and vital administrative support (Francom, 2020). The researcher also discovered that access to technology has increased, but teachers strongly stressed that training and technical support declined over time. Durff and Carter (2019) study validated that providing appropriate professional development and building strong support where teachers are collegial and share knowledge, training on locating relevant resources and establishing value and support to use technology for learning.

Administrators have a strong influence and support to encourage teachers to integrate technology by providing professional development, offering conferences, promoting collegial and mentorship among teachers, and allow teachers to learn and evolve at their own pace (Durff & Carter, 2019). Raman et al. (2019) randomly sampled

and surveyed 90 principals and 645 teachers using the Principals Technology Leadership Assessment (PTLA) and Technology Experiences survey. School principals who participated in professional development that emphasized ICT become technology leaders and help motivate teachers to integrate technology and prepare students for the 21st century workforce (Raman et al., 2019). Raman et al. (2019) studies support Durff and Carter's (2019) research by confirming that administrative support for technology integration is recommended to provide a positive vision and recognize substance influence on best practices that integrate technology.

Additional barriers in technology integration are connected to the lack of knowledge and skills offered to future teachers. Researchers conducted a comprehensive survey of 814 student teachers from 18 different universities, and four resulting interviews were held with 20 student teachers in four other universities in Turkey (Korucu-Kis & Ozmen, 2019). The researchers determined student teachers' perspectives on technology integration and found insight into barriers to using technology (Korucu-Kis & Ozmen, 2019). This study strengthened the idea that student teachers were not provided with an outstanding and meaningful technology integration experience. They have commonly reported that they still do not traditionally see technology as part of their class or see it as an essential tool (Korucu-Kis & Ozmen, 2019). Furthermore, universities must prepare future teachers by equipping them with technology skills, practice, and knowledge on how critical technology integration can enhance student learning.

Technology Standards

Student district leaders focus their goals and invest in providing students with updated standards, research-based practices, and resources to achieve student success. The main goal of education stakeholders is to identify problems, design, evaluate, implement solutions, and closely monitor outcomes at each learning stage (English, 2017). Rapid technological changes have greatly influenced education, and this forces school districts to not only on technical skills but also common knowledge (English, 2017). Stakeholders are obligated to keep up with changes to meet student needs and ensure that they are prepared for the 21st century workforce. Standards provide accountability and help strengthen an effective and positive learning environment. Although, it does not guarantee compliance from stakeholders. School and district leaders must provide support and practical guidance to assist teachers in preparing students for the 21st century workforce.

A significant motivation for technology to be effective and meaningful in the classroom heavily relies on teacher attitudes and practices. Zhang et al. (2020) reported that both veterans and novice teachers need professional development to implement curriculum standards successfully, technology standards, develop lessons to meet student needs with IEPs, and address the learning needs. The most frequent and persistent barrier to integrating technology even with the increase of accessibility to technology is a significant decline in teacher training and technical support (Francom, 2020). Francom's (2020) findings showed that access to technology has greatly improved but planning and integrating technology in lessons is still challenging. Teachers shared that the lack of time

has played a significant role in teacher frustration when lesson planning with standards that are not up to date and practical to prepare students for the 21st century.

Development of Digital Age Skills

The digital age has transformed the way students retain and acquire education and the approaches and best practices that teachers use to deliver their lessons (Saykili, 2019; Secoy & Singler, 2019; Starkey, 2020). Technology has enhanced learning experiences and improved instructional practices. Society's current socio-economic structures have been drastically affected and pressured by the impact of technology (Saykili, 2019). Technology's rapid influences in societies have affected school districts and forces stakeholders to keep up with these constant changes. Starkey (2020) stated that digital integration in schools aims to teach digital competencies, which are the up-and-coming concept of professional digital competence. There is a significant need for schools to focus on teaching skills to help learners succeed in the future workforce. For instance, in a rural town in Virginia, a sixth grade teacher created a lesson using differentiated, digital mini-lessons while still focusing on explicit instruction (Secoy & Singler, 2019). Throughout this explicit instruction, Secoy and Singler (2019) designed a technology-infused writing workshop that helped students be practical through digital modifications, digital age skills, and digital tools while the quality of learning and teaching are not compromised. Technology was used to enhance their understanding and provide a different approach to learning to reach learner needs. Teachers needed to provide one-to-one support using traditional teaching practices with digital tools integrated to entice understanding and creativity (Secoy & Singler, 2019). District and

school leaders develop goals and invest a significant amount of funding to ensure teachers and students conform to the digital age. Olszewski and Crompton (2020) conducted a survey completed by 335 K-12 teachers from 152 schools across 35 states and US territories to determine the academic gap between the use of technology and building digital-age skills in schools. They discovered that structured and consistent use of various digital tools significantly impacted student exposure to technology and the practical application of digital age skills (Olszewski & Crompton, 2020). In addition to that, the survey results showed that schools with teachers that successfully instructed digital age skills provided strong technology support.

District and school leaders should set standards that ensure best digital practices and constant exploration of digital tools. These standards validate that school districts should consider adopting specific technology integration frameworks such as TPACK and ISTE standards that offer a set of coherent guidelines that can encourage significant technology integration accountability, skills, and behaviors (Nelson et al., 2019). The innovation of technology has become a popular tool, and research findings reveal that technology enhances and improves learning in art, science, social studies, and math (Olszewski & Crompton, 2020). Experts from educational institutions worldwide have supported technology for years because it is evident that it enhances and increases effectiveness with pedagogical practice, supports authentic learning, and improves learning accountability and collaboration (Olszewski & Crompton, 2020).

Preparation for 21st Century Workforce

School districts and leaders are obligated to embrace the inevitable and ever-transforming digital era, where 21st century priorities prevail with innovations and technology that must be vigorously practiced (Raman et al., 2019). For example, Atik (2018) conducted a study in Turkey to determine if the country's vocational colleges meet the global economic workforce and determine if the local government has raised efforts to improve higher education institutions. This study suggested that the rapid changes have affected societies' development and transformation. In Atik's (2018) study, considerable time was dedicated to examining Turkey's vocational college curriculum and how issues and failures were addressed in their learning institutions. The country found the need to use their learning institutions to address the needs of their people. This is an excellent example of a learning environment that embraced technology, social media, and artificial intelligence, which significant for enforcing 21st century skills (Raman et al., 2019).

The 20th century educational model which continues to lead focus in many learning institutions, introduces standardized facts and procedures to prepare learners for the future's workforce (Alop, 2019). Learning institutions need to be globally competitive, develop engaged citizens, and ensure schools collaborate with 21st century competencies and skills through learning practices. These practices include developing critical thinking, complex problem solving, collaboration, and adding multimedia communication into core academic subjects (Office of Educational Technology, 2017). These skills are vital to help students succeed in the 21st century workplace, and they

need to explicitly learn design skills and habits, which means the design needs to be included in both art and non-art classrooms (Berk, 2016).

Students must gain skills that will help them effectively study, work, and live and obtain life-long learning skills because today's youth will face rapid and unforeseen adjustments (Moto et al., 2018). The future jobs will focus on the ones that machines cannot assist with, which are jobs that require more human qualities, such as creative expression, social interaction, physical skills, empathy, and collaboration (Alop, 2019). Additionally, the future's workforce skills include learning and innovation skills, information and technology skills, and life and career skills (Moto et al., 2018).

Classroom Environment

Technology has greatly influenced and transformed the classroom environment in various aspects, such as instructional delivery, the development of student products, and even how information is retrieved and accessed. This transformation obligates teachers to keep up with the fast-developing technology and enforce the practice of updating standards to meet the needs of the 21st century workforce. In the US, the development of technology standards is focused on meeting student needs and expectations that concern technology. Standards are vital because it gives teachers a guide for planning and understanding what they can do, what skills they possess, how to improve on it, and most especially, how to assist teachers in evaluating the standards (Olusola et al., 2019). This practice ensures that teachers identify critical skills, teach basic skills, and understand social, ethical, and human issues in improving effectiveness (Olusola et al., 2019). Additionally, Murgia et al. (2021) conducted a study on technology tools that help

support children's' discovery in the classroom. This discovery is present in the classroom when technology is present and supports critical thinking skills.

In a recent study in a Chilean school system, researchers explored how adolescents' subjective well-being is related to how they access technology. The researchers of this qualitative study utilized two large-scale empirical sources of information: The *2012 National Census of Educational Computing* and the *2013 National Survey of School Well Being*. The *National Survey of School Well-being* was used with 15-year-old adolescents from 191 schools. The *National Census of Educational Computing* was used in 9095 Chilean schools. These sources were essential tools because they comprised concepts of digital development, social well-being, school climate, and subjective well-being (Donoso et al., 2021). The sources were empirically large, and data were merged. A descriptive analysis was completed based on a dependent variable Personal Well-being Index, an independent variable, School Digital Development Index, and significant attributions that connect the schools and subjects. The researchers confirmed that the students' subjective well-being was closely connected with the social well-being and school climate of the schools they attended. The relationship showed that the students' subjective well-being, evident through the Personal Well-being Index, displayed a positive correlation with the measurement of social well-being and school climate and a negative correlation with age, SES, and dependence with the school administration (Donoso et al., 2021). There was a strong correlation between the SES and school administrative dependence with students in private schools because they came from families in high SES compared to students in public schools (Donoso et al., 2021).

In addition to that, the researchers confirmed that the women's present subject well-being was lower than men's in terms of social media. Donoso et al. (2021) and Riden et al. (2018) discovered that schools, who expose and provide students with learning experiences tied in with technology, provided their students with an effective learning environment with strong foundational skills. This shows that teachers can effectively prepare students to be successful in the 21st century workforce with proper guidance and updated technology standards. Digital learners are exposed to using technology in their daily lives for social and entertainment purposes with no difficulties, which means that they can successfully use technology with their learning (Tang & Chaw, 2016).

Benefits of Technology

Technology has changed teaching and learning in many significant ways. As the world undergoes rapidly changing technology, applications and programs are developing daily for needs other than educational purposes to meet student learning's increased demands (Burch & Mohammed, 2019). Many researchers have focused on exploring instructional technology and the benefits associated with technology. There are diverse ways of learning and teaching with technology, and to fulfill students' educational goals, it is crucial that school districts continuously update and evaluate educational technology (Burch & Mohammed, 2019). A literature review of 148 articles focused on a deep understanding of teacher perceptions on teacher perceptions and acceptance of integration. It confirmed that for faculty to understand and perceive technology tools integration positively, appropriate technology adoption is necessary (Burch & Mohammed, 2019). When technology integration is effective, teacher attitudes are also

affected. For example, through semi-structured interview research, seven elementary teachers who favored using technology successfully used technology with their students with autism (Sulaimani, 2017). The study revealed that six out of seven teachers favored using technology and believe that it positively impacts their students' learning experiences, particularly with enhancing peer to peer and student to teacher interactions (Sulaimani, 2017). To be more specific, technology has helped students personalize their learning, become independent learners, improve their communication skills, help reduce anxiety, and improve academic study and learning skills (Tucker, 2020).

Campus (2018) focused on evaluating the benefits of technology towards students' performance and did this by conducting a literature review of twenty current studies. The researcher targeted technology's research benefits in an educational setting based on satisfaction, effectiveness, performances, and student engagement. The researcher concluded that computerized innovation improved teaching and learning in many ways, and the effect depended on how teachers utilize technology in the classroom (Campus, 2018). The researcher's findings confirmed Sulaimani's (2017) findings on how technology helps improve communication skills, reduce anxiety, and improve academic skills, which ultimately affirmed that human capacity can be shaped and alter students with proper use of devices needs.

Since the integration of technology, several studies have focused on teachers and students have been conducted. In an action research study, 16 students who were taught English twice a week from a private University in Tunja were surveyed and interviewed to determine if technology contributed to their English class motivation (Barreto, 2018).

Findings confirmed that information and communication technology motivated students to work collaboratively, which enhanced their language and vocabulary skills (Barreto, 2018). In a descriptive-correlation-designed study, Hero (2019) surveyed 14 public school social studies teachers in Valenzuela City, Philippines. Through questionnaires and understand the impact of technology integration on social studies teachers. He discovered six dimensions of technology integration and confirmed that productivity and professional practice significantly improved with technology. The Hero findings confirmed Barreto's (2018) discovery about how technology helped teachers reflect on their practice, increasing student interest and fostering critical thinking. Ng and Fergusson (2019) also agreed that technology had enhanced teaching and student learning. However, there is still a need for scaffolding for many students. In a mixed-methods approach, Ng and Fergusson (2019) investigated pedagogical involvement in a partnership project and the perception of science teachers in Australia. Teachers believed that innovative technology enhances teaching and learning while students were motivated by online modules (Ng & Fergusson, 2019). These studies confirmed that technology has helped teach and learn by enhancing creativity, collaborative work, and teaching methods. However, teachers still need to provide additional support and guidance with students to use technology to help them learn effectively. In the STEM field, the robotics curriculum has been popularized in many school districts, and this technology has promoted problem-solving skills; and similar to Barreto (2018) and Anderson and Putnam (2019) studies, technology has enabled teamwork (Ntemngwa & Oliver, 2018). These recent studies confirm that technology integration has successfully influenced

teachers from different specialized fields (Anderson & Putnam, 2019; Barreto, 2018; Ntemngwa & Oliver, 2018).

Findings from many studies related to educational technology in the classrooms confirm that technology enhances student motivation and engagement (Dunn & Kennedy, 2019; Khan et al., 2019; Sahin & Yilmaz, 2020). Technology integration comes in many different forms and practices in the classrooms. In a small-scale research project, Barreto (2018) focused on technology used to motivate English use. Barreto (2018) used college students as a target group for the project and utilized online forums, surveys, and student artifacts. Findings revealed that collaborative work instills motivation for teachers who involve their students in activities that caught their attention empowers the learning process (Barreto, 2018). In another study, Dunn and Kennedy (2019) aimed to assess the impact of emotional and cognitive-behavioral engagement with Technology Enhanced Learning (TEL) on student grades and how motivation levels predict engagement. This study measured engagement and usage of TEL, student motivation, and self-report student grades of 524 undergraduate students (Dunn & Kennedy, 2019). Findings confirmed that intrinsic motivations predict engagement, while extrinsic motivation predicts usage (Dunn & Kennedy, 2019). Examples of technology-enhancing learning include augmented reality, adaptive computer testing, online discussion boards, and robotics (Douglas et al., 2020; Dunn & Kennedy, 2019; Khan et al., 2019; Sahin & Yilmaz, 2020).

When students in the engineering field are provided with tools, such as Augmented Reality, that allow them to visualize and interact in their classroom,

motivation towards learning is enhanced (Kaur et al., 2020). Additionally, Khan et al. (2019) found that student attention, satisfaction, and confidence increased through the impact of Augmented Reality. Seventy-eight science students at the University of Cape Town participated in research to measure and understand the implications of augmented reality on learning motivation (Kaur et al., 2020). Findings showed that augmented reality increased student learning motivation on three factors: (1) attention, (2) satisfaction, and (3) confidence (Kaur et al., 2020). Sahin and Yilmaz (2020) confirmed that academic achievements and attitudes showed a positive and significant correlation as Kaur et al. (2020), and Khan et al. (2019) findings on student motivation through Augmented Reality. Augmented reality has been adopted in the classroom setting and is an interactive learning tool that contributes to student motivation.

Computer adaptive testing suggests positive test-relevant motivation, engagement, and improving student learning outcomes (Martin & Lazendic, 2018; Ross et al., 2018). Ling et al. (2017) supported Martin and Lazendic's (2018), and Ross et al. (2018) findings by confirming that adaptive computer testing is effective by considering the possible effect of immediate feedback during test engagement, and it corrects test anxiety, time on task and test performance. Research comprising 849 student participants from a higher institution in Australia was surveyed, and student scores were collected. These students participated in a study to examine possible relationships between adaptive quizzes and student learning outcomes (Ross et al., 2018). The study's findings revealed that there were challenges involved in creating adaptive quizzes. However, students perceive to increase their motivation and engagement, which lead to improved learning

outcomes (Ross et al., 2018). This study affirmed that technology integration through computer adaptive testing encourages student engagement and motivation.

Technology boosts lifelong learning and helps students develop their technological competence by gaining knowledge of online tools and using them to work cooperatively and interactively with their peers through online discussion boards (Barreto, 2018). Cooperative learning skills have recently had a major influence on student learning and teaching through rich interaction within online discussions, which has increased engagement between students and their peers and instructors (Douglas et al., 2020). Barreto (2018) and Douglas et al. (2020) both confirmed that technology has more profound insights into online teaching and practice through personalized and guided online discussions (Yen et al., 2019). When discussion boards include detailed and highly interactive content, it produces a strong foundation for students to initiate and direct conversation and become confident learners (Douglas et al., 2020).

Like online classes, school districts have adopted robotics. It has increased student engagement as students reported that robotics encourages working with their peers. Solving real-world problems helps them be motivated, engaged, and keeps track of their work (Lara-Prieto et al., 2019). Additionally, teachers reported that robotics activities, such as coding, arose the students' curiosity and attention (Aksu & Durak, 2019). Ntemngwa and Oliver’s (2018) findings showed that teachers who successfully implemented STEM integrated robotics help students adapt to technological changes, discover learning trends, and identify personalized learning potential.

Implications

To date, the experiences of elementary school teachers regarding using latest educational technology with outdated technology standards have not been examined at the research site. The data collected during this study may contribute to social change by influencing and informing best practices to help students to be successful in the 21st century workforce. The findings may also inform district curriculum and instruction program managers to provide professional development to meet the district's instructional staff's needs. This project study may impact student learning because findings could influence changes in the curricula. Ultimately, the findings may lead to improved technology-integrated lessons with educational technology and best practices to prepare students for the 21st century workforce.

The data collected for this research could lead to many projects for the WPISD. A project would be to develop a curriculum to prepare students for the 21st century workforce. A second possible project is to provide professional development to enhance teacher understanding and best teach with technology integrated with their lessons. Lai and Bower (2019) reported that many contexts, methodologies, and perspectives had been utilized to evaluate technology use in education. A large amount of literature from thousands of journals in educational technology has made it historically difficult to reach an informed perspective on educational technology research and evaluation (Lai & Bower, 2019). This study may help the school district leaders understand teacher perceptions about how they currently use technology to help prepare students for the 21st century workforce because of the limited studies conducted in the academic field at

WPISD. The implications to the school district may be reflected in the greater understanding of teacher perceptions.

Summary

School and district leaders are forced to meet the digital era's constant and rapid transformational influence while meeting 21st century skills through innovations and technology (Raman et al., 2019). In the WPISD, teachers are expected to use the latest educational technology in their teaching, but the technology standards provided are not present for preparing students for the 21st century workforce.

Therefore, the purpose of this project study was to explore how elementary teachers use current classroom technologies to address 21st century skills as mandated by WPISD, despite having outdated technology standards.

The literature review analyzed and synthesized the conceptual framework guiding this study and includes an analysis of studies conducted in the development and significance of technology standards in the US and internationally. The conceptual framework for this project study had been explored by multiple researchers who include analyses of technology integration, standards, and curriculum. Furthermore, research findings from reviewed literature are about technology integration, curriculum, technology barriers, 21st century skills, stakeholder perspectives, and student preparation for the 21st century workforce.

In Section 2, the methodology, participants, data collection, instruments, data analysis, and limitations of the study are described. Instruments that were used for this

study are presented. The setting, sample, and methods of collecting data are explained in detail. The plan for analyzing data is also discussed.

Section 2: The Methodology

This section of the project study contains specific details about this doctoral study's qualitative design and methodology. Section 2 includes a discussion of the participant sample, access procedures, data collection, and data analysis. School district leaders and stakeholders may use this project study's findings to support teachers regarding using the latest educational technology standards to prepare students for the 21st century workforce. The purpose of this project study was to explore how elementary teachers use current classroom technologies to address 21st century skills as mandated by the WPISD despite having outdated technology standards. In this section, I discuss the qualitative study design that was used for this project study. I collected data regarding teacher perspectives, ideas, experiences, and knowledge about using the latest educational technology with outdated technology standards.

Qualitative Research Design and Approach

The purpose of this study was to explore how elementary teachers use current classroom technologies to address 21st century skills as mandated by WPISD, despite having outdated technology standards. Data collection regarding teacher perspectives, ideas, experiences, and knowledge on integrating technology in lessons to prepare students for the 21st century workforce was also conducted. K-5 elementary teachers were asked how they use technology standards the district last adopted in 2008 to plan and deliver their lessons.

A qualitative design was used for this project study. The research design was derived from the study problem and two research questions. RQ1 was about how teachers use current technology and 2008 technology standards. Information derived from this question helped determine how teachers deliver lessons despite having outdated technology standards. RQ2 involved teacher needs that can help with efficient delivery of lessons using current technology. Many researchers use the qualitative design to discover where, when, how, and what conditions cause or build on an action or behavior. The qualitative design involves words as opposed to numbers and exploring opinions and thoughts of respondents (Creswell, 2012). The qualitative design is appropriate for this study in its effort to explore K-5 elementary teacher experiences in order to develop more intuitive responses, ask follow up questions, and gain a significant understanding of attitudes, perceptions, and motivations.

The basic qualitative methodology was used to explore how WPISD elementary school teachers use the latest educational technology with 2008 technology standards. Novice researchers commonly use the basic interpretive study to investigate opinions and experiences. A basic inquiry method was appropriate for this study because participant interviews are the study's data source. A basic qualitative methodology is appropriate for this study because it allowed me to relate to participants' shared experiences and measure attitudes, opinions, and behaviors; however, I did not use a large population sample to gather numerical data or data that could be transformed into statistics.

For this study, four research designs were considered and explored. The first research design was the narrative case study. Case studies focus involve chronological

narration of individuals' experiences and stories, which was not effective for this study because it was centralized on single narratives. I considered using an ethnographic design; however, it was not suitable because it involves a particular group that is usually a large population that shared the same values and beliefs through observational data that has been collected over a long time. This design was unsuitable because I needed a large population of participants, which meant data collection takes a long time. Grounded theory was inappropriate for this study because I was not anticipating establishing a theory. I considered a fourth research design, the case study, which involves a deep understanding through multiple types of data (Creswell & Creswell, 2017). This design was not appropriate for my study because I only used interviews as my data source.

Participants

Criteria for Selecting Participants

I used purposeful sampling of participants to explore how elementary teachers in the WPISD use the latest educational technology in their teaching. Technology standards were not current for preparing students for the 21st century workforce. For this study, it was ideal to have a sample size of approximately 10-12 elementary school teachers. I consulted with the study site principal at the elementary school to provide a list of teachers who had at least two years of teaching experience, held a state teaching certificate, and used technology in the classroom as measured by the Effective Learning Environment Observation Tool (ELEOT). The ELEOT is an observation tool used to determine if the learning environment aligns with the AdvancED standards and indicators. The principal of the site school was the gatekeeper. The gatekeeper had the

authority to allow or deny access to participants and connections through other significant key persons within the school district. The research site for this study was a public K-5 elementary school located in the WPI. I used a purposeful sampling to select 12 participants for the study. Purposeful sampling ensured that a mix of people were interviewed. Additionally, purposeful sampling helped ensure that a particular group was not overrepresented while others in the study were underrepresented.

I gave elementary teachers who met selection criteria and agreed to participate an opportunity to be part of the study. I required teachers to have least 2 years of teaching experience, a state teaching certificate, and experience using technology in the classroom as measured by the ELEOT. Through email, prospective participants completed and returned an approved consent letter.

Justification for Number of Participants

My goal in selecting participants was to obtain rich and valuable information that significantly contributes to understanding the phenomenon. Selection criteria were critical when collecting rich narratives involving elementary teachers' experiences regarding using educational technology with outdated standards to prepare students for the 21st century workforce. My goal was to develop an in-depth examination of a central phenomenon. The goal was to gain insight regarding elementary school teachers' experiences related to the phenomenon of educational technology use with outdated standards to prepare students for the 21st century workforce.

For this study, the 12 elementary school teachers from grades K-5 were interviewed to better understand teacher experiences on the latest educational technology

with the 2008 adopted technology standards. Twelve participants provided sufficient data saturation, which addressed the purpose of the study and research questions. Yin (2018) stated that once data collected enabled the research to reach redundancy, the sample size achieved is appropriate.

Procedures for Gaining Access to Participants

The process to gain access to participants involved the district Commissioner of Education and the site administrator. They were contacted through an email which included information on the study's purpose and the problem to be researched. Establishing the study's purpose, respectfully requesting consent, and building rapport with the district was intended to support the district by identifying the appropriate participants and school sites for this study. After obtaining approval from the Walden University IRB (Approval No. 08-26-21-0762866), purposeful sampling methods were used to identify potential participants who met the selection criteria: a) teachers employed in the district for at least two years, b) hold a state teaching certificate, and c) use technology in the classroom based on the ELEOT. Teachers who meet the criteria received an email invitation to participate in the study. The invitation explained the study's purpose and procedures to ensure participant confidentiality and ethical protection. Once the study is complete, a summary of the findings will be shared with the study district, study site administrator, and participating teachers.

Establishing a Researcher-Participant Working Relationship

A trustworthy relationship with the participants who agreed to be part of this study was established. To develop and establish a strong working relationship with the

participants, several measures were conducted. A letter of invitation was sent via email from my Walden University email address to the teachers' WPISD email addresses provided by the school principal. Attached to the email were an informed consent form and directions as they participated in this study. Participants were given the option to switch to their personal email if they chose.

The goal is to help each participant feel comfortable sharing their responses to the interview protocol. Before the interview, participants were reminded that they could withdraw from the study at any time with no penalty or consequence for not participating. Participants were also be reminded that audio recordings and notes would be taken during the interview.

Participants were briefed about the researcher's role in listening and the primary instrument for gathering data. During the interview, the researcher was attentive to the participants and built a comfortable rapport, so participants knew that their time and information were valuable to the study. I made sure to show appreciation to each participant for their commitment and participation in the study. I consistently emphasized that their participation is purely voluntary and that their overall protection was always a priority throughout the study.

Measures for Ethical Protection of Participants

Informed Consent

Throughout this study, ethical protection was strictly prioritized from the beginning until the completion of the study. The ethical practice was in place to ensure the protection of all participants' confidentiality and anonymity while obtaining informed

consent. This is important because qualitative research can anticipate ethical issues that require managing (Creswell, 2012). I used the ethical guidelines set forth by Walden University to address any concerns throughout the study. Research and preparation were done to avoid and address ethical protection concerns, and approval from IRB was obtained before conducting this study.

Informed consent forms were provided to all participants using their email accounts. This consent form included the study's purpose, the researcher's role, their role as a participant in the study, the preservation of their confidentiality, and the study's voluntary grounds. The consent form also notified all participants of their right to withdraw from the study at any time, with no explanation required. Participants signed and returned forms using their preferred emails to ensure confidentiality.

Confidentiality

To protect each participant's identities, they were assigned an alphanumeric code. I used the letter "T" for the teacher, followed by a corresponding number for each interviewee to code the transcription data. For example, T1 was used for the first participant. I am the only person who knows the identity of each participant. The participants' identity was not in the findings or mentioned at any time to the district administrators. Participants were informed that all data collected are consistently protected and only used for this project study. I am the only person that has access to this data. Alphanumeric codes will be used instead of names to keep the participants' identities confidential (Creswell, 2012).

Protection from Harm

To protect all participants from harm, I maintained that all collected data, informed consent forms, interview notes, audio recordings, logs, and other documentation from the interviews were safe and secured. The interview transcripts were electronically stored on my personal computer in an encrypted file folder at my home. Interview transcripts and any related files during the data collection are encrypted. All non-digital data are securely stored in a locked filing cabinet in my home office. The data collected for this study will be secured for 5 years, as per Walden University's protocol. After 5 years, digital data will be deleted and removed from devices permanently, and hard copy data will be shredded.

Data Collection

This basic qualitative study consisted of interviews with each participant to explore how elementary teachers in the WPISD use the latest educational technology in their teaching. In contrast, technology standards are not current when preparing students for the 21st century workforce or higher education. The instruments used to collect data are semi-structured interviews to gain personal knowledge of a situation (Clearly et al., 2014). This study's qualitative data collection goal is to discover experiences and how the implications are associated (Merriam, 2009).

Type of Data Collection and Justification

The data collected were conducted via qualitative interviews from a sample of certified elementary teachers from the WPISD. Responsive interviewing techniques were used during interviews. A responsive interview is a conversational partnership that allows

the researcher to understand experiences through the participants' words and stories (Rubin & Rubin, 2012). In other words, a responsive interview is a conversation in which the interviewer is both the researcher and participant and can promote insight and reflection by contributing to the discussion (Rubin & Rubin, 2012). Through responsive interviewing, I gathered detailed information from K-5 teachers who are knowledgeable and provided in-depth information on how they use the latest educational technology in their teaching, while technology standards are not current.

The face-to-face interview with each teacher participant lasted about 45-60 minutes and took place on their campus in their classrooms, and some opted to conduct the interviews via Google Meets. Jacob and Furgerson (2012) recommended that questions asked of participants are predetermined and open-ended questions. Interviews were audio-recorded through Google Meets via a laptop computer with a microphone with the participant's permission. Notes regarding body language and other items of interest during the interview were taken. Understanding body language is important because it is necessary to help interpret the respondents' attitudes and feelings (Mariampolski, 2001). Additionally, researchers need to be aware of non-verbal communication to increase rapport and control negative attitudes (Mariampolski, 2001).

Interviewing was an appropriate means of data collection for this project study because the practice allowed me to address the research questions regarding the 2008 adopted technology standards and explore how elementary teachers in the WPISD use the latest educational technology in their teaching, while technology standards provided are not current when preparing students for the 21st century workforce. These interviews

allowed participating teachers to offer their perspectives and experiences regarding the 2008 adopted technology standards.

Data Collection Instruments and Sources

The purpose of this study was to explore how elementary teachers use current classroom technologies to address 21st century skills as mandated by WPISD, despite having outdated technology standards. I collected data through semi-structured interviews through basic inquiry. Interviews were the most used data collection method in qualitative studies (Kallio et al., 2016). Interviews are the best data collection source when researchers cannot observe behavior, feelings, or how people react to a situation (Merriam, 2009). I focused on collecting data through interviews. The data collected answered the research questions of this study.

Interviews

Interviews can be structured, semi-structured, or unstructured and are the preferred method for collecting qualitative data because of the rich information it provides (Merriam, 2009). A researcher-created interview protocol will be followed. The interview protocol will inform participants of the questions asked during the semi-structured interviews (Lodico et al., 2010). I sought assistance from my educational experts from my school district to review and provide feedback concerning the quality of my interview questions in seeking answers to the research questions of this study. I used an expert review panel, which consisted of my school district program manager of Instructional Technology and Distance Education as well as instructors of the school districts Educational Technology Certification Program, to review my interview protocol

to increase the content validity and reliability of the interview data (Yin, 2018). Qualitative research uses interviews to collect information to gain insight into others' descriptions and interpretations (Redlich-Amirav & Higginbottom, 2014; Stake, 1995). For this study, semi-structured interviews were deemed most appropriate, and a mix of structured and open-ended questions was used during the interview. Semi-structured interviews are flexible and were used to gain specific data from participants through structured and informal questions to allow for spontaneous answers that can add depth and thickness to the data (Kvale, 2008). The answers provided a clear description of the situation or created a story that the participant could recall. A researcher should not ask "why" questions because they can lead to dead-end responses, which is why open-ended questions will be used for this study so that participants can describe their experiences, options, values, and background (Merriam, 2009).

Qualitative questions are open-ended and allow participants to define the situation in their own words, leading them to formulate new ideas on the topic. An interview guide will be used when asking questions (Merriam, 2009). Additional questions were asked, which may take a hypothetical situation, ideal position, or interpretive questions to help add in-depth data from the participant. Other questions can relate to lesson plan preparation and delivery to further explore this study's research questions. Some interviews were conducted on the school site and some via Google meetings for social distancing purposes. The time and place of the interview were based on the participants' convenience. Each of the 12 participants was interviewed for approximately 30-45

minutes. I scheduled the interviews and the classroom observation within a week upon IRB approval.

Sufficiency of Data Collection

An interview protocol and open-ended questions aligned to the research questions were used to collect sufficient data. The open-ended interview questions allowed each participant to provide more information and elaborate on their experiences, feelings, attitudes, and understanding of using the latest educational technology in their teaching. In contrast, the technology standards provided were not current for preparing students for the 21st century workforce. The semi-structured interview format gives the research the flexibility to gain a deeper perspective of the participants' experiences and collect specific data from all participants (Merriam, 2009). To further understand each participants' experiences and seek answers for this study's research questions, I will use probing questions throughout the interview to elicit more information or clarify participant responses.

Process for Data Collection

Data collection from semi-structured interviews were generated, collected, and recorded through digital audio via Google Meets. Participants were given an option to participate in the interview face-to-face, with 6 feet social distancing and face mask safety measures, or through virtual interviews via Google Meet. Four out of twelve participants opted for virtual interviews. During each interview, I used digital audio recording and note-taking procedures to record the data collected. The audio recording and notes were used to record what was seen, heard, and experienced during each

interview. Interview data were included in addition to the digital audio recording and notes during analysis.

System for Data Tracking

As I collected data, I simultaneously organized and kept track of data using a research log. I ensured that all data collected for this study was safely secured. All written transcripts and notes are securely locked in a filing cabinet at my home office. The interview audio recordings were downloaded in a password-protected folder on my laptop and cellphone to ensure data security. As suggested by Creswell (2012), I used alphanumeric codes to identify participant identities to ensure protection. When I work, I lock all my research data in my filing cabinet at my home office. I did not bring any research data to my workplace. All data collected were only be accessed by me. According to Walden University's policy, all data will remain locked for five years, commencing the time I complete this research project study.

Procedures for Gaining Access to Participants

Gaining access to participants required obtaining permission from WPISDs Commissioner of Education and the study site's school principal. The fieldwork did not begin without properly obtaining the necessary permission to access participants and their school sites. Identifying significant gatekeepers who are the school districts' official leaders is important for the accountability and credibility of the study (Lodico et al., 2010). The WPISD required a research request letter approved by the Commissioner of Education. I emailed the commissioner requesting to meet to talk personally about my research, and in that same email, I attached an electronic copy of the research request

letter. When I met with commissioner, I also personally hand-delivered a hard copy of the research request letter and was prepared to answer any questions the commissioner had. This research request letter included the location for the study, a participant pool, a thorough description of the qualitative research plan, a description of how data will be utilized, and an outline of potential risks that could affect participants. Additionally, a copy of the approved proposal was attached to the letter via email.

Once the WPISD commissioner of education approved the research request, I submitted a request to conduct a study to Walden University's Institutional Review Board (IRB). This effort included an informed consent letter provided to the school study site's principal. After IRB approval, I emailed and respectfully asked for permission from each campus principal participating in the study. One school responded and agreed to be a school study site. The participating principal was informed of the research study and was allowed to reach out to me should they have any questions about the study. The school's gatekeeper provided participant information necessary for this study and allocated a list of teachers on campus that meet the criteria. The study's purpose, data collection methods, and a complete overview of the project study were included in the request letter addressed to the school site's principal. Once the request letter was approved and obtained, participating teachers received an email, including a description of the research study and an attachment of the informed consent form. Participating teachers responded and returned via email.

Role of the Researcher

I am an elementary school principal in the WPISD. My research role is to conduct qualitative interviews as an observer only. I made sure that this study participants did not have a professional relationship with me or worked under my supervision. Before the interviews, I informed, via email, participants about the research study being a part of my doctoral program requirement. I stressed that the WPISD school district was not the sponsor of the research. I stressed that for this study, I am a researcher and not an administrator. Before taking part in this study, participants gave full consent. Alphanumeric codes were used to protect the study's credibility and keep the identities of the participants confidential. These safeguards in place minimized the threat of internal bias throughout the study. My best interest is to work with the teachers from the specific school site because the school has been identified as a potential Future Ready school focusing on 21st century skills. I used peer review and member checking to validate my research and avoid any opportunity of misinterpretation of the respondents' intent (Merriam, 2009). I used subjective questions and made sure not to influence the participants' responses in any way. I avoided making any facial expressions or use different voice tones as I carefully listened to the participants' responses.

My professional role as a school administrator did not affect this study because I only collected data in a school where I held no position. I do not hold a supervisory position with teachers who were being interviewed. I have a strong interest in educational technology. I have been in education for 17 years; I have 9 years of teaching experience at the high school and elementary level, and 8 years of administrative experience. From

my experience as a teacher and administrator, I have explored learning gaps, disconnections, and inconsistencies between schools and district offices, and students' need not being addressed effectively. To help focus on the research process, data collection, data analysis, and my role as a researcher, I kept a research journal to log my thoughts and experiences throughout the study. This practice assisted me with reflecting on my research process and avoid any biases (Orange, 2016). I included any handwritten artifacts in this journal and ensured that all research documents were secured within five years of completion. The practice of constant reflection will allow me to focus and avoid biases that could influence or interfere with the interview structure, coding, interpretation, or conclusions presented from the data collected. This study was meaningfully and credibly conducted.

Data Analysis

Qualitative data analysis methods were used to analyze the data. Qualitative studies require constant data collection and analysis, and data were used to interpret an answer to the research questions (Lodico et al., 2010). Interviews were the only source of data collection for this study. An analysis of the data collected included a summary of codes, categories, and common themes from the findings. The purpose of qualitative analysis was to obtain information through qualitative interviews, allowing researchers to regenerate events that they are not familiar with (Rubin & Rubin, 2012). There are seven steps in data analysis. These steps were transcribing and summarizing interviews; coding excepts within interviews based on relevant concepts; coding between interviews; sorting and comparing codes, integrating various interviews to explore a different understanding

of the data, and combining ideas and themes to generate a theory and conveying findings (Rubin & Rubin, 2012). An analysis of the data collected was utilized to better understand WPISDs elementary school teachers' use of the latest educational technology with outdated technology standards to prepare students for the 21st century.

Coding Procedures

The data analysis phase began as early as the completion of the first interview. A review of the study's purpose and research question were conducted before the interviews. A focus on the purpose and research question was vital because it assisted in identifying essential data that may arise in the interviews. I managed data and used open coding to find common trends and schemes from each participants' interview. It was crucial to analyze data regularly because qualitative data is inductive and comparative, and a better interpretation of the data can arise (Merriam, 2009).

In qualitative research, researchers commonly conduct data collection and analysis simultaneously (Merriam, 2009). I organized and secured the data collection during interviews, which included audio recordings, handwritten notes, and the audio recording portion of virtual meetings. Effective organization of the data collection assisted in the coding process. The coding process was conducted digitally through Microsoft Word and Excel. During each interview, I took down notes on my audit trail to record non-verbal cues. These notes were important because it reminded me of each participant's body language, facial expressions, and overall demeanor during the interview. After each interview, I generated transcripts of the audio recordings using Google meet. There were gaps in between interviews because of preferred schedules and

availability. During the time I waited for teacher consents and responses, I took the opportunity to move forward and generated transcripts, reviewed transcripts, and emailed them to participants for review and gradually began working on the summaries. All the data were organized and transcribed using Microsoft word in preparation for the coding process. I read all transcripts to understand each participants' response and ensured accuracy for each interview.

During the open coding process, I read every transcript, and highlighted words and phrases that stood out to me. During the second round of reading, I continued to highlight words and phrases that I might have missed during the first round of reading. I noticed words that described a phenomenon that were consistently mentioned. I found 18 codes. I used color coding and highlighting to organize the emerged keywords relevant to my research questions. During the third pass at reading the transcripts and coding, I was able to organize the codes into categories. I finalized the third reading with 22 codes. I organized and categorized the codes into conceptual categories, for which there were seven total. From these seven categories, I developed themes and categorized them based on the research questions. The three basic themes developed were disconnect between standards and instructional practices, teacher awareness of future development needs, and preparation and training. Data were organized to develop any emerging, preliminary impressions and use my coding system to identify concepts and relations (Gibbs, 2007) quickly.

During the analysis, I used the thematic method and open and axial coding, which was conducted using Microsoft word (Merriam, 2009). Upon completing data coding, I

organized data into meaningful groups by labeling codes relevant to the study. I examined the codes to avoid overlapping and redundancy. After this, I collapsed the codes into general themes, which were maintained and listed in a Word document to consistently monitor the data analysis. I used one Excel spreadsheet to organize and sort information based on the research questions. This allowed me to merge similar themes or delete themes that do not have adequate data to support them. I conducted multiple spreadsheet reviews to ensure that common themes and threads had sufficient commonality and coherence and were distinctly organized.

I did not use any data analysis software for this study. I used Microsoft Excel only to manually organize my data using the thematic method. I assigned codes to different bits and pieces of data to begin constructing categories and identified ideas or themes using keywords shared and expressed by the participants (Merriam, 2009). I used the open coding strategy to identify ideas using key words from participants. I was intentional about searching for repeated words or experiences related to the use of technology, knowledge, utilization of 2008 technology standards, and training needs, all of which were essential concepts from the study's framework. After analyzing the interview data, I used open coding to label the data with words and schemes that made sense (Merriam, 2009). The open coding strategy was used to code, followed by axial coding. Twenty-two codes were discovered during the three passes of coding (see Appendix B). I then organized the codes into common categories which narrowed it down to seven categories. Based on the data collected from the interviews, the codes that emerged were organized into seven categories. The seven categories are (a) Edtech, (b)

Technology Devices – iPads, Elmos, projectors, (c) programs – Smart Ants, Achieve3000, IXL, etc., (d) no planning with 2008 Tech standards, (e) enforcement of 2008 technology standards, (f) teacher development needs, and (g) teacher frustration/attitudes.

I used axial data to combine and group ideas to form categories while refinements were complete to determine final categories and subcategories (Merriam, 2009). I used the Microsoft Excel highlighters to label and identify common codes. Open and axial coding was used in the beginning stages of data analysis to identify emerging codes and categories. Some of the developing categories involved lack of training/enforcement of 2008 technology standards, ease of use, and utilization of technology. I then used the descriptive method to assign themes for the emerging categories.

There were 12 participants for this study. The teacher participants consisted of teachers from first grade (2), second grade (3), third grade (2), fourth grade (3), and fifth grade (2). I scheduled an individual meeting with each participant according to their desired time and date. All teachers' interviews were either conducted in their classrooms after school, or through Google meets at their request. Each interview lasted between 30-45 minutes and was audio recorded. Codes and themes emerged based on the data analysis from interviews. I grouped initial codes into categories, and then into core themes (Merriam, 2009). This resulted in the production of three core themes. The themes are (a) disconnect between standards and instructional practices, (b) teacher awareness of future development needs, and (c) preparation and training.

Evidence of Quality and Procedures to Assure Accuracy and Credibility

Accuracy and credibility of information were taken seriously and securely done through multiple means. First, all interviews were audio-recorded, and audio from virtual meetings was recorded. Audio recordings encourage a safe, friendly, and interactive dialogue with participating interviewees and enhance information transparency (Creswell, 2012). Audio recordings also protect the research because it provides an unbiased and credible narration of the interview and allows a holistic view of the interviewees' perspective (Sullivan, 2010). Preliminary findings, audio recordings, and transcripts underwent member-checking which was conducted via email. Member checking was used to confirm credibility and trustworthiness (Lincoln, 1985). This practice showed that the findings of this study are legitimate and truthful. To authenticate and validate responses, transcripts will be emailed to each participant.

Procedures for Dealing with Discrepant Cases

In this study, discrepant cases were seriously considered. Discrepant cases are intentionally selected to identify and modify an emerging theory not entirely dispute it (Creswell, 2012). The discrepant cases can help the WPISD school leaders and teachers develop a decision process regarding technology integration in instruction. In addition, discrepant cases can help the school district's board of education create policies that can support teachers in the WPISD.

During the interviews of some participants, it seemed that they were fearful of being truthful about using or being knowledgeable about the 2008 technology standards.

This was evident in their body language and facial expressions. Other than that, no other discrepant data emerged.

Trustworthiness and Credibility of Findings

In all research, credibility and accuracy of findings are two major concerns when addressing how data were collected, analyzed, and interpreted (Merriam, 2009). Credibility ensures that findings are real and trustworthy (Creswell, 2012). For this study, I used purposeful sampling, member checks, and peer review to ensure the accuracy and reliability of my data were analyzed and interpreted properly.

The school principal of the study site made sure that participants met all criteria before being invited to participate in this study. The school principal prepared and provided a list of teachers who met the criteria. After each audio-recorded interview and completion of transcripts, participants received a copy of the transcripts to confirm the accuracy of what was mentioned during the interview. After that was confirmed by the participants, I provided each participant with a summary of my initial findings to confirm my interpretation as member checking efforts. According to Merriam (2009), one strategy to control a researcher's bias is to take back analysis findings to the interviewee to ensure significant control of any misunderstanding or misinterpretation. Each participant was given the opportunity to check the accuracy and ask any additional questions relating to the interpretation to establish credibility and validity (Creswell, 2012). Participants were given a week to complete member checking via mail. Participants were asked for approval or to respond with any correction or questions within three days. This procedure is important to avoid any possibility of interpretation of

the participants' perspectives (Merriam, 2009). To signify the accuracy of the information, my interpretation needed to be derived from their experiences and not misrepresented. Three out of 12 participants made changes to their summary. These changes were mostly additions. For example, one participant wanted to emphasize the need to add additional training for technology integration for K-2 students. All participants provided feedback and approval through emails. Additionally, two participants called me via cellphone to clarify some questions.

Data Analysis Results

The purpose of this qualitative study was to explore how elementary teachers use current classroom technologies to address 21st century skills as mandated by WPISD, despite having outdated technology standards. The data were collected and analyzed to answer the following research questions:

RQ1: What experiences do K-5 elementary teachers report in using current classroom technologies to address 21st century skills as mandated by WPISD, despite having outdated technology standards?

RQ2: What do K-5 elementary teachers report they need from the school district to effectively use current classroom technology more efficiently in delivering their curriculum?

From the interviews emerged seven categories. From these categories, I developed three themes which are disconnect between standards and instructional practices, teacher awareness of future development needs, and preparation and training.

RQ1

The first research question asked about the experiences of K-5 teachers with using current classroom technologies to address 21st century skills mandated by WPISD, despite having outdated technology standards. RQ1 was addressed and aligned with theme 1 and theme 2. After an analysis of 12 interview responses, it is evident that the WPISD ensures that all classrooms are equipped with current devices and apps that help address 21st century skills. A total of eight apps and programs that help address 21st century skills were mentioned by our participants (see Appendix B). The top program that teachers report with the highest commonality is Achieve 3000 and IXL. Participant T1 has shared that he is very big on Achieve 3000 because he sees, "improvement in student reading and writing." Participants have shared that they implement a daily routine using Achieve 3000, Freckle, Google Apps for Education because they believe that it helps with student achievement. Despite the outdated technology standards, teachers are still provided with current classroom technologies and programs that help teachers address the 21st century skills. Additionally, 100% of the participants shared that they do not use the 2008 technology standards.

Theme 1: Disconnect Between Standards and Instructional Practice

Theme 1 addressed RQ1 which focused the experiences of K-5 teachers with using current classroom technologies to address 21st century skills mandated by WPISD, despite having outdated technology standards. While all teachers report that they do not use the outdated technology standards, five out of twelve expressed training needs on troubleshooting devices. A disconnect between the technology standards and instructional

practices is emerged from the interviews. All participants revealed that they do not recall or use the 2008 technology standards when planning 21st century skill lessons. This theme encompasses 13 codes and three categories. The categories consist of *Tech Standards Enforcement, Teacher Frustration,* and *no planning with 2008 Technology Standards* (see Appendix B). Half of the participants recall seeing the technology standards, however, they shared that the standards are obsolete. Participant T8 shared that the standards are, "not relatable to her current students." Nearly two-thirds (58%) of participants expressed the need for an overview or training on how to use the 2008 Technology Standards. When asked about enforcement of technology standards, 75% of teachers (N=9) expressed that there is no enforcement, memo, or mention of the need to use the standards. Participant T4 shared that the tech standards are not included in their school's standard based report cards, so she does not see the need to address them. Every participant indicated they do not use the 2008 technology standards; however, teachers still integrate technology in their classroom using the devices and programs that the school district procures for all schools. All participants reported integrating and addressing 21st century skills in the classrooms, but the 2008 technology standards were not utilized in planning and lesson delivery according to participants.

The findings confirmed that current technologies such as iPads, Elmos, and projectors are provided by the school district. Furnishing classrooms with these devices help teachers address 21st century skills, however, 47% of teachers report that they need training on how to troubleshoot and use these devices. Half of the participants reported

that the 2008 technology standards are obsolete and 100% admit that they do not recall or use the standards in their planning.

Theme 2: Teacher Awareness of Future Development Needs

Theme 2 addresses RQ1 with the experiences of K-5 teachers with using current classroom technologies to address 21st century skills mandated by WPISD, despite having outdated technology standards. Teacher participants from Grades 1, 2, and 3, all shared the need for training on how to operate the devices provided to them, as well as how to troubleshoot when common issues come about when using the devices. Seventy-five percent of teachers shared that the 2008 technology standards are not enforced, which is why they do not use them. Teachers use current classroom technology to address 21st century skills through the top-rated apps, which are Achieve3000 (83%), IXL (83%), and Renaissance (75%). This theme is made up of 10 codes and 3 categories (see Appendix B). The categories consist of teacher development needs, enforcement of tech standards, and teacher frustration. A majority of the participants (83%) have completed the district EdTech program and found it to be very helpful with the efforts with technology integration, however, this program is centralized on tools and apps and minimal time on how to operate iPads and Chromebooks. Participants who participated in the EdTech program confirmed that technology integration is an important educational innovation to improve their teaching and how students learn 21st century skills. This confirmed that WPISDs EdTech program provides training on technology integration for teachers and at the same time gains motivation for educational innovations. In a similar study, Ahmad et al. (2020) study findings confirmed that teachers needed to be given

training and motivation to promote and increase digital literacy to improve skills in using the most current technology.

During the interviews, all participants realized that they either have not seen or not used the 2008 technology standards when planning their lessons. Nine of them shared that using the standards is not enforced, and 58% of the participants are hoping to get an overview or training on how to use the 2008 Technology Standards. However, while all mentioned needing training, half of the participants (N=6) mentioned that the 2008 standards are obsolete. This confirmed English's (2017) findings of how rapid technological changes have greatly influenced education, and this obligates school districts stakeholders to keep up with changes to ensure meet student needs meet 21st century workforce. Standards hold accountability and help improve learning; however, it does not guarantee compliance from stakeholders.

The findings confirmed that although the school district is great at providing devices and programs to help address 21st century skills, 67% of participant expresses that there is a lack of training on troubleshooting devices. Additionally, Francom (2020) certified that access to technology has enhanced over the years, but the challenge is still in the planning and integrating technology. He also adds that the lack of time has added to teacher frustration when planning with standards that are not up to date to assist in planning lessons that address the 21st century (Francom, 2020). Nine out of 12 teachers claimed that the 2008 technology standards are not enforced and 100% of teachers claim that they do not use the 2008 technology standards to address the 21st century skills.

Eight out of 12 teachers express that they would need and can greatly benefit from training on understanding and using the 2008 technology standards.

RQ2

RQ2 was about what teachers need from the school district to effectively use current classroom technology to efficiently deliver the curriculum. RQ2 was aligned with parts of theme 2 and theme 3. All 12 participants were appreciative of the district's effort in providing current technology devices and programs for all classrooms. Additionally, all participants have shared that the school districts do an excellent job in providing training on how to use the apps and programs that are provided to them. Examples of these trainings are focused on Renaissance, Achieve 3000, IXL, Freckle, etc. However, teachers have shown frustration in terms of using the device and troubleshooting. The district has invested a large number of federal funds to provide devices, however, 47% of participants mentioned that they need training on how to effectively use these devices.

Theme 2: Teacher Awareness of Future Development Needs

Theme 2 also addresses RQ2 which asked about what teachers need from the school district to effectively use current classroom technology to efficiently deliver the curriculum. While 83% of participants shared that their participation in the district's EdTech program jump started their efforts in technology integrations, 25% of participants expressed training needs on how to use technology with younger learners. Fifty-eight percent of teachers need training on the 2008 technology standards, and 67% express the need for training on troubleshooting devices.

Theme 2 is made up of 10 codes and three categories (see Appendix B). The categories consist of teacher development needs, enforcement of tech standards, and teacher frustration. A majority of the participants (83%) have completed the district EdTech program and found it to be very helpful with the efforts with technology integration, however, this program is centralized on tools and apps and minimal time on how to operate iPads and Chromebooks. Participants who participated in the EdTech program confirmed that technology integration is an important educational innovation to improve their teaching and how students learn 21st century skills. This confirmed that WPISDs EdTech program provides training on technology integration for teachers and at the same time gains motivation for educational innovations. In a similar study, Ahmad et al. (2020) study findings confirmed that teachers needed to be given training and motivation to promote and increase digital literacy to improve skills in using the most current technology.

The findings confirmed that although the school district is great at providing devices and programs to help address 21st century skills, 67% of participant expresses that there is a lack of training on trouble shooting devices. Additionally, Francom (2020) certified that access to technology has enhanced over the years, but the challenge is still in the planning and integrating technology. He also adds that the lack of time has added to teacher frustration when planning with standards that are not up to date to assist in planning lessons that address the 21st century (Francom, 2020). Nine out of 12 teachers claimed that the 2008 technology standards are not enforced and 100% of teachers claim that they do not use the 2008 technology standards to address the 21st century skills.

Eight out of 12 teachers express that they would need and can greatly benefit from a training on understanding and using the 2008 technology standards.

Theme 3: Preparation and Training

Theme 3 addressed RQ2 which asked about the teacher needs to help efficiently use current technology and deliver effective lessons. After an analysis of 12 interview responses, it is evident that the WPISD ensures that all classrooms are equipped with current devices and apps that help address 21st century skills. Despite the outdated technology standards, teachers are still provided with current classroom technologies and programs that help teachers address the 21st century skills. RQ2 asked about what teachers need from the school district to effectively use current classroom technology to efficiently deliver the curriculum. The district has invested a large amount of federal funds to provide device, however, 47% of participants mentioned that they need training on how to effectively use these devices.

The analysis of interview data revealed that the participants are fully equipped with current technology and apps that help them address 21st century skills despite having outdated technology standards. This theme is made up of 15 codes and three categories (see Appendix B). The categories are Apps/Programs that address 21st century skills, Teacher Development needs, and EdTech. The codes include all the different apps mentioned by participants, such as Achieve 3000, IXL, Freckle, etc. Other codes include training on the 2008 Technology Standards and needed training on troubleshooting and strategies for using technology with younger learners. This theme also includes codes that inform how helpful EdTech was for the participants. All participants expressed that the

school district provides training on how to use apps and programs. However, participants T4, T11, and T12 expressed the need for training on how to use the devices provided to them. Eight out of twelve, or 67% of participants shared that they would like training on how to address tech issues with devices. Many of them have shared that they had to depend on teaching themselves or reaching out to other teachers to get help on how to use the devices. Participants T4, T11, and T12 have mentioned that they would like training on how to integrate technology with younger students who are in grades K-2. Similar findings were found in Taghizadeh and Hasani Yourdshahi's (2020) study, which revealed that a large number of teachers were not offered training courses on how to use technology with younger learners, but they were motivated and willing to enroll in technology-based professional development and training. T12, a first grade teacher, shared:

> I am a very outdoor type of teacher, so transitioning from physical tangible teaching into technology usage, sometimes makes me feel nervous. I don't know where to go, what to do, or how to do it…basically, I need help with troubleshooting.

Seven out of twelve (58%) participants mentioned that they do not use the technology standards adopted in 2008 and would like an overview or training on how to use them. When asked to describe how the 2008 technology standards are used in planning lessons to teach 21st century skills, participant T3 shared, "I remember seeing it. I think I have a copy in my email. But to be honest, I don't use it to plan my lessons." Similarly, participant T5, with 14 years of teaching experience in the same school district,

shared she has not seen the 2008 technology standards and has not seen a memo that mandates teachers to use these standards.

Out of 12 participants, 2 teachers have not enrolled in the EdTech Program. Ten out of twelve (83%) participants completed the WPISD EdTech program. Eight participants shared that EdTech helped them get started with integrating technology in their classrooms and 25% of participants shared that they learned many great tools from this program. Participant T3 shared that the EdTech program was a “big one” for her because she learned so many great tools that she uses until today.

The findings confirmed that K-5 teachers in the WPISD use current technologies to address 21st century skills. Teachers are provided with research-based apps and programs, and training on how to use these apps and programs is provided by the school district. The latest technology devices are also provided by the school district. However, teachers do not use the 2008 technology standards to guide their lessons. In fact, they do not use any technology standards when planning their lessons. Seven out of 12 teachers reported that they would need training on understanding and using the 2008 technology standards, and 67% reported that they need training on troubleshooting devices so they can effectively use current technology more efficiently. Teachers reported needing training, however, 100% of participants appreciate the training that the school district provides on the apps and programs procured by the district.

The 2008 Technology Standards are the only current technology standards that WPISD has in place to provide teachers with guidance on how to plan and integrate technology in their lessons. For this study, the TPACK framework was used because this

study focuses on teacher technology, pedagogy, and content knowledge. From the TPACK framework, this study focused on the categories that have to do with technology (TK, TPK, TCK, TPACK) and pedagogy and content knowledge that tie into the 21st century skills and the 2008 technology standards (PK, CK, PCK). Participants express frustration with 58% of participants stating that they need training on how the 2008 technology standards, and the lack of enforcement. Zhang et al. (2020) reported that both veterans and novice teachers need professional development to implement curriculum standards successfully, technology standards, prepare lessons that meet learning needs. The TPACK framework can assist in evaluating teacher trainings to help teachers integrate technology in their classrooms using the 2008 technology standards.

Conclusion

The purpose of this qualitative study was to explore how elementary teachers use current classroom technologies to address 21st century skills as mandated by WPISD, despite having outdated technology standards. The participants included teachers from a K-5 elementary school. The primary form of data collection came from semi-structured interviews. I conducted interview of teachers via face to face or virtually through google meet, both of which were audio recorded. All audio recordings were transcribed and a summary narrative was sent to all participants for validity and confirmation. Furthermore, the data collected were used to develop a project, which could be used to inform the WPISD Commissioner of Education and Key Management to revisit and update the 2008 technology standards to help guide teachers as they address 21st century skills. Section 3 includes a description of the project, goals, rationale for selection, and how the problem

was addressed, a literature review, a project evaluation plan and project implications. Additionally, this section includes how the findings of the study have been used to create a project which will give stakeholders at WPISD the perspectives and experiences of our elementary teachers when planning lessons to prepare student for the 21st century workforce. The white paper also includes recommendations for future steps based on findings.

Section 3: The Project

Introduction

I explored how elementary teachers used current classroom technologies to address 21st century skills as mandated by the WPISD, despite having outdated technology standards. According to study results, teachers at the WPISD would benefit from updated technology standards, adoption of ISTE standards, and implementation of PLCs for consistent support.

To respond to the findings of this study, I created a white paper (see Appendix A) that describes three recommendations to help the WPISD update its technology standards with ISTE standards and provide support for teachers to address 21st century skills successfully. Recommendations include updated standards by adopting ISTE standards, providing training to use these standards successfully, and developing professional learning communities during implementation. The findings and literature review provide the basis for recommendations to address outdated standards and needed training and support for teachers.

Description and Goals

With this white paper project, I aimed to provide findings for WPISD stakeholders to update 2008 adopted technology standards with ISTE standards and provide support and training for teachers to assist with implementation. A white paper involves giving a solution to a problem and helping key decision-makers justify and implement solutions (Stelzner, 2010). The project is designed to inform WPISD stakeholder feedback and perceptions and propose recommendations for updated

technology standards and improved practices. Findings from two research questions were used to understand teacher experiences using current classroom technologies to address 21st century skills, despite having outdated technology standards. A clear description of the problem and recommendations will be provided in the white paper. The white paper contains feedback from teachers who participated in one-on-one interviews which I compiled, coded, and grouped into themes. It includes a summary of data to review and discuss recommendations in order to decide if they would like to implement them. Limitations of the white paper include the narrow scope of the research because the investigation was conducted in one site. The white paper consists of an introduction, background, methodology, findings, recommendations, and a conclusion.

Rationale

White papers combine expert knowledge and research into a document that provides a specific solution or recommendation (Gotschall, 2016). The white paper provides specific recommendations based on my research findings that should augment and enhance the WPISD 2008 technology standards. I discovered that 2008 technology standards are not enforced through data analysis, and teachers do not recall or use standards when developing lesson plans. However, teachers are using current technology and district-provided apps and programs.

Based on findings from interviews, I believe teachers would benefit from updated technology standards by adopting ISTE standards, training, and PLCs to help with implementation. Interview data confirmed that teachers were provided training with school district apps and programs. However, 67% of teachers shared they would like

more training regarding addressing tech issues with district-provided devices. Also, seven out of 12 (58%) participants mentioned that they did not use 2008 technology standards because they need an overview or training on how to use them. These findings suggest that training regarding troubleshooting devices and updated technology standards would be helpful for teachers.

All participants disclosed they did not recall or use 2008 technology standards when planning 21st century skills. Over half (58%) of participants expressed the need for an overview or training using 2008 technology standards. Half of participants reported that 2008 technology standards are obsolete, and 100% admitted they did not recall or use standards in their planning. These findings show that 2008 technology standards need to be updated, and adoption of ISTE standards would be appropriate for WPISD teachers. ISTE standards are excellent because they are consistently updated, and training and conferences are provided.

Nine participants (75%) shared that using 2008 standards is not enforced, and 58% of participants hoped to receive training regarding how to use standards. However, while all mentioned needing training, half of participants ($N = 6$) said that 2008 standards are obsolete and do not relate to their students' current curricula. Findings also confirm that while the district is excellent at providing devices and training for district-approved apps and programs, professional development regarding troubleshooting devices is needed.

Review of the Literature

A review of the literature obtained by searching for scholarly and peer-reviewed articles from the Walden Library database, ProQuest, and Google Scholar. The research site for this study is not located in the US; therefore, research from other international countries similar to the research site was included in this review. Keywords used to search for literature for this study were: *white paper*, *implementing ISTE standards*, *teacher barriers in technology integration*, *professional development*, *technology integration*, and *professional learning communities*.

White Paper

In a white paper, authors present research findings on an issue and provide recommendations for an appropriate audience. A White paper is appropriate for this project because it informs district stakeholders about a specific problem and provide recommendations to support a solution. Findings and results of this study are presented in the white paper (see Appendix A). After data were collected and analyzed, the construction of the white paper began. A white paper strictly follows a specific format to help inform readers. I reviewed other white papers to better understand the format and purpose of the document. Reviewing these white papers also helped me realize that using a white paper to make recommendations for this project is the best way to support my study. The white paper contains an introduction, summary of the local problem, methodology, and findings. Additionally, it includes three recommendations and a conclusion.

Implementing ISTE Standards

Teachers need clear guidance and training on integrating technology to meet technology standards. There is a lack of research on technology standards in the WPISD. 2008 technology standards are currently in place for teachers to use as a guide to integrate technology in their classrooms. Implementing technology standards or initiatives in schools may require teacher buy-in and support. Hodges and Cullen (2020) said including teachers in the planning of innovative technology initiatives might significantly increase staff buy-in and support of the initiatives. Training related to new initiatives could help develop teachers' ideas regarding staff supporting initiatives (Hodges & Cullen, 2020).

In the US and some other parts of the world, 2016 ISTE Standards are currently being used as a guide to plan lessons as teachers integrate technology (ISTE, 2019). The US Department of Education (2017) found almost half of all educators cannot use technology consistently and effectively in their planning and delivery. While studies have shown the impact of technology in improving student achievement, it is still essential to identify specific strategies on technology and pedagogy to complement technology integration (Grabau & Ma, 2017). According to ISTE (2019), the standards are a framework that allows educators to rethink education and make state-of-the-art learning spaces. The 2016 ISTE Standards for Students provides a framework for reflection, student choice, and personalized learning opportunities for digital-age learners (Fuller, 2020). Additionally, the ISTE standards offer opportunities for all stakeholders to rethink traditional teaching pedagogies to help improve teaching and learning at the local,

national, and international levels (Fuller, 2020). Lastly, ISTE offers programs that encourage students and teachers to continue improving their learning and practices with technology. For example, ISTE Standards for educators provide a framework that acknowledges rethinking education, adapting to a constantly changing landscape in education, and, more importantly, preparing students to succeed in learning in an interconnected global economy (McPherson & Sykora, 2019).

The ISTE student standards are diverse and have been used by many countries, especially in research and development (Yang, 2020). Yang (2020) investigated on the current situation of information-based learning based on the ISTE student standards. The researcher surveyed 330 primary and secondary students and discovered that the information learning ability of both primary and secondary students have greatly improved, especially in the use of technology, obtaining information, using communication tools, and thinking critically (Yang, 2020). Additionally, a study in China conducted by Rui (2018) consisted of a review of the ISTE standards for students determined that the standards have emphasized the seven roles for future learners and provided standards with four core concepts. The standards strongly emphasize pedagogy and not tools, which confirms the validity, practicality, and applicability of the standards (Rui, 2018). Students showed significant improvement in their learning, and teachers noticed the framework's benefits in their pedagogy. ISTE standards target core indicators, and one indicator is the Digital Citizenship standards. Aldosari et al. (2020) conducted a study to gauge the availability of the ISTE Digital Citizenship standards among secondary students in Saudi Arabia. Through a quantitative survey, 394 surveys were

administered and collected. Findings revealed that students showed a high level of digital citizenship and a high level of internet self-efficacy, and it was also recommended that more emphasis should be focused on raising awareness, property rights, online bullying, identity theft, and proper interaction with others on the internet (Adosari et al., 2020). Although many planning and implementation procedures need to be planned out and presented to all school stakeholders for the ISTE standards to roll out successfully, many districts, both nationally and internationally, have shown great student and teacher improvement with the guidance of the ISTE Standards. Yang, Rui, and Adosari et al. conducted research that support the use of ISTE standards to enhance pedagogical practices and student learning. These studies support the implementation of ISTE standards to help school districts address 21st century skills.

Teacher Barriers in Technology Integration

Much research has been conducted to study learning patterns that show not all teachers effectively integrate technology or address 21st century skills due to lack of knowledge, skills, training, self-efficacy, limited devices, and inadequate infrastructure (Francom, 2020; Jones, 2020; Suparian, 2021). Francom's (2020) research finding identified that time was the most common and stable barrier in technology integration. He further discovered that while access to technology tools and resources has increased, teacher attitude, professional development, and technical support has declined (Francom, 2020). The study also indicated that teachers from smaller school districts stated that they receive more access to technology tools, resources, and administrative support than teachers from larger school districts (Francom, 2020). Another qualitative study

conducted by Emre (2019) surveyed 76 preservice teachers and revealed positive perceptions of technology integration such as increased student engagement and effective use of technology. However, external and internal barriers to technology integration were shared. The participants expressed frustration with the lack of budget, equipment, knowledge, and time (Emre, 2019). The literature in this paragraph supports the findings and of this study. Participants of this study shared the lack of knowledge with the standards as well as trouble shooting needs. Administrative support is needed to address these barriers.

Many researchers have carried out studies on teacher barriers to integrating technology. To achieve effective technology integration, teacher knowledge, skills, attitudes, and perceptions towards integration must be identified after removing external barriers (Durff & Carter, 2019). The process of integrating technology in the classrooms should be perceived as accepting and changing it into a culture rather than just a mechanical process (Durff & Carter, 2019). In a mixed-methods study that used semistructured interviews, findings revealed that preservice elementary teachers' technology integration self-efficacy (TISE) increased after participating in a teaching practice course (Unal et al., 2017). The courses these teachers attended provided them with opportunities to gain experience in technology integration, which positively changed their beliefs about integrating technology. This study confirmed that mastery experiences are the most effective way to achieve self-efficacy (Unal et al., 2017). Teacher beliefs are one of many factors that affect teachers' integration of technology into the classroom. Vongkulluksn et al.(2018) examined how teachers value their beliefs on technology, their

feelings towards technology access, and the administrative support they receive in support of first-order barriers. The authors learned that direct modeling and multilevel path modeling contributed to teachers' beliefs and perceptions (Vongkulluksn et al., 2018). These studies confirm that when teachers are confident with their skills and guidance through modeling, their perceptions and efforts become a positive experience.

Resources, the allotted time for planning, and support are common barriers that most teachers report when expressing their experiences with integrating technology in their classrooms (Sharpton, 2021). Teachers need effective professional development with support from school leaders to provide devices and allotted time for planning. Sharpton (2021) conducted a descriptive research study to describe teachers' skills and confidence in using technology and their perception of barriers in their efforts to integrate technology. Through a series of quantitative measures, which included surveys, lesson plan review, and class observations, 12 core teachers perceived that lack of technology resources, time for planning, and support were barriers they faced. In another study, Walker (2019) carried out a qualitative phenomenological study to investigate and understand how early elementary teachers feel about technology and technology integration. This was done by collecting qualitative data from a total of 10 K-3 teachers in Louisiana. This study suggested that while teachers had an interest in integrating technology, they still struggled due to barriers such as lack of professional development, devices, time, support, and stress. The literature in this paragraph supports the recommendation to provide professional development and professional learning communities to help teachers successfully implement the ISTE standards.

Professional Development and Technology Integration

Effective professional development needs to be designed to help teachers gain greater knowledge, engage in rigorously applying new knowledge, and include multiple opportunities to integrate an understanding of the latest knowledge in their classroom (Canaran & Mirici, 2020). Researchers Canaran and Mirici (2020) conducted a qualitative case study in Turkey that proposed a new team-teaching model as professional development. Findings suggested that teacher reflections from the beginning and end showed a gradual shift from negative to positive views. This goes against the traditional professional development framework, which usually follows a one-size-fits-all approach, frequently fails to consider teachers' specific needs, pedagogical knowledge, and experiences with integrating technology (Ciampa et al., 2017).

Professional development with technology integration with clear support, guidance, and goals focuses on student achievement. Lee et al. (2017) conducted a study to investigate how teacher learning beliefs in a 2-year technology professional development impacted student achievement. The authors found that teachers' technological skills and Internet Communication Technology (ICT) capabilities significantly improved and increased each year. The ongoing teacher training positively impacted teacher learning and beliefs about technology, impacting student achievement (Lee et al., 2017). Dilshad et al. (2019) investigated 700 teachers’ engagement in continued professional development (CPD) using a self-developed questionnaire in a similar study. The researchers discovered that the most effective professional

development is designed for teachers to gain guidance as they develop their technology knowledge and skills over time.

Professional development models that support teachers with technology integration are often short and taught in isolation. However, the Technology Integration Planning Cycle (TIPC) Model of Professional Development states that effective teacher training should include whole-group professional development sessions, long-range planning, access to instructional coaches, professional learning communities, digital tool resources, observations with reflections, and a comprehensive project website (Hutchison, 2018). Designing professional development with the elements of the TIPC model may contribute to teachers improving their professional practices and gaining a successful experience may improve student achievement. Hutchison and Woodward (2018) conducted a mixed-methods study collecting pre-posttests, interviews, observations, and field notes. They discovered that selective exposure to digital tools, professional learning communities, and opportunities for reflection was the most effective and significant elements of the TIPC Model. Professional development that allows teachers to work collaboratively and reflect on what they learned during the training played a significant role in enhancing instructional technology skills. Canaran and Mirici (2020) conducted a study using semi-structured interviews and archival data to investigate successful elements of teacher professional development that support collaboration and reflection. The study revealed that professional development that provides collaborative work and reflection resulted from an encouraging practice on technology integration (Canaran & Mirici, 2020).

Providing a progressive approach to professional development affects teacher attitudes with technology integration. Gurevich et al. (2017) shared three stages of professional development during their study of new teachers' attitudes toward the use of technology. Using a questionnaire collected for five successive years, they discovered that teacher attitudes on the value of technology integration had gradually changed over time because of experience, consistent training, and constructive feedback. In another study, Liao et al. (2017) discovered that more personalized and sustained professional development improved the perception of technology integration. Both studies prove that consistent professional development, progressive assistance, and immediate feedback significantly impact teacher attitudes towards technology integration.

Studies on successful technology integration reveal that effective, meaningful professional development, administrative support, and a curriculum framework play significant roles in productive technology integration in the classrooms. Spencer (2019) investigated teachers' technology integration barriers from grades Pre-K through fourth grade. She did this through a quantitative study using a cross-sectional survey, which was electronically distributed to 75 certified elementary level teachers in one school district. Survey results revealed a significant need for effective and meaningful professional development to help teachers integrate technology. Data showed that teachers need instructional support with campus infrastructure and coaching support to enhance their integration practices and skills. Another study explored the factors that led to teachers' unwillingness and desire to embrace and accept technology in their teaching (Yenal, 2021). Through a qualitative case study, the researcher revealed strategies for

teachers to overcome obstacles that prevented them from using technology in their teaching design. This was done by semi-structured interviews document review from 10 purposefully selected teachers. The data showed that the main requirements for teachers to be more at ease with technology is by providing professional development and administrative and district support. Lastly, a phenomenological research design showed that teachers highly believed that technology is significantly essential to prepare their students for future professions. They did not have a curriculum framework on consistent technology integration practices that helped them with their efforts (Maynard, 2020). Data were collected using semi-structured interviews and social media posts made by teachers through their school website and Twitter accounts. All three studies stress the importance of meaningful and consistent professional development, support by school administrators, and curriculum guidance to achieve effective technology integration. The literature reviewed under professional development fully support the need to provide additional support when training teachers. Time for collaboration, reflection, and practice helps with successful implementation.

Professional Learning Communities

DuFour and DuFour (2009) are credited with much of the pioneering work in Professional Learning Community (PLC), which considered core values by collaborative teacher teams that targeted a goal focused on all students learning at high levels. Additionally, PLCs are collaborative teams that dedicate time for meetings to maintain and focus on results to make data-driven results (Flavin-Williams, 2017). Some districts are still unaware of how PLCs can be organized and utilized; however, those who

practice PLCs in their district see improvements in teacher practices because the learning is driven by teachers themselves, which is connected to Knowles' (1985) adult learning theory.

Much study on the effectiveness of PLCs depends on school administrator support, guidance, and shared focus. Thornton and Cherington (2019) reported findings from research in sustaining PLCs in New Zealand's early childhood program. The researchers found that to maintain an effective PLC; it must have clear guidelines on membership and induction of new members, shared focus and commitment, practice research for improvement, clear guidelines on roles, provide opportunities for dialogue, and freely practice sharing ideas and giving feedback (Thornton & Cherington, 2019). These findings are connected with results from a case study conducted by Bouchamma and April (2020), who wanted to explore the experience of one principal who willingly wanted training on how to integrate PLCs in his school. This was explored through observations of a series of school activities focused on PLC integration. The findings of this study revealed that school leaders should be responsible for monitoring the PLCs progress and effectiveness. Additional support, including financial support and simple logistical needs such as allotting time for PLCs to meet, can significantly benefit teachers. This confirms Thornton and Cherington's (2019) findings that shared focus, clear direction, and providing feedback help PLCs be an effective practice. An allotted time for planning built into the school schedule allows teachers to share information and participate in rich collaborative planning and reflection (Alsarawi, 2019).

PLCs supported by school administrators empower teachers and are mostly preferred over traditional professional development training. Another study that focused on school administrators' perception of PLCs was conducted by Woodlon (2021). The researcher conducted qualitative research on school administrators' perceptions of PLCs replacing traditional professional development. Through purposeful sampling, Woodlon (2021) conducted semi-structured interviews with four school administrators and four teachers. The study revealed that administrators and teachers prefer PLCs over traditional professional development training and support the change. The school administrators believe that PLCs positively influence teachers' practice and enhance school culture. Towle (2021) conducted a qualitative case study using a questionnaire, teacher interviews, and PLC meeting observations to address the lack of a successful framework implementation and lack of time through the implementation of PLC at public and private schools in the northeastern United States. Towle's (2021) findings confirms Woodlon's study, revealing that the PLC model supports the change and empowers teachers towards optimal learning and away from isolation.

Professional learning communities are also a reliable source of social-emotional learning opportunities for teachers and promote excellent teacher efficacy and school culture. In an action research study, Strong (2021) explored the effects of implementing PLCs as a part of an eighth-grade advisory program on teacher confidence toward SEL and perceptions of school climate. Using a mixed-methods research design, the study revealed the following three key results: a) promoted teacher competence and commitment toward SEL, (b) increased SEL professionalism, and c) increased

camaraderie among advisory teachers (Strong, 2021). These findings contributed to the existing research on PD for SEL on school climate and teacher efficacy. In another study, Mory (2019) conducted a nonexperimental, quantitative research design and explored teacher leaders' perceptions of the strengths and weaknesses of PLCs in the middle school setting. She invited 380 participants, and 127 responded to the Professional Learning Communities Assessment-Revised (PLCA-R) survey. There were no significant findings from the survey; however, descriptive statistics for responses indicated that supportive conditions-relationship had the most effective value with teachers.

Professional learning communities improve and enhance teacher practices and ultimately reach student achievement. Professional learning communities are a form of professional development because they improve teaching and learning and encourage successful student outcomes (Carpenter, 2017). If organized and lead effectively, PLCs can provide rich dialogue and collaboration where teachers can assess their practice and their effectiveness on student learning. In Valckx et al. (2018) study, they discovered that PLC participants have evidence of collective responsibility when teachers participate in PLCs and perceptions of teachers feeling that they individually are capable of growing and learning professionally (Osmond-Johnson, 2017). This means teachers can work with other teachers to achieve an individual or shared goal (Ghedin & Aquario, 2020), which will help members of a PLC stay focused on their target, while guidelines and agreements will ensure the work is being carried out (Easton, 2017).

Elementary teachers in the WPISD need clear guidance and training with integrating technology. The ISTE standards used in many school districts provide

guidance, updated technology standards, and programs that encourage students and teachers to improve teaching and learning with technology. Teachers need effective training and support from school leaders to successfully implement the ISTE standards and overcome teacher barriers in technology integration. In addition to training, teachers can benefit from PLCs because it provides clear guidelines, shared focus, best practices, and opportunities for teachers to network by sharing ideas and providing feedback.

Project Description

The data analysis from this project study indicated a need to update the 2008 technology standards by adopting the ISTE standards and support implementation through training and PLCs. The analysis of interviews showed the need for additional training to support teachers. In order to make strong, research-supported recommendations for change, a white paper with recommendations was chosen for this project based on study. White papers are an effective way to provide an improved solution to a problem that targets a specific audience.

The local problem this study addressed was the technology standards were adopted in 2008 and have not been updated. There are three recommendations for this project. The first recommendation is to update the 2008 technology standards by adopting the ISTE Standards. The second recommendation is to provide training on implementing and utilizing the ISTE standards successfully. Lastly, the third recommendation is to develop PLCs during the implementation of ISTE Standards.

The white paper includes data analysis findings to inform the district about the three themes that emerged from the semi-structured interviews. The themes for this

project study are preparation and training, disconnect between standards and instructional practices, and teacher awareness of future development needs. Two out of three recommendations were developed to help teachers implement the ISTE standards. My recommendations are based on the elementary teachers' perspectives on using current classroom technologies to address 21st century skills.

The only potential barrier to following through with the recommendations in the white paper would be the time commitment. The meetings, planning, implementation, and debriefing required in the process will require a substantial amount of time from both district and school leaders. Effectively carrying out the planning and implementation process can take hours and may take an entire workday to complete. This is followed by two to three-hour blocks of time with school leaders sharing the implementation process with their teachers. Much time will also be needed to appoint a PLC leader and organize members from each school. The PLC will play a significant factor in the success of the implementation because strong PLCs consistently generate higher student performance and allow teachers to collaborate and communicate effectively (Woodlon, 2021). No barriers regarding the adoption of ISTE standards or training of the ISTE standards will arise because the district has district leaders and an educational technology team knowledgeable and skilled to train the ISTE standards.

The WPISD currently has most of the materials, needed resources, and support to implement the recommendations outlined in the white paper summary report. A small amount of funding will be associated with printing the white paper for presentation purposes. The cost will include printing and binding. I am committed to allotting time

and effort in sharing the white paper with the Commissioner of Education and Senior Directors of the district and, if approved by the full Board of Education, the ultimate decision-maker for the district. The proposed recommendations require time investment for teachers and administrators. Adopting the 2008 Technology Standards took quite some time with researching and organizing. However, no professional development was provided. With the adoption of ISTE Standards, not much time and effort will be needed for research or organizing because the ISTE Standards are already set and used by many school districts. The WPISD Director of Instructional Technology has attended numerous ISTE conferences and webinars, which gives him much credibility and knowledge in proceeding with the adoption and implementation with the school district. The district has a team of Education Technology experts who are also knowledgeable and skilled to lead and train to implement the ISTE Standards. Less funding will be necessary for trainers because the district can already train. Additionally, WPISD also has PLCs currently in place. Professional communities such as ELA, math, science, social studies, and health are active. Creating and leading a new professional community dedicated to assisting teachers with implementing the ISTE standards will not be too costly. Most of the recommendations proposed in the evaluation report can be made without additional financial investment.

Based on what I learned from teachers in WPISD, I recommend district leaders consider updating the 2008 technology standards by adopting the most updated ISTE standards. ISTE is an excellent update for the district because they stay up to date and provide training and conference for teachers and school leaders. Once district leaders

receive BOE approval to adopt the ISTE technology standards, district training on overview and implementation of the standards should be conducted and enforcement policies put in place. A professional learning community will be organized for all schools to support the implementation of the ISTE standards once this is in place. Each school will have a dedicated member to the PLC who will then share updates, training, and other support to their colleagues. This will ensure collaboration and consistent support for teachers.

The implementation of recommendations provided in the white paper summary report would begin when I share the report with the district commissioner of education and the senior directors. At a time and date that is good for everyone, a one-hour meeting will be scheduled with the commissioner of education and the three senior directors to review the white paper. For the initial district review, the commissioner of education and the senior directors will have two weeks to review the white paper, which will be accompanied by an executive summary of the research (upon request) to help prepare any questions, comments, or concerns that they may have with the recommendations stated in the white paper. The executive summary of the research will be available to all district leaders and board members before I meet with them if they request it. If the commissioner of education and the senior directors would like to set up a meeting to discuss their feedback, an additional 1-hour meeting will be scheduled before sharing the white paper summary report with all the members of the board of education. Another 1-hour meeting will be given to the district commissioner of education and senior directors to discuss recommendations and implementation steps, if any collaboratively. If given the

approval to share with the board of education, a one-hour meeting will be provided to share the recommendations of the white paper with the board. The board will be allowed to review the white paper for a week and may ask questions regarding the study, data collection, and recommendations. When the board provides approval, the commissioner of education and the senior directors will have one month to do a deeper review of the white paper and prepare any feedback they may want to share.

Conducting the study and sharing the white paper summary report with the WPISD leaders and board of education were my primary roles in this project. Upon delivery of the white paper and a two to three-page executive summary of the study (if requested), the district leaders will make recommendations. Based on those recommendations in the white paper, I will assume the role of a consultant if the leadership team needs clarification regarding the position shown in the white paper. The district leaders, the commissioner of education, and senior directors will advise the following steps to follow the schools.

Project Evaluation Plan

The project for this study is a white paper summary report in which the research and project are presented in an objective-based summative evaluation manner. The white paper was used because it allowed me to assess if the results and recommendations met the goals of this study. The data collected included thoughts, experiences, and perspectives of elementary teachers. Collecting the summative data helped identify the everyday experiences, ideas, and concerns that need to improve.

The district commissioner of education and senior directors will determine whether the recommendations in the white paper summary report are purposeful, meaningful, and valuable enough to warrant a presentation to the board of education. Should the district leaders decide to use the white paper summary as a foundation, members of the board of education will review and make recommendations. Based on the findings of this project, the board of education may choose to move forward with a plan to implement all, some, or none of the recommendations provided in the white paper summary. Additionally, after reviewing the report, the board of education may have further recommendations or questions. My role as the researcher would be to answer questions and clarify recommendations or findings.

The commissioner of education, senior directors, and the board of education are the decision-makers. They may decide that specific study components and recommendations made in the white paper may require additional, more extensive research or evaluative processes. Suppose the decision-makers implement all or some of the recommendations in the white paper summary. In that case, an outcomes-based evaluation could be used to determine the effectiveness of the implemented recommendations. One evaluation method could be a cover letter discussed with all decision-makers and attached to the white paper. Stakeholders could use this to document informal comments, suggestions, and feedback. Another method could be a survey to gather stakeholder feedback. If approved by the commissioner of education, the survey could be online and presented to the board of education.

Project Implications

Technology standards are meant to guide and improve the teaching and learning process specifically to help students succeed in the 21st century and positively impact social change within the school district. While the district does have 2008 adopted technology standards, it is not up to date. The data analysis supports the need to update the technology standards and provide necessary professional development training to help teachers prepare students for the 21st century workforce.

The findings of this study may provide district leaders, the board of education, school administrators, and teachers a clear summary of how adopting the ISTE standards can benefit the organization. The findings indicate that implementing the updated ISTE Standards have the potential to improve teaching, student learning, instructional core, and initiate conversation and collaborative work amongst teachers for enhanced student learning.

This study has the potential to influence the teaching and learning process at the neighboring islands and private schools by adopting the most updated ISTE standards. Successful adoption and implementation of the ISTE standards may lead to improved planning, aligned teaching, increased communication and collaboration, and ultimately enhanced student learning with technology integration. Teaching and learning practices with technology will significantly improve and a unified practice will guide student achievement.

The findings of this study may reach beyond the scope of the WPISD schools. The implementation of the ISTE standards, based on the findings, is likely to benefit

administrators, teachers, students, and the overall teaching and learning process at all educational institutions in the Western Pacific Islands. The findings from this study may also impact public schools, charter schools, and community colleges.

The WPISD has invested millions of federal funding in ensuring that all classrooms are equipped with the latest technology and tools to help prepare students for the 21st century, yet the technology standards are outdated. Teachers are not utilizing the 2008 technology standards, which are not enforced. One of the WPISDs goals as a district is to help students be career-ready and prepared for the 21st century workforce. It is only fitting to ensure that the latest technology standards are provided to teachers to have proper guidance on how to plan and deliver their lessons to fulfill this goal. White papers are becoming a helpful tool for researchers to share information, problems, and solutions to decision-makers in education. This white paper will give stakeholders at WPISD the perspectives and experiences of our elementary teachers when planning lessons to prepare students for the 21st century workforce. The white paper also includes recommendations for future steps based on findings. In Section 4 of this study, the reflections and conclusions of the capstone are presented. The strengths of the project and the weaknesses and recommendations are provided to make a social impact.

Section 4: Reflections and Conclusions

Introduction

In Section 4, strengths and limitations of this basic qualitative study which explored how elementary teachers used current classroom technologies to address 21st century skills despite having outdated technology standards are presented. Section 4 also includes an analysis of myself as a scholar and developer of the project. Additionally, my experiences with project development, scholarship and leadership are shared in this section. Finally, my reflections regarding the significance of what I learned, importance of the process, and any further or future research are included in Section 4.

Project Strengths and Limitations

A white paper that recommends updating 2008 technology standards by adopting ISTE standards and providing support through professional development and PLCs is part of this project. Through the ISTE, target district leaders can engage in current professional development training, best practices, and the latest technology standards that are constantly updated and revisited to ensure student achievement. Recommendations presented in the white paper will help the target district meet its goal of producing college and career ready students to be competitive in the 21st century workforce.

Elementary teachers within the target school site had a voice in this basic qualitative study. Semi-structured one-on-one interviews and data analysis were used to provide qualitative viewpoints and information to generate appropriate recommendations. A summary will be shared with decision-makers of the target school district.

The study helped me determine needs and technology experiences of WPISD elementary teachers. Findings of the study helped discover common themes that were used to support recommendations. In the white paper, I provide three recommendations. The target school district can benefit from updating their technology standards by adopting ISTE standards, provide training on how to use these standards successfully, and develop PLCs during implementation.

Implementation of current ISTE standards will help meet the needs of 21st century learners by providing skills for learning and teaching in the digital age and providing information to use technology effectively. In addition, ISTE standards are recognized and adopted worldwide and adopted in all 50 US states and many educational institutes. ISTE standards are consistently revisited and revised to ensure teachers and learners are up to date with current best practices involving technology.

This qualitative basic inquiry project study was initially intended to explore how elementary teachers use current classroom technologies to address 21st century skills as mandated by the WPISD, despite having outdated technology standards. Data suggested that teachers do not know or use technology standards when planning or teaching lessons. Teachers shared that although the district provides technology devices and apps for their classrooms, training regarding using devices is needed. Teachers need effective professional development with support from school leaders and allotted time for planning (Sharpton, 2021). This type of support increases their skills and confidence in their efforts to integrate technology.

This study was focused on one elementary school target site. Twelve teachers from the target site consented to participate in this study. Recruitment challenges that impact research studies include demographics and researcher characteristics (Patel et al., 2003). Techniques used to recruit study participants include financial incentives, and assertive tracking (Patel et al., 2003). Schools in the target district traditionally experience low turnout for non-compensated activities; however, I was still able to get 12 teachers to commit. Future research may recommend recruiting participants from middle and high schools in the target district.

Recommendations for Alternative Approaches

A basic inquiry study design was necessary to explore how elementary teachers address 21st century skills despite having outdated technology standards. The school principal of the school site approved participation in this study and notified teachers who met study qualifications. Semi-structured interviews were arranged with consenting teachers from the target school site. Purposeful sampling ensured that teachers met criteria to qualify for participation.

An alternative approach I could have taken to address the problem was to address how school administrators enforce and monitor 2008 adopted technology standards. The majority of participants shared that they do not use standards or have not seen them because those standards are not enforced. A white paper with recommendations based on the study findings could benefit school administrators in terms of their efforts to prepare students to be college and career-ready.

Another approach would be to provide professional development regarding 2008 technology standards. Participants expressed that they did not recall or use standards. Professional development regarding ISTE standards would be a way for teachers to see difference between the 2008 technology standards and the ISTE standards. This could also help teachers realize 2008 technology standards need updating.

Additionally, participants shared it is difficult to use technology with students from grades K-1 because they have little exposure to technology at home. Another alternative to address the problem would be to include middle school and high school teachers in the study. Gaining secondary teacher perspectives regarding using 2008 adopted technology standards may have added data. Comparing primary and secondary teacher perspectives would be an addition to data collection.

Scholarship, Project Development, and Leadership Change

The work I put into this doctoral program has taught me about conducting effective and authentic research. Before this project study, I did not know what a true scholar was or the work involved with being a scholar. This project study has fostered a deeper level of determination in terms of meeting my professional goals, strengthened work ethic, advancing my knowledge and skills, and making a difference in education, which is a strong passion of mine. This process has pushed me to grow as a scholar.

Reading and exploring peer-reviewed articles, dissertations, project studies, and scholarly books is a common practice and skill to have as a school leader. The process of acquiring a Doctorate in Education has greatly impacted my research skills and my desire to use data to solve problems. I use practices and skills I learned from this doctoral

journey to improve my leadership skills and implement professional development, content, and curriculum needs.

Weekly assignments and discussions regarding coursework helped prepare me for the demands of the capstone project. I learned to set realistic goals, meet deadlines, and network with other educators from various parts of the world.

The Doctor of Education program has advanced my ability to be unbiased, reflective, and purposeful. I used skills and practices I learned throughout coursework, residencies, and the project study process in my personal and professional life. As a school principal, I can say this process has taught me a new appreciation for research and significantly improved my leadership skills.

The desire to make a difference in my school district has led me to take on this challenging doctoral journey. As a principal of the largest elementary school in my school district, I felt confident and comfortable in my ability to lead a school. I believe things were just as they should be, and my teachers, staff, students, and community were collaborative and motivated. I since seen disconnects and challenges within the schools and school district, and I would not have had the confidence to address these challenges before the Ed.D. experience. I can confidently say that this doctoral experience has strengthened my skills as a scholar and as an instructional leader.

Researching and completing a project study on a problem within my school district has allowed me to demonstrate my growth as a leader to all stakeholders within the school system. Developing and providing the school district with a white paper signifies my desire to improve our practices to meet 21st century teaching and learning.

This experience has improved my annual evaluation as a distinguished change agent leader who can problem solve and gain stakeholder buy-in.

The Doctor of Education program has increased my confidence in addressing problems within our school system. Before this program, I did not have much confidence to do such practices. This program has provided me with a skill set that has developed me into a change agent within the school district rather than just within the walls of my own school. I am also an integral member of the Educational Technology team and the effective and efficient school personnel planning group at the district level. I am now able to take a lead role in the different district committees I am a member of and help set goals for assigned groups, propose initiatives, ensure evaluation, and assessment are taking place after having experienced the process of conducting research, and recommending solutions.

This doctoral program has shown me the value systematic inquiry. I can assist the school district by informing and improving effective, constant data collection, analysis of these data, and decisions driven by data. As a district Educational Technology team member, I am now helping build a better understanding of teacher experiences with the outdated standards, and I can provide recommendations to help the district. As a project developer, I look forward to making changes and contributing positive social change within my school district and region.

My doctoral research journey has taught me that being a change agent is a challenging role. Research studies, which focuses on change, are consistently conducted in the education field, where change is inevitable. A great deal of dedication, time,

consistency, and commitment to research and analysis is necessary with the change. I have learned that all decision-makers and stakeholders will always have opinions, and sometimes, a debate is provided. I have realized that not everyone holds the same passion for social change. It takes a courageous leader who takes risks to make change happen.

Conducting this project study has edified the value of data and research to support change. I have strengthened my problem-solving skills and understand the significance of finding logical solutions to problems. This doctoral research experience has helped me become more intentional with my research efforts, become a better listener, and a become better at analyzing qualitative data. I have learned that research should positively influence a community or organization's operation in making decisions. Exploratory research investigates problems and I have learned that it is important to understand the research problem before making a hypothesis. Determining whether the topic is worth investigating is also a part of the process.

Reflection on Importance of Work

The Ed.D. program has taught me a great deal about myself as a researcher, scholar, practitioner, and project developer. Each step was challenging, and I learned so much through each step. I learned to reflect on my project, the outcomes, and my skills as a scholar.

Completing this project study has improved the way I interact and use data in my professional capacity. I find myself looking deeper into data, finding common codes, categories, and themes. A professional example would be how I recently gathered and analyzed our annual teacher and student survey. Normally, I would collect surveys from

both teachers and students. The goal is to get as many surveys back from students as possible because the Covid-19 pandemic caused the district schools to continue remote learning. Then, after collection, we submit our data to our district Accountability Research Evaluation office which is normally the last time I see the survey. The district does not summarize the data or share any findings with school leadership. However, after my experience with the project study, I have grown curious and had the urge to analyze and understand the data from these surveys, which is why this year I gathered all the surveys. With the help of my office staff, we were able to analyze the data from the surveys and determine common responses. With the data organized and collected, I looked deeper into the data. I began to compare the student responses with the teacher responses. Several answers align, and a few stood out. In one case, I identified a large discrepancy between how teachers and students viewed school safety. We created and sent out another open-ended question to get a more detailed explanation as to participant answers, because of my new found interest in data. We discovered that there was a cyberbullying issue. I called a leadership meeting and we discussed ways to address the issue. Before conducting this project study, I would likely have moved forward with and the usual process and not been as determined to take the time to analyze and review the data. I have developed a deeper understanding of how essential data is and necessary to hear from all our stakeholders. The Ed.D. process at Walden has changed my awareness and desire to get a clearer picture through data.

Research has become a frequent practice in my career as a school administrator. I tend to always desire answers to questions, and also question why things are the way they

are and how we can change them. I believe that I am a more critical thinker and look to research to answer issues or questions. The skill I gained by looking through peer-edited journals and credible resources has helped me appreciate reliable and valid data that support findings.

My writing skills have improved throughout this doctoral journey. It was a challenging part of the whole journey. I had to teach myself to take the habit of using research-based evidence to support my ideas. It has been quite difficult when research seems to go against what I believe in, but I appreciate that it has helped me reflect on my thoughts and ideas. Although I do take pride in the fact that I am tech savvy, I would have to say that I am now more purposeful with the apps and resources I find online. I also pay close attention to my writing form and style to make my scholarly voice compelling.

In the past, I have found it difficult to ask for help. I want to solve my problems independently. However, I have learned through this process to let go of pride and not hesitate to reach out to my committee, student advisor, and colleagues for support. As a school leader, I often think that my ideas are decisions were better than anyone else's. However, I now see a need for more guidance and reflection on my thoughts and ideas before making decisions. I take full responsibility for myself and my journey as a learner, and my professionalism has improved throughout this study.

In 2018, I decided to embark on this doctoral degree for personal fulfillment. However, as the years have gone by and experiences I have endured, I can say that personal fulfillment is no longer the reason for this journey. I now desire to use the skills

that I have gained throughout this degree program to positively affect my school district, especially for the students and staff I serve under my leadership.

Throughout the years on this doctoral journey, I can say that I have developed significant skills in reflecting, looking deeper into data, and being sensitive and aware of everyone's differences. I have learned to become a better listener. This is extremely important during the interview and data collection part of the study. I found myself empathizing and reflecting on everyone's point of view and relating to their experiences and perspectives. As a doctoral student, I have learned to appreciate the hard work, effort, and perseverance displayed by my staff, faculty, colleagues, and even with my husband and children.

It is now a normal practice in my life to analyze what is going on around me and try to find reasonable solutions to issues and problems. Being a change agent has become a strong role that I pursue in my professional capacity, and at home when I am parenting and giving advice to my teenagers. It helps to provide evidence or data to prove your point to teenagers.

My role as a project developer was challenging. As a school principal, who puts students, teachers, staff, parents, and the community first, I found it challenging to balance my time with work and my role as a mother and wife. Juggling these two worlds and being an Ed.D. student, especially during this pandemic. My husband and children have been very understanding and supportive of my desire to pursue this degree, so they have given me time to sit and write with no distraction. I also learned to delegate and give

my vice principal and other teacher leaders distinct roles to help lessen my load and improve their leadership capacity.

Distance learning was also challenging. All my degrees and certification were earned at traditional learning environments where the teacher provides face-to-face instruction. This degree at Walden University forced me to be disciplined with time and seek assistance using other resources such as colleagues, committee, student advisor, library, etc. There was a point in my third year of pursuing this degree when I felt like quitting. However, with the help of my student advisor, library services, and the writing center, I was able to get more support to push through. I also learned that I needed to stop being so shy and ask my chair for support and guidance when required. My committee chairperson was candid with me and made sure not to sugarcoat anything. She helped push through each stage of the project. This project study had significantly developed my skills as a project developer, which has given me the confidence to take on additional leadership roles and committees within my district.

Implications, Applications, and Directions for Future Research

This study involved exploring elementary teachers; experiences, behaviors, and opinions to assess how teachers develop lesson plans to address 21st century skills. This basic inquiry qualitative study did not find evidence suggesting that elementary teachers were provided with guidance through technology standards or curriculum. However, the study concluded recommendations on how to address the outdated technology standards and the need to provide training and professional learning communities to help teachers with implementation.

All the schools from the target district can benefit from basic inquiry study and project development by exploring how elementary teachers use current classroom technologies to address 21st century skills despite having outdated technology standards. This study should be a step into exploring an updated curriculum that can help the school district improve 21st century teaching and learning. As the district pursues the recommendations of this study's white paper, they should identify teacher and student needs to assure continued growth and improvement with the district's efforts to produce college and career ready students who are prepared for the 21st century workforce.

This basic inquiry study began as an exploration of elementary teachers' experiences as they use the current technology to address 21st century skills. The study confirmed that the problem is elementary teachers are not using the district's technology standards because it is outdated, obsolete, not enforced, or they just do not recall seeing them. In contrast, the district technology standards are outdated. Teachers have been integrating technology without guidance for educational standards and claimed that they lack training on using the standards and integrating it with their lessons. However, the study results did discover that the school district is excellent at providing technological needs for the classrooms. The elementary teachers just lack training on how to use the devices. Recommendations based on the data collected were made and included in the white paper. This project study provides significant findings and white paper that recommends the WPISD to update their current technology standards with the ISTE standards, provide training and PLCs for a successful implementation. With these recommendations, the WPISD will be well on its way to providing updated technology

integrated lessons and producing college and career ready students who will be ready for the 21st century workforce.

Conclusion

As I reflect on everything that has happened in my life within the past 5 years that I have spent pursuing my Ed.D., the best word to describe this experience is, *perseverance*. I have learned to push through all the anxiety and pressure I was feeling and reminded myself why I decided to embark on this journey in the first place, which was personal fulfillment and to improve my skills to better serve the teachers and students in my care as a leader.

Pursuing an Ed.D. has always been a dream goal. This process has been very humbling and has taught me to persevere and push through to meet my goals. I have acquired a significant level of self-confidence knowing that I was able to evaluate a problem in my district that has impacted the teaching and learning process in our elementary classrooms. I know I can be a change agent within my school campus and school district.

The process of conducting this project study has been a meaningful educational experience. This process has helped identify teacher perspectives and experiences with the district's adopted 2008 technology standards. These perspectives and experiences revealed some problems and teacher needs that should be addressed.

The recommendations on the white paper have the potential to provide growth and improvement within the district. Updated technology standards can improve teaching and learning to ensure 21st century skills are met. Additionally, providing teachers with

training and PLCs during implementation can strengthen teacher collaboration, build efficacy, and improve practices to gain student achievement. These recommendations have the potential to make a more significant social impact with the middle schools and high schools within the district and the neighboring islands in the commonwealth to improve teaching and learning.

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Appendix A: Project

Recommendations to Strengthen Technology and 21st Century Teaching and Learning in the WPISD

By

Lynn O. Mendiola

Introduction

The Western Pacific Islands School District (WPISD) has invested millions of dollars in equipping classrooms with projectors, iPads, Laptops, smart TVs, and online programs and curricula to improve instruction and students' learning. However, the school district has not adopted a curriculum or technology standards for elementary schools since 2008 (WPISD Instructional Technology Director, personal communication, February 19, 2020). One of the main goals of the district is to ensure that it produces students who are college and career ready to enter the 21st century workforce. It is significant to provide lessons and teach skills that will help students be prepared to compete in the 21st century workforce. However, the district does not have a curriculum or up to date technology standards to help the achieve the college and career ready goals.

Through this research study, I sought to explore how elementary teachers use current classroom technologies to address 21st century skills as mandated by WPISD, despite having outdated technology standards. Data gathered is comprised of perspectives and experiences of participating elementary teachers. The focus of this project study centered on the following research questions:

- **RQ1:** What experiences do K-5 elementary teachers report in using current classroom technologies to address 21st Century skills as mandated by WPISD, despite having outdated technology standards?
- **RQ2:** What do K-5 elementary teachers report they need from the school district to effectively use current classroom technology more efficiently in the delivery of their curriculum?

Local Problem

The problem in the district is the technology standards were adopted in 2008 and have not been updated (WPISD Instructional Technology Director, personal communication, February 19, 2020). Without a plan to adopt updated technology standards and a curriculum in place, the technology purchased is not maximized to support teaching and learning (WPISD Distance Education Program Manager, personal communication, January 6, 2020). Additionally, WPISD uses the standards adopted in 2008 and does not follow the International Society for Technology in Education (ISTE) standards, which are regularly updated (WPISD Instructional Technology Director, personal communication, March 20, 2021).

The school district's mission is to provide optimum curriculum and instruction to become productive and contributing members of the global world (Citizen-Centric Report, 2009). An effort to address this mission is to ensure that all classrooms are equipped with the latest technology and teachers are provided the necessary professional development. A digital citizenship and learning curriculum are needed to provide students with the proper skillset and content to participate and excel in the digital world (WPISD Instructional Technology Director, personal communication, February 19, 2020).

Summary of the Study

Methodology

The study investigated participants' perception concerning how elementary teachers use current classroom technologies to address 21st century skills as mandated by WPISD, despite having outdated technology standards. Data collection on teacher perspectives, ideas, experiences, and knowledge on integrating technology in lessons to prepare students for the 21st century workforce was also conducted. K-5 elementary teachers were asked to use the district's technology standards last adopted in 2008 to plan and deliver their lessons.

The Technological Pedagogical and Content Knowledge (TPACK) framework was used as a guide to identify how teachers successfully integrate technology while the technology standards provided are not current for preparing students for the 21st century workforce. The TPACK framework was a great tool to help identify and analyze the experiences of elementary teachers in the district and how they use the latest educational technology in their teaching. Mishra and Koehler (2006) stated that the effective use of technology in classrooms requires an intricate interplay across several instructional components. These components include knowledge in content and pedagogy, technology and pedagogy, and content supported by technology (Mishra & Koehler, 2006). These components directly addressed the key research questions of this study.

To collect data, to teachers were interviewed about their experiences on how WPISD elementary school teachers use the latest educational technology with 2008 adopted technology standards. Novice researchers commonly use the basic interpretive study to investigate opinions and experiences (Merriam, 2009; Merriam & Tisdell, 2015; Percy et al., 2015). A basic inquiry method was appropriate for this study because participant interviews are the study's data source, which developed an in-depth understanding of a particular phenomenon and explored and understood experiences (Creswell, 2012). Through this method, I was able to relate to the participants' shared experiences and measure their attitudes, opinions, and behaviors.

Elementary teachers, who met the selection criteria, gave consent to be a part of this research study. The research site for this study was a public K-5 elementary school located in the Pacific Islands. The selection criteria required teachers to have at least two years of teaching experience, obtain a state teaching certificate, and use technology in the classroom as measured by the Effective Learning Environment Observation Tool (ELEOT). I used purposeful sampling to select 12 elementary school teachers from grades K-5, who were interviewed to better understand teacher experiences on the latest educational technology with the 2008 adopted technology standards. The data collected were conducted via qualitative interviews from a sample of certified elementary teachers from the WPISD. Through responsive interviewing, I gathered detailed information from K-5 teachers who are knowledgeable and provided in-depth information on how they use the latest educational technology in their teaching, while technology standards are not current.

Data collection consisted of interviewing 12 participants using one-on-one semi-structured interviews. The interview questions focused on participant perspectives on using the technology standards the district last adopted in 2008 to address 21st century skills in their lessons. To analyze the data, I used open coding to ensure that each participant's experience was the driving force behind my findings. I coded each interview and organized common codes that were consistently mentioned by the participant and determined categories, which helped develop culminating themes. Codes such as "don't recall the standards," "obsolete standards," and "EdTech" were consistently mentioned. All participants mentioned that they do not recall or use the 2008 technology standards, and 75% of participants said standards are not enforced. The participants are very appreciative of how the district provides the latest technology and programs, however, 58% would like training on the technology standards to help them with their lesson planning and delivery.

The participants are very appreciative of how the district provides the latest technology and programs, however, 58% would like training on the technology standards to help them with their lesson planning and delivery.

Data Analysis Findings

The themes drawn from teachers' perspectives were based on semi-structured interviews—the findings from the interviews emerged three themes.

Theme 1: Disconnect between standards and instructional practices. All the participants disclosed that they do not recall or use the 2008 technology standards when planning 21st century skills. Over half (58%) of participants expressed the need for an

overview or training on using the 2008 technology standards. When asked about the enforcement of technology standards, 75% of teachers (N=9) expressed no enforcement, memo, or mention the need to use the means. Half of the participants report that the 2008 technology standards are obsolete, and 100% admit they do not recall or use the standards in their planning.

Seven out of twelve (58%) participants mentioned that they do not use the 2008 technology standards because they need an overview or training on how to use them.

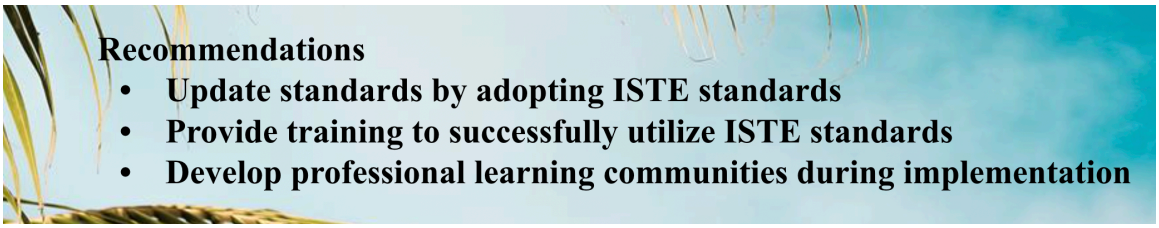
Theme 2: Teacher awareness of future development needs. Nine participants (75%) shared that using the 2008 standards is not enforced, and 58% of participants hope to get an overview or training on how to use the standards. However, while all mentioned needing training, half of the participants (N=6) said that the 2008 standards are obsolete and do not relate to their students' current curriculum. The findings also confirm that while the district is excellent at providing devices and training for district-approved apps and programs, 67% of participants express that professional development on troubleshooting devices is needed.

Half of the participants (N=6) said that the 2008 standards are obsolete and do not relate to their students' current curriculum.

Theme 3: Preparation and training. The interview data confirmed that teachers were provided training with school district apps and programs. However, most teachers (67%) shared that they would like more training on addressing tech issues with the district-provided devices. Also, seven out of twelve (58%) participants mentioned that

they do not use the 2008 technology standards because they need an overview or training on how to use them.

Recommendations



Update Standards by Adopting ISTE Standards

Data analysis showed that participants need an updated set of technology standards to assist them in planning 21st century skills lessons. Nine out of twelve teachers shared that they do not use the district adopted 2008 technology standards because it is not enforced, and they do not recall what the standards are. Others who have seen the standards, which is 50% of participants, shared that the standards are obsolete and do not connect with the current technology that their classrooms have. All participants have shared that do not use the 2008 technology standards, nor do they use any technology standards as a guide during their planning. The main source of guidance, in terms of educational standards, that teachers report using is the Common Core State Standards. One participant shared that she only uses the Common Core State Standards because it is district-mandated, however, with the district adopted 2008 technology standards, which is not mandated. With the recommendation to adopt the latest ISTE Standards, district leaders, teachers, and students will be equipped with standards that they can use to guide teaching and learning.

The ISTE standards provide skills for learning and teaching in the digital age by providing a wide-ranging roadmap for schools to effectively use technology (ISTE, 2020). Teachers and students would benefit from measures that fit the needs of today's learners and curriculum. Additionally, the ISTE standards are also known as the National Education Technology Standards (NETS), which are recognized and adopted worldwide and adopted in all 50 US states and many schools from countries worldwide.

Provide Training to Successfully Utilize ISTE Standards

It is recommended that WPISD consider adopting the ISTE Standards to provide their teachers with guidance on addressing 21st century skills. ISTE provides annual conferences for educators to ensure up-to-date technology, current best practices, and programs (Aslam et al., 2020). ISTE provides all the necessary resources to implement innovative technology and help teachers understand useful and innovative methods to help maximize student achievement (McCoy, 2021). T12 shared that the district is great at providing devices and apps, however there no training on what the standards are and how to use them. The ISTE organization provides support during implementation and has a framework for guiding teachers, students, and district leaders with digital age learning.

ISTE stays up to date and ensures that the latest educational technology and practices are provided to all educators. The WPISD will not constantly revisit or update the standards on their own because of ISTEs efforts to stay up to date. This will alleviate issues of obsolete standards as mentioned by T7 and T8. Both teachers mentioned how the standards are not relatable to current students. ISTE targets the knowledge and

behavior to empower teachers and make student learning possible, focusing on equity, digital citizenship, and continuous learning and professional growth (ISTE, 2020).

Develop Professional Learning Communities during Implementation

Lastly, it is recommended that the WPISD develop and implement professional learning communities to enhance instructional practices and provide consistent support during implementation. Professional learning communities are a form of professional development because they improve teaching and learning and encourage successful student outcomes (Carpenter, 2017). If organized and lead effectively, PLCs can provide rich dialogue and collaboration where teachers can assess their practice and their effectiveness on student learning. Ten out of twelve teachers have reported that the best training that their participation during the district's EdTech program has helped them during their participation. About 67% of participants also mentioned that the EdTech program was great and preparing them to integrate technology in their classrooms. The EdTech program consists of cohorts and is successful because of the support teachers have within each other. If the district mimics something similar to the EdTech program, with the components of PLCs, implementation of the ISTE standards will help teachers. Effective practice in PLCs is reflective work with others. This means teachers can work with other teachers to achieve an individual or shared goal (Ghedin & Aquario, 2020). Shared goals will help members of a PLC stay focused on their target, while guidelines and agreements will ensure the work is being carried out (Easton, 2017).

Conclusion

The WPISDs goal is to prepare college and career ready students and help students be competitive in the 21st century workforce. The district has invested millions of federal funding on equipping schools with the latest technology and apps, however technology standards are outdated. The purpose of the study was to explore how elementary teachers use current classroom technologies to address 21st century skills as mandated by WPISD, despite having outdated technology standards. The study's findings indicated a disconnect between the technology standards and teaching practices because most teachers have shared that they do not use or are not knowledgeable about the technology standards. The white paper was a method used to summarize collected and analyzed data. This white paper includes an introduction, background of the local problem, methodology of the research findings of the study and recommendations based upon findings (Purdue University, 2021). The data collection involved interviewing 12 participants. The results revealed that teachers would benefit from updated technology standards and consistent support in adopting and implementing updated technology standards.

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Appendix B: Codes/Categories/Themes

Code Word/Phrase	Example	Number of occurrences in interviews	Number of participants who mentioned this code	Common Categories	Research Questions	Theme(s)
EdTech	T2 mentioned that she started using technology during her participation in EdTech.	31	10/12 = 83%	EdTech	Answers RQ1: What experiences do K-5 elementary teachers report in using current classroom technologies to address 21st Century skills as mandated by WPISD, despite having outdated technology standards?	**Theme 3: Preparation & Training**
Helpful (EdTech)	T7 mentioned that EdTech helped her get started with technology integration.	8	8/12 = 67%			
Learned A lot (EdTech)	T3 mentioned that EdTech was a "big one" for her, and she learned so many tools.	3	3/12 = 25%			
iPads	All teachers have iPads in their classrooms.	24	12/12 = 100%	Technology Devices	Answers RQ1: What experiences do K-5 elementary teachers report in using current classroom technologies to address 21st Century skills as mandated by WPISD, despite having outdated technology standards?	**Theme 2: Teacher Awareness of Future Development Needs**
Elmo	All teachers have Elmo in their classrooms.	12	12/12 = 100%			
Projector	All teachers have projectors in their classrooms.	14	12/12 = 100%			
Achieve 3000	T1 mentioned he is very big on Acheive3000 because he has seen the improvements in his students' reading and writing.	13	10/12 = 83%	Apps/Programs to Address 21st Century Skills	Answers RQ1: What experiences do K-5 elementary teachers report in using current classroom technologies to address 21st Century skills as mandated by WPISD, despite having outdated technology standards?	
IXL	T11 mentioned that she uses IXL with her students daily.	11	10/12 = 83%			

Renaissance	T7 mentioned that this is the district's main source for gathering reading and math data	8	9/12 = 75%		Answers RQ1: What experiences do K-5 elementary teachers report in using current classroom technologies to address 21st Century skills as mandated by WPISD, despite having outdated technology standards?	**Theme 2: Teacher Awareness of Future Development Needs**
Smarty Ants	T4 mentioned that her students use Smarty Ants on the daily	8	8/12 = 67%			
Freckle	T1 mentioned that it's the latest Math program for elementary	6	8/12 = 67%			
Google	T1, T3, T8 and T9 all mentioned that they use GAE in their classrooms regularly	20	9/12 = 75%			
YouTube	T6 mentioned she uses YouTube to extend her lessons.	4	4/12 = 33%			
Prodigy	T5 mentioned her students enjoy using Prodigy as part of their efforts to meet math goals	7	6/12 = 50%			
Don't Recall/Use (2008 Standards)	All participants do not use or have not seen the 2008 technology standards.	47	12/12 = 100%	No Planning with 2008 Tech Standards	Answers RQ2: What do K-5 elementary teachers report they need from the school district to effectively use current classroom technology more efficiently in the delivery of their curriculum?	**Theme 1: Disconnect Between Standards and Instructional Practices** **Theme 2: Teacher Awareness of Future Development Needs**
Obsolete (2008 Standards)	T8 mentioned that some standards are too obsolete and are not relatable to her current students	8	6/12 = 50%			
Not Enforced (2008 Standards)	T12 mentioned that the school district is great at providing devices and apps	11	9/12 = 75%	Enforcement of 2008 Technology Standards	Answers RQ2: What do K-5 elementary teachers report they need from the school district to effectively use current classroom technology more efficiently in the delivery of their curriculum?	

Training on Programs	T4, T5, T6, T11 and T12 mentioned that the district provides training on district invested programs	18	12/12 = 100%	Teacher Development Needs	Answers RQ2: What do K-5 elementary teachers report they need from the school district to effectively use current classroom technology more efficiently in the delivery of their curriculum?	**Theme 3: Preparation & Training** **Theme 2: Teacher Awareness of Future Development Needs**
Technology Investment	All teachers mentioned that the school district provides training on how to use apps and programs	6	5/12 = 47%			
Need Training on 2008 Technology Standards	T3, T4, T5, and T11 mentioned that they would like and overview or training on how to use the 2008 Technology Standards.	8	7/12 = 58%	Teacher Frustration/Attitudes	Answers RQ2: What do K-5 elementary teachers report they need from the school district to effectively use current classroom technology more efficiently in the delivery of their curriculum?	**Theme 1: Disconnect Between Standards and Instructional Practices** **Theme 2: Teacher Awareness of Future Development Needs**
Training on troubleshooting	T5, T11 and T12 mentioned that they would like training on how to address tech issues with devices.	11	8/12 = 67%			
Training on using tech with younger students	T11 and T12 mentioned that they would like training on how to integrate technology with younger students (K-2)	3	3/12 = 25%			