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New or Novice Teacher Integration of Mobile Learning Instruction

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This is to certify that the doctoral study by

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has been found to be complete and satisfactory in all respects,
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Walden University
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Abstract

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MA, Bemidji State University, 2008

BS, Concordia College-Moorhead, 2003

Doctoral Study Submitted in Partial Fulfillment

of the Requirements for the Degree of

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Abstract

The substitution, augmentation, modification, and redefinition (SAMR) model is designed to help teachers integrate technology in the classroom. In a district with 1:1 mobile technology, teachers expressed frustration and inconsistency about the use the SAMR model for effective teaching and learning. In this project study, the SAMR model conceptually framed the exploration of teachers' integration of mobile learning and their perceptions about using technology in the classroom. Guiding research questions addressed teacher's integration of the SAMR model and elements that contributed to their instruction with mobile technology. A qualitative case study of a school district included purposeful sampling of 12 new or novice special education, mathematics, physical education and science teachers who had integrated technology in their instruction. Data sources included semistructured interviews, review of artifacts such as lesson plans or curriculum guides, and subsequent observations of their classroom instruction. Interviews were transcribed and coded to identify themes. Observations were documented by using a checklist and data were analyzed using the SAMR model to determine levels of technology integration. The content of artifacts was analyzed to explore congruence in the data. Teachers demonstrated low enhancement levels of the SAMR model for technology integration and described elements of productivity use or student engagement as contributions to their curricular modification. The findings were used to formulate a professional development plan for teachers to design effective technology-integrated curricula. This study may impact positive social change by providing a model to assist other districts with similar inconsistencies in the modification of instruction for mobile learning environments to enhance teaching and learning.

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Dedication

First and foremost, I'd like to praise and thank the Father, Son, and Holy Spirit for showering me with blessings throughout my life. I adore You with the deepest humility, and render to You, with my whole heart, the homage which is due to Your sovereign majesty.

This project study is dedicated to my parents. Through your constant prayers, wisdom, and encouragement, I have accomplished more than I thought possible. Thank you for enriching my life with love and guidance.

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I would like to acknowledge the prayerful dedication of my parents, Bruce and Mary Beisel, and all other family and friends that have offered support and encouragement throughout my doctoral program.

I am very grateful to the various staff members at Walden University who have challenged, encouraged, and guided me in my scholarly efforts. I am particularly indebted to my faculty chair, David Falvo, and committee members, John Holahan and Karen Hunt, who have spent considerable time reading and revising my drafts. Their support and guidance were deeply appreciated.

I would also like to acknowledge the assistance of various individuals throughout TRF school districts. Due to the confidentiality of the research requirements, I cannot identify them by name. Without their cooperation, this research study would not have been possible. I would like to thank superintendent Brad Bergstrom and building principals, Patrick Marholt, Bob Wayne, and Shane Zutz for their approval to conduct research at their schools.

Finally, I would like to thank administration and staff at Goodridge School. I would like to specifically thank Galen Clow and Becky Carlson for their cooperation during my data collection at TRF schools. I am grateful to all the staff members who encouraged and supported me throughout my doctoral journey.

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Section 1: The Problem

Introduction

Some teachers and principals at Thief River Falls School expressed frustration and did not understand how to effectively modify curriculum and instruction for transformative education as outlined in Puentedura's (2009) substitution, augmentation, modification, and redefinition (SAMR) model for technology integration (M. Nordine, personal communication, November 2014; M. Okeson, personal communication, March 24, 2016; S. Zutz, personal communication, March 7, 2016). The SAMR model is a framework designed to help teachers integrate technology into curriculum and instruction. In neighboring districts, similar difficulties existed in transforming teaching and learning for a digital age (G. Clow, personal communication, 2015). The purpose of this research was to explore how new or novice teachers describe, demonstrate, and document the integration of 1:1 mobile technology for teaching, learning, and curriculum modification and implementation in relation to the SAMR model.

In this district, the SAMR model was suggested as a guide for curriculum design in a 1:1 mobile learning environment. This framework was used to determine various levels of curriculum design and instructional transformation using 1:1 technology. The SAMR model assisted in focusing the research questions to understand the activities of novice teachers who are implementing curriculum using 1:1 technology. Kihoza, Zlotnikova, Bada, and Kalegele (2016) suggested that the benefit of the SAMR model is dependent upon the attitude of teachers and professional support to improve the practice of technological tools in education.

For educators across America, the implementation of mobile technology has changed the dynamics of curriculum, instruction, and assessment. Within these environments, teachers impart skills and competencies for redesigning teaching and learning for students in a digital era. According to a recent Pew Research (2014) survey, teenagers lead technology saturated lives. Researchers found that 95% of teens use the internet and 74% access it on their mobile device, 78% of teens have a cell phone and 47% include a smartphone, and 81% of teens use social networking sites (Pew Research, 2014). In another Pew Research (2015) study, "Two-thirds of Americans expect that robots or computers will do much of the work currently done by humans" (p.1). Such statistics drive teachers toward promoting practices that meet the needs of students and the current workforce. With the legislature's current passage of the Minnesota statute (120B.125) for the Career and College Readiness standard, teachers and leaders must keep pace with a technologically driven workforce. Understanding the experiences and perceptions of teachers, especially new or novice teachers, who are currently modifying curriculum with mobile devices extended the knowledge of an evolving profession.

Krumsvik (2014) articulated that teachers' "competency journey" is shaped by many contributions as they design and modify curriculum for effective teaching and learning with technology (p.275). Educational support through ongoing professional development and pre-service/induction program development are elements that have been found in the implementation and competency process for redesigning curriculum and instruction with technology (Downing & Dyment, 2013; Krumsvik, 2014; McLeod, 2015). These professionals needed time and modeling to become creative innovators in

teaching and learning with mobile technology, as related to the higher levels on the SAMR model (Charbonneau-Gowdy, 2015; Cochrane, 2012; Pierce & Stacey, 2013). Often, preservice teacher programs lack pedagogical instruction on how to effectively implement 1:1 technology (Alley, Grimus, & Ebner, 2014; Downing & Dyment, 2013; Webb & Jurica, 2013). Collaboration from other teachers, especially through induction programs, and the support of a wider learning community can boost the commitment and motivation to transform curriculum associated with mobile learning technology (Charbonneau-Gowdy, 2015; Hepp, Prats Fernandez, & Holgado Garcia, 2015; Krumsvik, 2014). An exploration of teachers' perceptions of technology integration and their role in the transformation of curriculum and instruction was considered in this project study. Implications considered recommendations for teacher preparation programs and policy changes to assure successful 1:1 mobile learning for new or novice teachers.

In Section 1, I outlined the local problem, rationale, definition of terms significance of the study, research questions, review of literature, and implications. Section 2 of this project study, I included the details of the research method, analysis, findings, and recommendations for novice teachers in districts with mobile learning.

Definition of the Problem

Teachers, especially novice teachers, and principals at Thief River Falls School District (TRF district) declared frustration about using 1:1 mobile technologies for teaching and learning, and they admitted that they did not understand how to best use these tools for effective curriculum implementation (M. Nordine, personal

communication, November 2014; M. Okeson, personal communication, March 24, 2016; S. Zutz, personal communication, March 7, 2016;). One administrator explained that some teachers are not committed to modifying curriculum and instruction for effective teaching and learning as defined by the SAMR model (S. Zutz, personal communication, March 7, 2016). The curriculum coordinator highlighted that curriculum is focused on how to use the technology as a tool to support student learning but does not provide specific mentoring programs to new or novice teachers (S. Olson, personal communication, 2014). In addition, little evidence of sustained academic growth was reflected through standardized state tests (Minnesota Report Card, 2016). Although much research related to teacher professional development about technology has been done recently (Hughes, 2013; Muilenburg & Berge, 2015; Pierce & Stacey, 2013), much more is needed, especially related to how often teachers collaborate, share experiences, or take advantage of professional learning available to northwest Minnesota school districts. Understanding of the unique supports needed for these teachers has become significant to modifying curriculum and instruction as demonstrated by the SAMR model for effective teaching and learning with technology.

In recent literature, authors asserted that sustained professional development and leadership impacted teacher's commitment and support for curriculum modification for effective teaching and learning in 1:1 environments (Foulger et al., 2013; Jaipal Jamani, & Figg, 2013). Despite professional development that promotes the SAMR model of technology integration, many teachers have demonstrated lower levels of technology use for curriculum and instruction within their classrooms (S. Olson, personal

communication, 2014; K. Reynolds, personal communication, 2015; S. Zutz, personal communication, March 7, 2016). At TRF district, some teachers have led professional development technology sessions or developed innovative SAMR based curriculum for their classrooms (K. Reynolds, personal communication, 2015; S. Zutz, personal communication, March 7, 2016). Other teachers have expressed disagreement with iPad use for certain learning activities or age levels (M. Nordine, personal communication, November 2014; M. Okeson, personal communication, March 24, 2016). As of May 2016, the district hired a new superintendent of schools (TRF School District, 2016). It remains unknown what this impact brought to the integration of 1:1 technology for effective teaching and learning. Exploring the variations of instruction and motivations of teachers toward curriculum modification, as related to the SAMR model, was needed to address the current frustrations that impact district-wide success in the transformation of effective teaching and learning with mobile technology.

Rationale

Evidence of the Problem at the Local Level

Despite the community efforts to transform the digital classroom, some teachers and administrators at TRF Schools admitted that technology largely remains an enhancement tool for learning (S. Zutz, personal communication, March 7, 2016; M. Nordine, personal communication, November 2014; M. Okeson, personal communication, March 24, 2016). According to the SAMR model, transformation of teaching and learning was found within the innovation level of modifying and redefining curriculum. Without understanding how to move to the higher levels in the SAMR

model, teachers were stagnant in technology substitution or augmentation levels within their classrooms.

Advocating for northwest Minnesota schools. Intending to develop 21st century skills, local schools implementing mobile learning anticipated a successful impact on student learning that would translate into economic progress throughout the local region. Integrating technology devices in the classroom provided an opportunity for communities to attract highly qualified teachers and develop best practices for schools throughout northwest Minnesota. Many of these communities faced challenges in the recruitment and retention of highly qualified teachers. Like neighboring schools, TRF School District reported a five-year retention rate of 56% (B. Rogolla, personal communication, December 10, 2015). In addition, 19% of positions in the last five years were filled with variances (B. Rogolla, personal communication, December 10, 2015). Unlike the previous generation of teachers, novice teachers were the largest category of teachers leaving the profession (Ingersoll & Perda, 2010). This resulted in costly efforts to advertise, hire, and provide professional development for new or novice teachers (DeFeijter, 2015). Exploring the factors that led to successful 1:1 mobile learning environment and the impact of mobile learning efforts assists local schools in recruiting and retaining highly qualified teachers throughout northwest Minnesota.

Collaborating communities. Because of the centralized location, many northwest Minnesota schools and government services have coordinated professional learning efforts based out of Thief River Falls, MN (Northwest Service Cooperative, 2016). The region is rurally located, thereby complicating time and distance to major

cities and universities offering professional development. Despite this challenge, advocates for the greater Minnesota region encouraged online professional development or the collaboration and support from other schools and community businesses (Minnesota Rural Education Association [MREA], 2015). TRF School District emphasized "a community partnership focused on education" (TRF Public Schools, 2016).

With the support of the community, local schools have invested financial and human resources toward accommodating the technological capacity within the school district, including professional development and curriculum design. Despite the transition in current administration, community and business partnerships remained committed to district improvements as evidenced in the TRF Education Foundation (TRF School District, 2016). Upgrading software and mobile devices, including iPads and Chrome laptops, have been integrated into technology plans and development. Regional robotics or science, technology, engineering, and mathematics (STEM) programs have successfully launched with the support of community leaders (G. Clow, personal communication, 2016). With the influx of digital technology in the local region and community education classes, an annual technology in-service day at TRF Public Schools has emerged. Teachers from the surrounding region participated in leading breakout sessions on various curriculum or instruction integrating technology. By understanding the benefits and challenges within the TRF mobile learning environment, teachers and administrators in neighboring schools gain the foreknowledge to effectively implement 1:1 instruction and curriculum in their school districts.

Evidence of the Problem From the Professional Literature

Teachers and educational leaders at TRF admitted to frustrations and incompetence of how to modify and develop curriculum for effective teaching and learning with mobile devices as outlined in the SAMR model. Although most were comfortable and enthusiastic about using technological tools, many novice teachers have not received much experience with, or confidence in, developing curriculum and pedagogy for effective teaching and learning with technology (Alley et al., 2014; Charbonneau-Gowdy, 2015; Downing & Dyment, 2013; Rehmat & Bailey, 2014; Sutton, 2011). At TRF district, teachers could seek out technology-friendly material, but they were not bound to that delivery model (S. Olson, personal communication, 2014). Researchers suggested that gaining individual competence for curriculum modification impacts the commitment to planning time, support & collaboration with other teachers (Chou, Block, & Jesness, 2012), digital compatibility of devices, and ongoing professional development (Svihla, Reeve, Sagy, & Kali, 2015). Effective integration of technology in the work of novice teachers has become an important curriculum, instruction, and assessment issue (Jacobs, 2010). Frameworks for instructional use of technology, such as technological pedagogical and content knowledge (TPACK) and SAMR, have served as models for establishing teacher competencies and assessment of technology activities for effective technology integration (Brooks Kirkland, 2014; Chou et al., 2012; Muilenburg & Berge, 2015). However, the SAMR framework has not been studied as it relates to curricular modification for effective teaching and learning in districts using 1:1 mobile learning. This represented a gap in practice, particularly as it

related to the challenges for new or novice teachers in districts using a SAMR framework for technology instruction and curricular design.

Researchers suggested that exploring strategies used by novice teachers to overcome implementation obstacles or frustrations and how they develop 1:1 mobile learning curriculum and instruction as they enter a technology-rich school district was warranted (Alley et al., & Ebner, 2014; Bang & Luft, 2013; Puttick, Drayton, & Karp, 2015). Additional research was needed to advance an understanding of strategies used by new or novice teachers to integrate effective technological instruction in a 1:1 mobile learning setting through appropriate curriculum modification and curriculum implementation (Chou et al., 2012). Much was learned by an examination of teachers' perspectives related to instruction and curriculum planning within mobile learning environments.

The purpose of this research was to explore how new or novice teachers describe, demonstrate, and document the integration of 1:1 mobile technology for effective teaching and learning through curriculum modification and implementation related to the SAMR model. This research extended the knowledge of previous research outlining implementation elements for mobile learning, particularly among new or novice teachers (Charbonneau-Gowdy, 2015; Teixeira, Matos, & Domingos, 2015). Investigating these perceptions assisted in determining factors that impact the success of mobile learning for new or novice teachers. This exploration helped lead to specific supports needed in the modification of curriculum for effective teaching and learning within the local school

district. These supportive strategies were outlined in Section 3 for professional development plans and teacher preparation programs.

Definition of Terms

Augmentation: technology acts as a direct tool substitute, with functional improvement (Puentedura, 2009).

Mobile learning: learning across multiple contexts, through social and content interactions, using personal electronic devices (Crompton, 2013).

Modification: technology allows for significant task redesign (Puentedura, 2009).

New teacher: a certified educator in their first year of employment (Minnesota Department of Education, 2016).

Novice teacher: a certified educator within their first five years of employment (Minnesota Department of Education, 2016).

One-to-one (1:1) technology: programs that provide all students in a school, district, or state with their own laptop, netbook, tablet computer, or other mobile-computing device (Great Schools Partnership, 2014).

Redefinition: technology allows for the creation of new tasks, previously inconceivable (Puentedura, 2009).

SAMR model: an acronym that stands for substitution, augmentation, modification, and redefinition of technology infused educational activities (Puentedura, 2009).

Sociocultural factors: combining social and cultural factors, including the behavior or customs of a group of people (Cohen & Geier, 2010; Rice, 1995).

Substitution: technology that acts as a direct tool substitute, with no functional change (Puentedura, 2009).

Significance of the Study

This study was unique because it focused on the challenges of new and novice teachers integrating the SAMR framework for technology instruction and curricular design in a mobile learning environment (Alley et al., 2014; Chou et al., 2012; Puentedura, 2013). Within a changing context of the teacher and student roles in education, a qualitative study provided a foundation to explore the perceptions of 1:1 mobile learning and strategies that led to successful integration for new or novice teachers. Alley et al. (2014) and Puttick et al. (2015) suggested that future projects should consider the benefits of performance for mobile learning and transformative education. The results of this study provided the needed insight into how novice teachers modify curriculum and implement 1:1 technology for teaching and learning in relation to the SAMR model (Puentedura, 2013). Findings from this study may assist local leaders in providing support for new or novice teachers to improve their technological competence in curricular design modification and implementation of effective 1:1 mobile learning.

Creating an atmosphere in which educators have the knowledge and skills to transform their profession brings positive change to the learning community. In smaller learning communities, partnerships between educational institutions and business provide a sense of *giving back to the community* that accentuates service and unity for local improvements. Collaboration with higher education and local business have contributed

resources, innovative ideas, and support for efforts to improve teaching and learning (Agyei & Voogt, 2014; Bang & Luft, 2013). Structuring successful experiences with a supportive community emboldens the potential for teachers to apply transformative learning as modeled in the SAMR framework (Nawi, Hamzah, & Tamuri, 2015). More importantly, when teachers are committed to professional growth and improvement, more students benefit from experienced and effective teachers (DeFeijter, 2015; He & Cooper, 2011; Hepp, Fernandez, & Garcia, 2015).

Understanding the best classroom or school practices for mobile learning also assists in avoiding potentially problematic situations for teachers and leaders (Becker, 2013). Educational leaders need insight and knowledge to implement specific strategies for new or novice teachers to be successful with technology in their classrooms (Muilenburg & Berg, 2015). By having an effective plan to implement mobile learning curriculum and instruction, the potential for unstructured or off-task student behaviors are minimized (Becker, 2013; Dietrich & Balli, 2014). Considering professional development, time management, or induction programs helps to determine specific strategies for successfully implementing curriculum modification for mobile learning environments (Aubusson, Burke, Schuck, Kearney, & Frischnecht, 2014; Griffiths, 2013). The potential findings from this study provide implications for improving educational policies, practices, and support systems for beginning teachers.

Guiding/Research Questions

The qualitative research questions that guided this case study focused on elements that assisted in defining the levels of technology integration related to the SAMR model.

Because TRF District recommended, but did not require, curriculum modification through the SAMR model, I focused on understanding teachers' perceptions of effective teaching and learning through the use of 1:1 technology more broadly. Therefore, the research questions were intended to provide a comprehensive context for curriculum modification, as related to the SAMR model, through descriptions, demonstrations, and documented evidence from new or novice teachers. These questions attempted to determine effective supports or strategies needed in curriculum modification and implementation of 1:1 mobile learning for beginning teachers.

1. How do new or novice teachers *describe* their use of 1:1 technology for effective teaching and learning through modification and implementation of the SAMR model?
2. How do novice teachers *demonstrate* their use of 1:1 technology for effective teaching and learning through curriculum modification and implementation of the SAMR model?
3. How do novice teachers *document* their use of 1:1 technology for effective teaching and learning through curriculum modification and implementation of the SAMR model?
4. How do novice teachers adjust to challenges associated with 1:1 technology for effective teaching and learning through curriculum modification and implementation of the SAMR model?

Review of the Literature

This subsection contains a comprehensive report of recently published scholarly literature on the integration of mobile learning for effective teaching and learning. Consideration was given to the conceptual framework used in this research. The SAMR model of technology integration for curricular design and instruction assisted in evaluating the impact of successful mobile learning and factors that helped new or novice teachers' redesign teaching and learning. Tucker (2013) explained that this model outlines a progression of the educator's journey toward redefining technology for effective teaching and learning. In the development of teaching practice using this model, Puentedura (2014) urged that teachers determine their passions, student barriers, or future skills that would assist the design of transformative teaching and learning.

Conceptual Framework

The conceptual framework for this study was based upon the SAMR model of technology infused educational activities. This model outlined the variations of instructional design or development that can be used to assess the enhancement or transformation of 1:1 technology in the classroom. Kihoza et al. (2016) reported that both the TPACK and SAMR models are used to guide curricular plans and evaluation of technology in the classroom, but the SAMR model offered a method for teachers to explore innovative opportunities with technology that was never accomplished before. Although the SAMR model was less researched than the TPACK model, it was the guiding model promoted at TRF district (K. Reynolds, personal communication, October, 2015; S. Zutz, personal communication, March 7, 2016). Chou et al. (2012) suggested

using the SAMR model as a means for developing a teacher's content delivery and design of 1:1 learning instructional activities (p.15). Using the SAMR model as a framework for the project study informed the research questions by probing into the strengths and opportunities for curriculum modification and implementation of classroom technology. The SAMR model delimited the context of technology integration to reveal specific classification levels of curriculum designs that were demonstrated, documented, or described as enhancing or transformative learning.

The SAMR model originated from a consulting firm that sought to transform education by providing resources and examples that guide teachers in curricular design and instruction. Figure 1 displays the SAMR model emphasized at TRF district for effective teaching and learning with mobile technology.

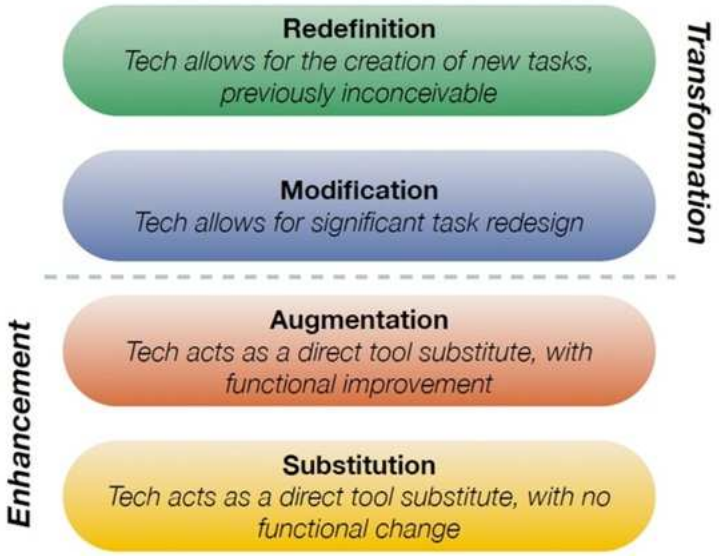

Figure 1. SAMR model of technology infused educational activities. Reprinted from "SAMR: Framing the Goals of Transformation," (Puentedura, 2009). Copyright 2009 by R. Puentedura. Reprinted with permission.

In this framework, four steps of technology used for learning activities related to an educational enhancement or transformation of the activity. The lower steps included substitution and augmentation to an educational activity with the use of the technology. The higher steps included modification and redefinition of the educational activity through the application of technology.

In this hierarchal model of technology adoption, a four-tiered approach represented a means of "selecting, using, and evaluating technology in K-12 education" (Hamilton, Rosenberg, & Akcaoglu, 2016, p.441). As Salmon (2005) explained, this approach introduces a radical paradigm shift in both pedagogy and customary practices to teaching and learning. The SAMR model represented a means of moving teachers and students through the various degrees of technology integration for teaching and learning. In the lower levels, technology simply enhanced pre-existing traditional resources (Hudson, 2014). Among the higher levels, technology presented abilities to generate a new process, product, or remix of practice (Fabian & MacLean, 2014).

Under the classification of substitution, Puentedura (2009) asserted that technology could be used as direct tool of substitution to the traditional forms of teaching and learning. For example, a teacher may have students substitute taking notes on a Word Document rather than the traditional paper-pencil format. Substitution generated "no functional change" into teaching and learning practice (Puentedura, 2014). In the augmentation level, the technology generated a minor functional improvement (Puentedura, 2014). In this case, instead of reading a lesson aloud, students may listen and follow along on their digital device (Nkonki & Ntlabathi, 2016). Supplemental

materials, like study guides or dictionaries, can be linked into an online text or classroom website at an augmented level of technology integration (Kihoz et al., 2016). Both substitution and augmentation offered an enhancement to teaching and learning with technology, but didn't redesign or create new products of learning or practice.

Modification and redefinition were transformational frameworks for technology adoption. In modification, "technology allows for a significant task redesign" (Puentedura, 2009). For example, an interactive computer simulation may replace a diagram (Kihoza et al., 2016). Rather than just substitution or augmentation, these simulations offered students an opportunity to manipulate variables that are untraditional to classroom activities, lessons, or laboratory studies. In many ways, modification constructed knowledge or a product based on audio and visual technology tools (Kihoza et al., 2016; Nkonki & Ntlabathi, 2016). Finally, redefinition was defined as using technology "for the creation of new tasks, previously inconceivable" (Puentedura, 2009). For example, a report or essay could be transformed into a new, digitally edited video by a student or group in order to share or stimulate feedback across social media or with students in other countries (Hamilton et al., 2016). The technology created a new and individualized product through the use of sharing knowledge and applications nonexistent to the traditional classroom.

The SAMR model of classification provided a broader context of technology-infused instruction that illuminates the process of effective teaching and learning (Charbonneau-Gowdy, 2015; Merriam, 2009). Using the SAMR model as the conceptual framework for the study provided a distinct orientation to the interview questions and

observations of participants (Merriam, 2009). Using a technology integration framework functioned as a guide to understanding how new or novice teachers were prepared or supported in transforming curriculum and instruction at the levels revealed in the SAMR model for effective teaching and learning with mobile technology. The SAMR model identified areas of technology integration that were described, demonstrated, and documented from an exploration of new and novice teachers' instruction and curriculum modifications. Data collected from the participants was analyzed based on the SAMR levels by which teachers modify curriculum for effective teaching and learning. For example, lesson plans or artifacts that revealed a writing assignment that uses a Word Processor, rather than paper and pencil, were categorized at the substitution level of the SAMR model.

In an effort to determine strategies that promoted the context of educational transformation defined in the SAMR model, I reviewed research that contributed to successful mobile learning environments. Themes included professional development, preservice preparation, school environment/sociocultural factors, leadership, collegial support & collaboration, and time. These elements were interpreted through the lens of the SAMR model as a framework for technology integration for effective teaching and learning. In order to interpret the success or lack of success with mobile learning in school districts, I searched contributions of technology to teaching and learning as represented through the SAMR model of technology adoption. Within the literature, authors discussed how mobile learning has changed academic growth for certain subgroups of students, supported learning and innovation skills, modified teacher and

student roles in curriculum designs, and changed the engagement and motivations among teachers and students. The purpose of the literature review was to present a general overview of the tools needed for effective 1:1 mobile learning among new or novice teachers and to be able to interpret the successful impact of mobile learning related to the SAMR model. To provide an overall summary, the conceptual framework linked the broad themes of integrating 1:1 mobile learning into successful instruction and curriculum for teachers.

A comprehensive search through the Walden University library was used to review the current literature on this topic. Many articles were found using the search terms *1:1 mobile learning, SAMR model, technology integration, novice teachers and technology, mobile learning and teacher perceptions, technology and teacher pedagogy*. To find current and peer-reviewed research, several databases were used: ERIC, Education Research Complete, ProQuest Central, and Sage. By reading the abstracts, I organized the articles into the broad themes described as factors of success and impacts of 1:1 mobile learning. All articles were printed and analyzed with notes and underlining. Internet searches were used to find governmental or organizational databases that contained the most recent educational statistics. Search terms used to find statistical data included *technology in schools, students and mobile learning, teachers and mobile learning, teacher preparation, technology and novice teachers,* and *schools and 1:1 technology*. A personal email and informal conversation with local school officials provided the statistical data on new or novice teachers and integration of 1:1 mobile learning.

After reviewing the collected literature related to problem and purpose of this study, several themes were identified as related to the modification of curriculum and instruction represented in the SAMR model. The framework of SAMR model considered the contribution of classroom technology that exists or redefines curriculum for new and novice teachers. This helped draw attention to the elements of teacher enhancement or transformative learning defined by the SAMR model. Evaluating teacher descriptions, demonstrations, or documents of technology integration helped to determine specific strategies associated in curriculum modification within the SAMR model. Similar to other technology adoption models, researchers suggested that professional development and support among new or novice teachers are essential components to gain technological and pedagogical skills for developing effective 1:1 mobile learning (Alley et al., 2014; Muilenburg & Berge, 2015). For new or novice teachers to be supported, positive relationships among the professional learning community contributed to successful gains in the transformation of educational curriculum through the use of technology (Kearney, Schuck, Burden, & Aubusson, 2012). These influences were linked to student achievement (Kearney et al., 2012; Kposawa & Valdez, 2013) and the decisions of novice teacher's application of technology and modification of curriculum (Preston et al., 2015; Svihla et al., 2015). For the SAMR model to be an effective guide toward mobile learning implementation and modification of curriculum, a dynamic approach of technology integration was needed (Hamilton et al., 2016).

Factors of 1:1 Mobile Learning Success

According to Puentedura's (2009) model of technology integration, teaching and learning evolved from a functional tool to an innovative component of transformative learning. This framework held the assumption that traditional classroom pedagogies can be developed into new products or practices in teaching and learning (Hockly, 2012). Such a task required that teachers become facilitators of learning by redesigning their curriculum and instruction beyond the confinements of time and space within their classrooms (Aubusson, Burke, Schuck, Kearney, & Frischknecht, 2014; Puentedura, 2013; Puttick, Drayton, & Karp, 2015). The contributions of professional development, pre-service preparation, socio-cultural context of the school and community, leadership and support, collegial collaboration, and commitment of time to modify curriculum all added to the complexity of the success or lack of success for teachers with 1:1 mobile technology in their classrooms (Agyei & Yoogt, 2014; Alley, Grimus, Ebner, 2014; Bang & Luft, 2013; Charbonneau-Gowdy, 2015; McLeod, 2015; Rehmat & Bailey, 2014). In particular, those schools with higher rates of teacher attrition intensified the challenges for effective teaching and learning with mobile technology (MREA, 2015). Researchers acknowledged that many new or novice teachers have neither the experience nor self-efficacy to design and develop transformative learning through the use of mobile technology (Krumsvik, 2014; Webb & Jurica, 2013). Exploring the contributions for teachers to sustain effective teaching and learning in a mobile environment were considered in the next sections.

Professional Development

There were many considerations to the professional development of teachers, particularly as they related to curricular design and modification for a mobile learning environment. In a critical review of the SAMR model, authors acknowledged that teachers, technology specialists, and professional development coordinators might have a different interpretation or understanding of how to apply this model to different classroom settings (Hamilton et al., 2016). In these instances, a complexity of factors complicated the intentions of technology adoption and integration into classroom practice. In professional development alone, contributions toward technology competence or development included a frequency and commitment to professional growth, a continuum of experience and skills, individual belief and pedagogy, and support or induction programs (Alley, Grimus, & Ebner, 2014; Aubusson, Burke, Schuck, Kearney, & Frischnecht, 2014; Ingersoll, 2012; Muilenburg & Berge, 2015).

Investing in the professional development of teachers increased student achievement (Akiba & Liang, 2016; Polly, McGee, Wang, Martin, Lambert, & Pugalee, 2015). Providing guidance through professional development opportunities and preparation time increased teacher commitment to effectively apply classroom technology (Alley, Grimus, & Ebner, 2014; Muilenburg & Berge, 2015). As adult learners, teachers appreciated opportunities to diversify instruction through creativity and self-reliance (Knowles et al., 2005). Researchers revealed that new or novice teachers are comfortable and enthusiastic with using technology, but needed to acquire the pedagogical skills to modify curriculum for effective teaching and learning with mobile

devices (Agyei & Voogt, 2014; Charbonneau-Gowdy, 2015). The following sub-sections reveal elements that contributed to professional development for teachers as related to teaching and learning with mobile technology.

Frequency & Commitment. Implementing classroom technology has remained a sizable investment to sustain in educational institutions (Delgado, Wardlow, McKnight, & O'Malley, 2015; Mohamed & Mohammed, 2013; Remis, 2015; Rohr, 2014). Frameworks, like the SAMR model, were often used to better establish the development of these costly classroom materials. Besides financial resources, technical and pedagogical training with technology has required considerable time and commitment among teachers. In smaller districts with higher rates of teacher attrition, effective professional development for teachers has remained particularly challenging (Hunt-Barron, Tracy, Howell, & Kaminski, 2015). Often these districts were limited to one-day in-service opportunities and did not provide specific support, induction programs or mentoring to new or novice teachers. In addition to knowledge and skills for mobile learning, researchers explained that teachers must be committed to utilizing technology and value its importance (Alley, Grimus, & Ebner, 2014; Muilenburg & Berge, 2015; Maschmann, 2015). UNESCO policy guidelines (2013) confirmed, "In many instances, a government's investment in teacher training is more important than its investment in technology itself" (p.31). Professional development needed to be a continuous process in order to feed the ongoing educational transformation defined by Puentedura's (2009) model of technology integration and evaluation (Kihoza, Zlotnikova, Bada, & Kalegele, 2016). The SAMR model presented a format for teachers and leaders to evaluate the

development of traditional practice and shift practice toward to new applications or remixes of curricular designs.

Experiences & Skills. Many models, frameworks, or standards helped teachers and educational leaders inform or guide teaching and learning with mobile technology. The SAMR model gained popularity within the K-12 setting because of its practicality in the field (Hamilton, Rosenberg, & Akcaoglu, 2016; Kinnaman, 2016). Specifically, the model allowed teachers to find more meaningful applications that can gradually update instructional practices (Kinnaman, 2016). Understanding how to use and apply the technology for learning and innovation skills and technology applications informed professional development for designing relevant curricular material with 1:1 technology. Because of the changing profession, Downing & Dyment (2013) suggested focusing on advancing technical skills and pedagogy for in-service and pre-service teachers. Alley, Grimus, & Ebner (2014) highlighted the importance of training teachers for a mobile world and reviewing the changes in the skills needed for teachers to become facilitators of learning. Skill sets were identified as research and information skills, creating and sharing skills, skills for manipulating tools within programs or applications, social media and digital citizenship skills, online safety and copyright skills (Alley, Grimus, & Ebner, 2014, p.53). Professional educators sought to assimilate the knowledge of effective pedagogy with the innovation of an evolving curriculum that is grafted into digital tools of daily practice. To build these skills and transform lessons through the SAMR model, researchers suggested that current professional development needed to be guided by the

quality of teacher experiences and relevance of the technology for the pedagogical purposes (Muilenburg & Berg, 2015; Pierce & Stacey, 2013).

Studies showing professional growth directed through ongoing support and development of a positive learning community provided a context to draw successful experiences that extend into a new or novice teacher's classroom. The SAMR model reflected a progression of technology adoption by teachers. As reflected by Puentedura (2009), technology use moves from enhancement to novel applications of teaching and learning. It was assumed that as teachers experience successful substitution or augmentation, the higher levels of transformative teaching and learning, modification and redefinition are made possible. Muilenburg & Berg (2015) asserted that teachers need technology-rich teaching experiences modeled during professional development. The applications presented to teachers must be applicable and relevant to their skill sets in order to facilitate continued success and curricular modifications with technology in the classroom. Pierce & Stacey (2013) found that teachers make incremental improvements integrating technology based on their individual capabilities. Muilenburg & Berg (2015) suggested that experiential skills are the basis for navigating changes in technology transience and the development of technology-based instruction and learning. Building upon these successful experiences empowered the readiness and satisfaction of teachers using technology to transform education described in the SAMR model (Nawi, Hamzah, & Tamuri, 2015; Puentedura, 2009).

Individual Belief & Pedagogy. Recognizing the variability of teachers as learners was a consideration for successful professional development of mobile learning.

Hamilton, Rosenberg, & Akcaoglu (2016) identified that the SAMR model tended to focus on a classroom product or use of technology, without highlighting the change of pedagogy that accompanies mobile classrooms. The SAMR model was criticized for its simplicity due to its relationship to a product-based outcome rather than a dynamic learning process (Hamilton, Rosenburg, & Akcaoglu, 2016). As an example, researchers argued that the SAMR model may over-emphasize higher levels of technologically produced learning artifacts without asserting instructional goals or objectives that can be met in the process of producing these materials (Hamilton, Rosenberg, & Akcaoglu, 2016). These researchers highlighted that the context of the setting, student needs, and the skill or belief of the teacher on meeting learning goals can be central to the decisions of technology adoption or movement up the levels of the SAMR model (Hamilton, Rosenberg, & Akcaoglu, 2016).

While mobile technology had a positive perception among teachers, age and experience were factors found to influence frequency and usage of mobile technology (Nawi, Hamzah, Ren, & Tamuri, 2015). In a study exploring the sub-components of the TPACK model for secondary science teachers, experienced teachers rated their content and pedagogical knowledge significantly higher than novice science teachers (Jang & Tsai, 2013). Likewise, researchers suggested that the type of digital tools and the teachers' belief system or pedagogy should be further examined (Aubusson, Burke, Schuck, Kearney, & Frischnecht, 2014). An understanding of teachers' perspectives helped to develop specific strategies needed for the professional development of new or novice teachers in a mobile learning environment. Aubusson et al. (2014) found that

intrinsic rewards, such as student enjoyment and the needs of the school environment or community are areas that impacted the commitment toward designing technology rich activities in a mobile learning environment.

Sherin & van Es (2005) noted that modifying teaching and learning with technology was a complex process related to both responding to the context of student needs and the teacher's pedagogical beliefs. In one study, researchers used the SAMR model to interpret innovations to online learning from the Blackboard Management System (Nkonki & Ntlabathi, 2016). Their findings suggested that curriculum was limited to lower levels of the SAMR model, thereby limiting transformational learning levels (Nkonki & Ntlabathi, 2016). It was reported, "convenience, management, and efficiency were the drivers of their [teachers] motivations to use Blackboard" (Nkonki & Ntlabathi, 2016, p.6). Nkonki, Ntlabathi, and Mkonqo (2013) also found that teacher's pedagogical decisions were related to Blackboard's functional uses for teaching and learning. To develop the multiple dimensions to teaching and learning with technology, the SAMR model didn't represent a teacher's pedagogical choices or preferences as a framework for technology adoption (Hamilton, Rosenberg, & Akcaoglu, 2016).

Induction Programs and Support. While gaining popularity among K-12 educators, minimal scholarly research presented the SAMR model as a guide for supporting teachers or a function of induction and mentoring programs for technology integration. Despite the lack of research of the SAMR model as a supportive guide for induction programs, researchers indicated that induction or mentoring programs contribute to professional growth by helping new or novice teachers assimilate the

transformation of education with districts using technology (Bang & Luft, 2013; Griffiths, 2013; Ingersoll, 2012). Induction programs had a positive impact on novice teachers (Griffiths, 2013). In a case study exploring the perceptions of teachers who entered the profession through an employment-based route, participants highlighted the effectiveness of the role of the mentor, particularly in their early development (Griffiths, 2013). The researcher suggested that the context of the whole school, including support from colleagues and senior management, was vital to the workplace learning and growth. Griffiths (2013) explained that participants had varied school experiences, whole-school collaboration, and support. Mentorship from experienced teachers allowed the new or novice teacher to feel comfortable sharing positive or negative experiences.

Ingersoll (2012) reported on the diversity of teacher induction programs and the effects of induction programs for beginning teachers. These programs varied in content, duration, intensity, and financial costs (Ingersoll, 2012). Induction programs guided younger teachers by having a mentor teacher provide communication, feedback, collaboration, and extra classroom assistance. Ingersoll (2012) reported that the majority of teachers in the workforce today are younger and many of these educators are leaving within the first year of teaching. Therefore, induction programs have grown considerably due to the changing trends of the teaching workforce (Ingersoll, 2012). Researchers explained that the more comprehensive the induction programs, the more likely new or novice teachers will stay at a district and become successful professionals (Hurling, Resta, & Yeargain, 2012). Ingersoll (2012) reported that having multiple components of supports, such as having a mentor, regular support from administrators, common

planning time, or classroom aides, had a large effect on teacher retention. Ingersoll asserted, "Only 5% of beginners received a comprehensive package in 2007-08. Our conclusion was that induction helps, but it depends on how much one gets" (p.50).

Induction or mentoring programs allowed teachers to openly discuss anxieties and pedagogy with others (Preston, Moffatt, Wiebe, McAuley, Campbell, & Gabriel, 2015). Holden & Rada (2011) reported that technology usability contributes to teachers' frustrations in transforming education with mobile learning. Bang & Luft (2013) explained that teachers experiencing induction programs, particularly technology-combined induction programs, were more likely to use technology than teachers who do not experience such programs. Downing & Dyment (2013) recognized that confidence and competence for working with mobile technology increased when teachers were given individualized support. In the study of using Blackboard online learning, Nkonki and Ntlabathi (2016) recommended that teaching and learning innovations should be supported through a multi-disciplinary team. Hamilton, Rosenberg, an Akcaoglu (2016) suggested that the SAMR model may need to be revised to account for the different interpretations that teachers or educational leaders may discern from the framework. Additional understanding of the larger context of professional learning, supported through induction or mentoring, provided a more context-sensitive model. Rather than a limiting one-day in-service, individualized support and ongoing collaboration with colleagues significantly reduced the challenges within the design and development of transformative technology activities discussed in Puentedura's (2009) model.

Researchers asserted that effective professional development was needed for successful mobile learning environments (Agyei & Voogt, 2014; Charbonneau-Gowdy, 2015). A solid pedagogical understanding of technology and the support of the wider learning community engaged teachers toward the higher levels of the Puendura's (2009) model for educational transformation with technology (Hamilton, Rosenberg, Akcaoglu, 2016; Nkonki & Ntlabathi, 2016). Determining the impact of an integrated 1:1 classroom was found by understanding the complex interactions new or novice teachers have with mobile learning as they probe their own skill and knowledge of emerging technology for education, explore positive technology experiences, and communicate within the context of an evolving profession.

Pre-service Preparation

Many standards or frameworks have been given scholarly attention for their abilities to guide the understanding of teacher preparation and confidence in adopting technology for teaching and learning. Although limited in scholarly research, the SAMR model has emerged in the K-12 setting and gained esteem for many practitioners (Hamilton, Rosenberg, & Akcaoglu, 2016). Hamilton, Rosenberg, & Akcaoglu (2016) reported an increasing amount of workshops or presentations related to the SAMR model at the International Society for Technology in Education (ISTE). Despite the emergence of a popular technology integration framework, one study acknowledged that the usefulness of both TPACK and SAMR frameworks were dependent on the teacher's professional intentions and competence of information and communication technology (ICT) (Kihoza, Zlotnikova, Bada, & Kalegele, 2016). Researchers reported that pre-

service teacher trainers had low pedagogical competencies and ICT skills (Kihoza, Zlotnikova, Bada, & Kalegele, 2016). This finding led to the researchers to conclude, "The moment teachers training colleges see the light that the TPACK and SAMR models' characteristics make the use of technology interesting, organized, exciting, and easier; they would perceive it as mandatory and future professional teacher relevance" (Kihoza, Zlotnikova, Bada, & Kalegele, 2016, p.122).

Researchers indicated that teacher-credentialing institutions are in the early stages of adopting methods of mobile technology preparation (Foulger, Burke, Williams, Waker, Hansen, & Slykhuis, 2013). Many new or novice teachers were competent with technology for personal use and excited about their intentions to use technology in their classrooms (Charbonneau-Gowdy, 2015; Rehmat & Bailey, 2014; Sutton, 2011). Hughes (2013) asserted that most pre-service teachers reported a moderate level among elements of self-efficacy, attitude, and philosophy of digital technology use in the classroom. Rehmat & Bailey (2014) suggested that additional research was needed to follow up on pre-service teachers' perceptions of using technology after their education programs. Despite optimistic intentions of new or novice teachers, researchers reported a lack of pedagogical preparation and experience with technology transformation during pre-service training (Sutton, 2011).

Sutton (2011) suggested that additional research was needed to understand how new or novice teacher's perceptions of instruction evolve as they begin their careers. In a qualitative study on teacher preparation and experience with technology, Sutton (2011) found that there was "a disconnect between technology training and other aspects of

teacher training, a lack of content-area relevance, and inadequate retention and transfer" (p.39). Likewise, Webb & Jurica (2013) found that teachers had adequate foundational technology skills, but were unable to weave technology seamlessly into their daily lessons. Webb & Jurica (2013) revealed that technology became a "supporting tool, rather than the focus of the lesson" (p.64). Charbonneau-Gowdy (2015) reported that novice teachers resorted to the basic forms of technology use, such as PowerPoint or videos, despite their enthusiasm for technology-infused instruction during pre-service development. Again, Hughes (2013) explained that pre-service teachers mainly used technology for productivity activities during their preparation for teaching. This included word-processing, Internet browsing, or PowerPoint activities (Hughes, 2013). Puentedura's (2009) model evaluated such activities at a substitution level of educational transformation. These studies indicated that most pre-service teachers are not prepared to transform curriculum as outlined in the SAMR model.

Although pre-service teaching programs had limited technological pedagogy practices, Hughes (2013) suggested that continued professional development, technical support, teacher preparation modeling, and student teaching placement in a technology-rich school could provide future strategies for enhancing instruction for teachers. Understanding the how and why of teachers' curricular design choices provide a context for effectively integrating mobile learning in the classroom.

Jaipal Jumani & Figg (2013) acknowledged that professional development for the use of technology in the classroom has evolved into a "content-centric approach" (pg. 215). They found that teachers needed pedagogical modeling and knowledge rather than

technology skill development (Jaipal Jumani & Figg, 2013). In Hamilton, Rosenberg, & Akcaoglu's (2016) critical review, researchers admitted that the SAMR model lacks context and over-emphasized a technology-produced product in its hierarchal format. McLeod (2015) also reported that teacher's curricular decisions to use technology should have a "targeted and intentional" (p.228) approach, rather than replicating lesson with the technological tool. Webb & Jurica (2013) asserted that university professors should model technology integration into all projects and lesson plans in order for students to also deliver instruction in the same manner. Considering these aspects, Jamail & Figg (2013) asserted that teachers should understand how to teach their content area, especially for creating successful experiences in practice. The past successful or unsuccessful experiences, learning goals, and alignment strategies of teacher's curricular development continues to impact mobile learning and the application of the SAMR model as a guide for teaching and learning.

Socio-cultural Context

Puentedura (2012) reported that the SAMR model remains a tool that can adjust to an evolving context within the classroom, including the changes in students and teachers. However, critical reviewers noted that the SAMR model "ignores the complex setting in which technology integration occurs" (Hamilton, Rosenberg, & Akcaoglu, 2016, p.436). These scholars argued that context, including the technology infrastructure and resources, community support, and knowledge or support for teachers should be considered in the complex nature of school communities (Hamilton, Rosenberg, & Akcaoglu, 2016). Likewise, Nkonki & Ntlabathi (2016) asserted the contextual setting of

online learning, including institutional culture, played a significant role in changing the past practice of teaching and learning. Zhao & Frank (2003) suggested that models should consider the interdependent interactions of all teachers, students, and school communities.

Researchers explained that a sociocultural perspective is a way of understanding the factors that change or direct an individual's lifestyle (Cohen & Geier, 2010; Rice, 1995). Social factors included incidental or contemporary events related to one's personality or attitude (Cohen & Geier, 2010; Rice, 1995). Cultural factors related to the aspects of individuals that are passed down from previous generations or deeply ingrained into the patterns of behavior or identity (Hidalgo, 1992; Leventhal, M.W., 2012). Together, social and cultural factors have contributed to the decisions and planning of educators in a mobile learning environment. Sociocultural factors exhibited a general understanding of a school or community. A broad perspective of local sociocultural factors can be revealed in school communities. In the pedagogy of place, understanding of community lifestyle helped teachers to better modify curriculum that extends student achievement (Azano & Stewart, 2015). Teachers were able to positively influence the learning community if they positioned themselves as a learner in the geographical and cultural context of families and their communities (Kearney, McIntosh, Perry, Dockett, & Clayton, 2014).

Researchers considered the collaboration of community and school environments for adapting the transitional stages needed in Puentudra's (2009) model of transformative education with technology. Bang & Luft (2013) asserted that technology integration

slowly evolves based on assessing the needs in a school environment and community. Kearney, Schuck, Burden, Aubusson (2012) found a distinctive mobile learning pedagogy by relating current socio-cultural constructs of authenticity, collaboration, and personalization to learning activities beyond space and time barriers. Such an integration of pedagogy transformed education in a broader sense and captured the strength of local community. Researchers explained that new or novice teachers needed sufficient information about the sociocultural community to support and manage expectations in their classroom (Becker, Hyland, & Soosay, 2013; DeFeijter, 2015; Kearney et al., 2014). Buchanan (2012) and Baker-Doyle (2010) suggested that a comprehensive understanding of the macro and micro perspectives from social networks within the community influenced supportive relationships and adaptability towards change. These contributions impacted the decisions of how or why teachers modify curriculum.

Simply providing mobile devices to each student did not guarantee transformation of curriculum. Agyei & Voogt (2014) found that the variation in school structure and/or culture impacted the utilization of technology-enhanced activities. Their strategy suggested the importance of promoting collaboration and discussion between regionalized higher education and local schools. Higher education could provide a support system for leading technology-enhanced education at the K-12 school level (Agyei & Voogt, 2014). Such research indicated that partnering between the sociocultural contexts of the community established innovative and supportive ideas and experiences for new or novice teachers in their design and development of technology integrated curriculum and instruction.

Charbonneua-Gowdy (2015) suggested that innovation in curriculum design and modification occurred through a structure of safety, commitment from leadership, and minimizing risk. Researchers asserted that pre-service and current new or novice teachers establish competence and efficacy for mobile learning before entering classrooms (Charbonneua-Gowdy, 2015; Jaipal Jumani & Figg, 2013). Charbonneua-Gowdy (2015) explained that teachers needed to feel safe organizing classroom technology during pre-service programs in order to be innovative in their future classrooms. Once in these new classrooms, educational leaders needed to provide support and time for teachers to explore and develop curriculum at their pace of change. Charbonneua-Gowdy's (2015) explained that once in their classrooms, novice teachers expressed concern for disapproving teacher mentors and uncontrolled students as reasons for being less creative during their actual teaching experiences (p.248). These contexts impacted development and design for effective teaching and learning.

Acknowledging that mobile learning or an online environment has different textures helped ease the challenges for new or novice teachers. Researchers suggested that teachers needed sufficient information about the sociocultural community to help define their role in instruction or curriculum expectations (Becker, Hyland, & Soosay, 2013; DeFeijter, 2015; Kearney et al., 2014). He & Cooper (2011) found that strategies for first year teachers included learning from the students and their connections to the community. By focusing on elements of place-based pedagogy, like getting to know the students and families, these teachers were able to focus on positive experiences and find individual ways to manage frustrating aspects of teaching (He & Cooper, 2011). Mobile

tools added to the valuable forms of collaboration and/or communication within social networks. Authors suggested the need for novice teachers to make connections with the learning community and "fully understand the multiple roles as teachers and perceived teaching as more than content delivery" (He & Cooper, 2011, p.111). Understanding these layers of teacher influences contributed to the exploration of curriculum modification and design for successful mobile learning.

Leadership

Puentedura (2016) presented considerations for educational leaders and initiated the SAMR model for teachers. The presentation highlighted the importance of a larger network of learning, particularly focusing on both the internal and external communities of practice. Here, consideration was given to the collaborative efforts needed for teachers to share ideas and experiences of technology integration based on the SAMR model (Puentedura, 2016). Puentedura (2016) also recognized the individual teacher as an independent learner whose curricular designs for technology are loosely structured based on the digital tool and guidance from websites, educator blogs, or social networks. Recognizing the differences in professionals as educators and learners themselves, Puentedura (2016) urged teachers to recognize their passions and experiences for curricular designs fashioned for the future.

In the technology adoption at Glastonbury Public Schools of Connecticut, the SAMR model was used to provide a platform for building a professional learning community (Kinnaman, 2016). Here, district leaders recommended that teachers' decisions and feedback should connect to the development of technology integration as

related to the SAMR model (Kinnaman, 2016). Nkonki & Ntlabathi (2016) recommended that transformational learning should be grounded in a multi-disciplinary team approach to teaching and learning, including the ideas and perspectives from teachers to curriculum or technology specialists. Creating a professional learning network, particularly with a focus of innovation from traditional teaching and learning practice, was supported through collaboration and communication from all members and their interactions (Goh, S. & Zhen-Jie, B., 2014; McLeod, 2015; Nkonki & Ntlabathi, 2016).

In the 21st century, schools and businesses have emphasized the importance of a collaborative model of leadership. Coined as "servant leadership", the format changed the traditional top-down management style toward a model that stresses the importance of relationship and collaborative interactions between colleagues (Goh, S. & Zhen-Jie, B., 2014). Servant leadership affirmed diversity and maintained the groups' strengths. Researchers asserted that teachers are empowered to modify and strengthen curriculum or instructional goals as long as educational leader have built rapport and trust with these individuals (Goh, S. & Zhen-Jie, B., 2014). In this format, teachers felt safe and valued enough to take risks that improve teaching and learning. Mohala, Goldman, & Goosen (2012) suggested that leadership teams must create an environment where workers "feel comfortable, driven, and valued" (p.10). This mode of leadership allowed educational leaders to distribute responsibilities and decisions, thereby helping to create a positive school climate and a team dedicated to problem solving (Chi Yan Lam, 2015; Goh &

Zhen, 2014; Kulik, C. & Roberson, L., 2008). Positive collegial relationships contributed to the commitment and professional growth of teachers (Conner, 2014; Shah, 2011).

In studies of novice teachers, researchers found that school management and leadership significantly contributed to effective teaching and learning (Ingersoll & May, 2012; Opfer, 2011). Becker (2013) found that without proper technology policies in the classroom, classroom instruction could become problematic. This included distraction of email, messaging, playing games, or surfing the Internet (Becker, 2013, p.2). Preston, Moffatt, Wiebe, McAuley, Campbell, & Gabriel (2015) identified that "e-leadership" provided teachers with the safety, adequate workloads, ease of use, and attitudes that teacher need to interact with educational technology effectively.

Krumsvik (2014) presented an individual digital competence model for teacher educators (TE's) based on the intentions found in national or institutional policies. The author argued that there was a gap in practice between the intentions of larger policies and the micro level of individual digital competence. Without focusing on the individual digital competence, larger scale policies filtered into wasteful time and energy, as new teachers worked to enhance digital competence during their first few years of teaching (Krumsvik, 2014, p.271). Asserting that most pedagogical frameworks lack functionality, Krumsvik (2014) suggested having clearly defined definitions and models for promoting individual competence within teacher education. However, in a critical review of the SAMR model, Hamilton, Rosenberg, & Akeaoglu (2016) explained that the framework reflected "inconsistent interpretations and understandings" (p.435). Krumsvick (2014) concluded that teachers need an operational and contextualized digital

competence model and student teachers must link specific needs during teacher education courses, practicum experience, or during their first years teaching.

Conchrane (2012) explained that mobile learning projects fail or succeed based on appropriate modeling, through a project leader and sustained collaborative support. Researchers suggested that by using the SAMR model, leaders could frame the efficacy of technology tasks with the appropriateness of the instructional policy for student use of technology in the classroom (Becker, 2013; Brooks Kirkland, 2014). McLeod (2015) also noted the significant role leaders have in modeling and discussing technology integration with colleagues. Such a strategy involved using a discussion protocol, like trudacot, to find more specific and concrete evidence of instructional changes in activities (McLeod & Graber, 2015). Hepp, Fernandez, & Garcia (2015) offered strategies leaders could apply for confronting the problems of curriculum modification with digital tools. This included providing open dialogue, teacher autonomy, decentralized management, community involvement, and flexibility in technology plans (Hepp, Fernandez, & Garcia, 2015, p.39). In these studies, researchers explained that educational leaders should compose reasonable time and space for teachers to evolve classroom practices to a more student-driven, technology-rich environment (Hepp, Fernandez, & Garcia, 2015; McLeod, 2015). Svihla, Reeve, Sagy, & Kali (2015) acknowledged the importance of understanding and supporting each teacher-designer's learning to gain knowledge of obstacles and opportunities for district-wide improvements in technology integration for effective teaching and learning. Hamilton, Rosenberg, & Akeaoglu (2016) also suggested that educational leaders consider the broader context, that recognizes various

perspectives of how models like SAMR are interpreted, in order to effectively adopt technology into classroom teaching and learning.

Collaboration and Support

Researchers reported that the SAMR model evaluates or guides technology adoption, but the support and collaboration of experiences with these levels requires a team effort and commitment to establishing technical and pedagogical competencies (Kihoza, Zlotnikova, Bada, & Kalegele, 2016; Nkonki & Ntlabathi, 2016; Puentedura, 2016). Teacher empowerment for educational transformation was provided through a positive school climate that endorsed the continued development of technological and pedagogical skills needed in curriculum with 1:1 mobile learning (Cohen & Geier, 2010; Goh & Zhen, 2014; Kihoza, et al., 2016). Positive relationships among colleagues promoted supportive and collaborative working conditions for teachers to become effective professionals (Shah, 2011). A learning commons approach incorporated collaborative teacher inquiry for assessing the efficacy of technology tasks developed in Puentudura's (2009) model (Brooks Kirkland, 2014).

Burton & Johnson (2010) and Azano & Steward (2015) found novice teachers desired to be professionally and personally connected to the communities they teach. Positive school climate was influenced by the rapport between students, parents, and teachers. Rapport was described as encompassing a mutual trust between individuals and characteristic of effective teachers (Frisby & Martin, 2010). In a study of understanding the strategies to overcome challenges for beginning teachers, He & Cooper (2011) explained that novice teachers needed to make connections with the learning community.

Strategies for these connections included, "learning from the students in order to motivate them, getting to know the students and families, focusing on positive experiences, and finding individual ways to manage stress/frustrations" (He & Cooper, 2011, p.108).

Chou, Block, & Jesness (2012) provided a case study highlighting a 1:1 iPad pilot project for a large K-12 school district. Among the conclusions, researchers highlighted the importance of a social network of support and collaboration to extend instructional activities as outlined from the SAMR model (Chou, Block, & Jesness, 2012; Puentedura, 2016). Recommendations from a study on the educational process used in technology training of teachers suggested that collaboration was needed for digital competence (Hepp, Fernandez, & Garcia, 2015). This involved training teachers with the knowledge of educational applications as well as dialogue and support for problems associated in the digital world (Hepp, Fernandez, & Garcia, 2015; Svihla, Reeve, Sagy, & Kali, 2015). Among these constructs, researchers included supporting dialogue between teachers and their curricular designers (Svihla, Reeve, Sagy, & Kali, 2015).

Collaborative teacher inquiry allowed the discussion or documentation of positive or negative experiences with technology-rich lessons or activities. Teixeira, Matos, & Domingos (2015) explored the schemas used by teachers implementing technological resources. Researchers found that teachers' attitude and acceptance of technology was significant to their schemas and many of these schemas gradually built over time (Teixeira, Matos, & Domingos, 2015). Researchers concluded that schemas were created by the availability of classroom resources/school conditions, the characteristics of the students, the teachers' ideas of the technology's strengths or limitations, and dialogue

with other teacher's experimentation with technology (Teixeira, Matos, & Domingos, 2015, p.131). Such schemas were influenced by the respect, trust, and support teachers have in their learning community (Preston, Moffatt, Wiebe, McAuley, Campbell, & Gabriel, 2015). Teachers' attitudes were linked to the successful experiences of new technology and a foundation of innovative collaboration (Teixeira, Matos, & Domingos, 2015; Ting, 2011).

In an atmosphere of positive learning, the outcome of school-wide goals was supported and enhanced through teacher collaboration and commitment (Cohen & Geier, 2010; Ice, Thapa, & Cohen, 2015). The school climate was reflective of community engagement, professional capacity, and instructional guidance. Teachers exhibited relational trust and cooperation when they were supported through positive relationships with colleagues and a community of camaraderie (Chi, 2015; Conner, 2014). Collegial trust resulted from the competence, benevolence, and honesty within the staff relationships (Allodi, 2010; Chi, 2015). A holistic sense of community and healthy collegial relationships assumed responsibility for student achievement (Shah, 2011). If these are challenges within the classroom or school environment, novice teachers were likely to have an unfavorable attitude or commitment to transforming education with technology.

Time Allotment

Kihoza, Zlotnikova, Bada, & Kalegele (2016) recognized that frameworks like SAMR or TPACK were only effective with the assumption that teachers have the abilities, attitudes, or competencies to be innovative in their educational fields.

Researchers reported that mobile technology needed to be adaptable enough for novice teachers to gain efficacy and competence in pedagogical skills within the classroom, particularly because of the lack in teacher preparation (Sutton, 2011; Webb & Jurica, 2013). Researchers revealed that new or novice teachers had a wide-range of technological abilities and skills (Charbonneau-Gowdy, 2015; Hughes, 2013). Facility resources were not the single factor that contributed to teachers' decisions to modify curriculum (Kihoza, Zlotnikova, Bada & Kalegele, 2016). However, an accumulation of professional development and planning time provided the foundation to move up the ladder on the SAMR model.

Downing & Dyment (2013) reported that confidence and competence increased within teachers over time. This became a consideration as school districts continually hire new or novice teachers. Researchers recommended that teachers be given an appropriate amount of time to develop competence in pedagogical and operational skills for mobile learning (Downing & Dyment, 2013). Conchrane (2012) and McLeod (2015) found that without significant time for changing teacher's pedagogy or use of technology, mobile learning projects failed in transformative classroom practices.

Romrell, Kidder, & Wood (2014) admitted that the SAMR model and mobile learning are defined by being "personalized, situated, and connected" (p.87). Therefore, planning lessons that move to higher levels of SAMR need more than simply foundational technology skills. Teachers needed to apply experimental learning that challenges students to develop deeper modes of thinking relevant to the digital environment (Webb & Jurica, 2013). In Teixeira, Matos, & Domingo's (2015) study of

teachers' schemas, evidence presented gradual indications of adjusting resources to transform education and move to higher SAMR levels. Such schemas and the principles of design process for mobile technology needed to be flexible toward the variable abilities of teachers' skills (Webb & Jurica, 2013). Without considering the progress of incremental adjustments toward instructional changes and the time to develop technology-rich lessons, teachers resented top-down policies of technology integration (Ting, 2011).

Educational Impact of 1:1 Mobile Learning

Gauging the impact of a 1:1 mobile learning environment, as related to the SAMR model, assists educational leaders in future decisions of curriculum, instruction, and assessment. Educational professionals were determined to bring about positive change for students by preparing them for an evolving technological future. Therefore, understanding the challenges and opportunities with mobile learning were considerations for effective teaching and learning. In a review of current literature, researchers exposed areas by which technology contributed to the educational context and how the SAMR model correlated to these contributions. The following sub-sections revealed the themes found in literature.

Academic Growth

The influx of 1:1 initiatives has drawn full attention of the educational profession for several reasons. One of the most important reasons was the potential benefit of academic growth for students. Academic growth means achievement or academic progress on statewide tests or individual learning improvements as measured by the

advancement of skills or knowledge by a student. Effective integration of technology initiatives required informed teachers with the strategic instructional applications to meet students (Batainech & Anderson, 2015). In some of the studies, researchers reported that the quantity and quality of technology predicted academic achievement while controlling for demographic differences (Cheema & Zhang, 2013). Without curriculum modified for Puentedura's (2009) higher levels of technology integration, teaching and learning with mobile devices remained only a functional tool rather than a transforming technological tool (Romrell, Kidder, Wood, 2014). While not all studies indicated consistent improvements on test scores, subgroups of students did find academic success through the utilization of computer-assisted tools within randomized controlled studies (Fede, Pierce, Matthews, & Wells, 2013).

Academic growth was measured in various forms. Researchers reported mixed results for technology effectiveness on standardized tests among student diversity, grade level, and content (Spanos & Sofos, 2014, Downes & Bishop, 2015, Kposowa & Valdez, 2013). Researchers from one study highlighted an increased achievement as measured by standardized tests in mathematics and English/language for 4th and 5th grade students (Kposowa & Valdez, 2013). Goldstein & Alibrandi (2013) noted a significant increase in standardized reading test scores, especially for ELL students. Internationally, Spanos & Sofos (2014) found that digital literacy improved for students participating in a one-to-one laptop initiative in Greece. Word processing, spreadsheet, and presentation functions increased with elementary age boys and junior high girls (Spanos & Sofos, 2014).

Increasing the functionality and enhancement of writing, graphing, and communication/collaboration were some areas that benefitted students using mobile technology. In evaluating the academic performance for digital students, Rosen, Chang, Erwin, Carrier, & Cheever (2011) examined the relationship of electronic communication and writing skills among young adults. The researchers assessed young adults, age 18-25, gender, and level of education. Researchers used texting and/or instant messaging to determine associations between formal and informal writing. In the findings, researchers reported a negative association between the use of texting and formal writing and a moderate difference among gender and level of education (Rosen et al., 2011). Researchers found a significant association between texting behavior and literacy skills. In another study on writing skills for secondary students, Blankenship & Margarella (2014) found that the amount of writing and student assessment scores improved when technology was applied to writing instruction. The advancement in formative feedback through technology applications increased student motivation and assessment of secondary students writing skills.

Puentedura's (2009) model suggested moving beyond the performance of technology tools toward redefining innovation in literacy, writing, or data analysis. Corn, Tagsold, & Patel (2011) asserted that technology has improved the practice of writing through workable drafts, correction of spelling, and grammar. Drayton, et al. (2010) and Zheng, Warschauer, Hwang, & Collins (2014) explained that science software capabilities, data collection and analysis are improved with technology capabilities. However, these were only substitution aspects of the SAMR model for technology

integration. Teachers raised concerns that the functionality of technology hinders the ability of students to connect ideas and think critically (Corn, Tagsold, & Patel, 2011; Higgins, 2014).

Looi, Zhang, Chen, Seow, Chia, Norris, & Soloway (2011) studied the learning effectiveness of inquiry-driven mobilized lessons for a 3rd grade science class of mixed ability in Singapore. A one-year curriculum implemented activities that were designed for mobile learning in the science classes. The 1:1 mobile inquiry curriculum shifted teacher/student attitudes, increased engagement and self-directed learning, and improved science test scores. This suggested that engagement and student performance were linked. Conclusions proposed that mobilized curriculum might need more design time and professional development for teachers to understand the best way to implement the curriculum for academic growth (Looi et al., 2011).

For the desired math and science skills in the digital world, a study of 4th grade students found that inquiry-based learning environments helped significantly improve student learning (Deniz & Dulger, 2012). Using microcomputer-based laboratories (MBL), students increased their ability to interpret graphs with the use of technology (Deniz & Dulger, 2012). Likewise, an inquiry-based science study found that promoting technology skills, relevant to today's scientists, significantly increased students' abilities to process and understand scientific skills (Hakan & Yager, 2016).

Connecting these skills, through collaboration or teams, has become a desired concept in both education and business (Reychav, Ndicu, & Wu, 2016). Reychav, Ndicu, & Wu (2016) explained that individuals engage in groups to acquire knowledge that

deepens understanding and innovation for real-world problems. Puentedura (2009) suggested that these aspects of learning are classified within the transformational level of the SAMR model. In their study, mobile devices were used to determine the impact of collaboration from social networks. In the findings, researchers reported that students interacted more frequently and gained deeper knowledge through the social network found in a mobile technology environment (Reychav, Ndicu, & Wu, 2016).

In a critical review of the SAMR model, researchers noted that the structure of the framework was often too rigid for educators whose learning environments have a unique or dynamic context (Hamilton, Rosenberg, & Akcaoglu, 2016). In recent presentations, Puentedura's (2009) meta-analysis of research concluded that using this model will lead to better academic achievement. However, these studies reported an effect size that failed to account for various population characteristics or a broader context of the learning environment (Hamilton, Rosenberg, & Akcaoglu, 2016). The research selected by Puentedura (2014), a meta-analysis by Pearson, Ferdig, Blomeyer, & Moran (2005), "focused on the interactions between learners and technology" (Hamilton, Rosenberg, & Akcaoglu, 2016, p.437). This did not measure academic growth. As previous studies were presented in this literature review, academic achievement by means of technology applications did appear for particular sub-groups of students. However, there were no scholarly studies that have been able to link the SAMR model to academic achievement.

21st Century Skills

The SAMR model presented a framework for developing technology integration that incorporated teaching and learning outside the confinements of a school building.

Puentedura (2016) articulated each level of the model as a means of building skills of the 21st century. For example, the substitution level integrated recall or reproduction of knowledge. Augmentation provided some functional change through skill or conceptual development. Modification extended skills of strategic thinking and redefinition promoted problem solving or forms of innovation.

In addition to categorization of technology skills at each SAMR level, Puentedura (2016) highlighted five 21st century practices for technology classrooms, known as "EdTech Quintet." This included social, mobility, visualization, storytelling, and gaming. In social practices, students will learn communication, collaboration, and sharing skills. In mobility practices, students gain an anytime or anyplace learning experience or product creation. For visualization practices, abstract ideas can be made tangible or perceivable. In storytelling, knowledge can be integrated or transmitted. Finally, gaming will provide a means of feedback or formative assessment for students.

In addition to the skills highlighted within the Puentedura (2016) SAMR model, the Partnership for 21st Century Learning (2015) acknowledged that learning outcomes for today's students should include life skills, innovation skills, and information, media, & technology skills. All these skills were grouped into themes of global awareness, economic, environment, health and civic literacy. Life or career skills highlighted responsibility, productivity, social skills, and adaptability. Learning or innovative skills included creativity, problem solving or critical thinking, communication, and collaboration. Puentedura (2009) suggested that such skills fall into the redefinition or modification level of the SAMR model for transformative learning in the 21st century.

Informational skills will provide the ability to understand the forms of information and media for effective communication. While educators were not limited to infusing all these skills into curricular outcomes, mobile learning provided a framework to engage many of them. The SAMR model encompassed a platform for designing or evaluating the areas of 21st century skills for effective teaching and learning (Puentedura, 2013).

Researchers highlighted some studies that emphasized a broader scope of educational effectiveness with mobile learning, particularly aligned with 21st century skills. Downes & Bishop (2015) researched the relationship between a four-year mobile learning program and elements of middle schools. As related to 21st century skills outlined in The Partnership for 21st Century Learning (2015), characteristics associated with middle school concepts included relevant and integrative curricula, organization to promote healthy relationships, and supportive school cultures. Downes & Bishop (2015) concluded that effective technology integration should be coordinated with the characteristics found in the middle school concept. In addition, researchers acknowledged that teachers should be competent with technological pedagogical content knowledge to guide students in the mobile learning environment (Downes & Bishop, 2015). In their findings, researchers exposed the new challenges and benefits for future technology initiatives. Obstacles included students moving from in-school technology use to out-of-school technology use, lack of common planning time, poorly correlated professional development, and state driven curriculum designs (Downes & Bishop, 2015). Benefits included team-building activities, individualized learning opportunities, and relevant & engaging activities (Downes & Bishop, 2015).

The new skills of the 21st century have transformed the student-teacher roles and functions of curriculum in the classroom. He & Cooper (2011) noted that a 21st century classroom involves teachers in multiple new roles and instruction that becomes more than content delivery. In a study of 1:1 iPad pilot project, Chou, Block, & Jesness (2012) found that teachers benefited with the ability to obtain current information and student-centered activities. Broussard, Herbert, Welch, & VanMetre (2014) provided a case study of a Louisiana high school's 1:1 computer adoption to determine changes from textbook focused (teacher-centered) to learner focused (student-centered) curriculum. Some of the advantages included greater organization & efficiency, better communication, eco-friendliness, meeting needs of visual and verbal/auditory learners, enhanced college preparedness, and students' ability to learn responsible computer use. New challenges still existed with computer malfunctions, distractions, less challenging courses than in a traditional classroom, lack of diligence in charging batteries overnight, "lost class time from one period to the next because student access restrictions were not lifted from prior class, academic dishonesty (e.g., students emailing answers to other students), reticence to learn technology and preference to traditional pen-and-paper approaches" (p.43), tablet updating, lack of continuous professional development and support, technology that was more appropriate for some subjects than others, and students not being self-disciplined to stay on track without monitoring (Broussard, Herbert, Welch, & VanMetre, 2014).

Student centered learning was found within a ubiquitous mobile learning environment and at the higher levels, modification and redefinition, of the SAMR model.

Sha, Looi, Chen, & Zhang (2012) studied relationships between technology integrated classrooms and theories of self-regulated learning (SRL). The construct of SRL claimed that academic achievement was determined by behavioral and environmental factors. Researchers studied an elementary science class in Singapore to understand and analyze mobile learning as it relates to the SRL model. Their findings suggested conventional ideas of mobile learning should be replaced with an understanding that learners are continually in motion, learning across time and space (Sha et al., 2012). In the context of the elementary students, learners were more engaged and proactive when they had technological devices and foundational knowledge constructs (Sha et al., 2012). In these studies, researchers outlined the significance of widening the scope of learning and outcomes of 21st century themes.

Curriculum Designs

Puentedura (2013) asserted that to move up the ladder on the SAMR model of technology integration, curriculum requires a non-traditional mode of teaching and learning. Traditional practices have primarily focused on foundational knowledge, thereby synthesizing core content and informational literacy (Puentedura, 2014). However, Puentedura (2014) reported that today's learners engage in humanistic knowledge and meta-knowledge. Developing humanistic knowledge focuses on cultural competence, life skills, and ethical awareness. Puentedura (2014) asserted that meta-knowledge will be needed for collaboration, problem-solving, critical thinking, and innovation in the future workplace. Such practices can be incorporated into curriculum for the 21st century and were reflected within levels of the SAMR model.

Alley, Grimus, & Ebner (2014) outlined the various elements that were associated with producing and distributing curriculum and instruction for mobile learning environments. This included "technology that is smaller and more powerful, options of materials and/or information available anywhere and at any time, opportunities to quickly search and assemble materials, mechanisms that can validate learning materials, more multimedia, open educational resources under common licenses, and systems that adapt to the diversity of learning" (Alley, Grimus, & Ebner, 2014, p.56). Envisioning these different textures to curriculum were part of the transformational level found in the SAMR (Puentedura, 2013) model. Kinnaman (2016) explained that applying the SAMR model disintegrated the traditional learning methods for an adoption of practical or meaningful uses with technology applications.

In a study of curriculum decisions among teachers, Aubusson, Burke, Schuck, Kearney, & Frischknecht (2014) found that teachers were selective in their choice of technology, resources, and pedagogy (p.227). Charbonneau-Gowdy (2015) found that most novice teachers resorted to basic forms of technology use, such as slide presentations or videos (p.248). Teachers' decisions were expressed in concerns with the usability or flexibility that technology offers to the design or selection of curriculum. Other teachers were concerned with the student distractions (Becker, 2013) or engaging inquiry and problem-solving skills. Without proper technology policies, Becker (2013) explained that technology poses the distractions of email, messaging, playing games, or surfing the Internet (p.2).

Bang & Luft (2013) found that induction programs, gender, and socioeconomic status (SES) facilitated or inhibited the use of technology in curriculum. The results of their study indicated that males were more likely to use PowerPoint and software than female secondary science teachers, teachers in higher SES districts used technology less than those in lower SES districts, and teachers involved with an induction program were more likely to apply technology to their curriculum designs (Bang & Luft, 2013). Jalali, Panahzade, & Firouzmand (2014) found that male teachers were more likely to have a teacher-centered approach to their instruction when more technology was used in the classroom. Likewise, female teachers were more likely to use technology in their class, applying a more student-centered approach to instruction. With a more student-centered approach, Jalali, Panahzade, & Firouzmand (2014) found a more lenient classroom. In an assessment of TPACK ratings among secondary science teachers, Jang & Tsai (2013) found a statistically higher difference among males than females in rating their technology knowledge and competence. In addition, experienced teachers were rated statistically higher than novice teachers in their TPACK rating (Jang & Tsai, 2013).

Transformative education didn't have the same appearance for different subjects or classrooms. Nkonki & Ntlabathi (2016) found that technology was primarily at a substitution or augmented levels among online teaching and learning. However, Puentedura (2009) suggested that the SAMR model promotes a sequence of enhancement with technology to a transformation of curriculum. Some researchers argued that the hierarchal levels limit the dynamic process of teaching and learning (Hamilton, Rosenberg, & Akcaoglu, 2016). The goal of the curricular design in the SAMR model

was to reach a level of innovation between the interaction of the learner and the learning tool.

In a study of the effectiveness between hands-on and computer-based learning activities, Ekmekci & Gulacar (2015) found that students were more motivated and exchanged more ideas with hands-on activities than students using computer-based activities. In the findings, researchers reported no significant differences in learning gains between students who did the activity [electric circuit exploration] and those who did it in a computer-based environment (Ekmekci & Gulacar, 2015, p.771). Ekmek & Gulacar (2015) asserted that a combined approach to computer-based and hands-on learning should be considered in curriculum designs. This recommendation asserted Hamilton, Rosenberg, & Akcaoglu's (2016) suggestion to use the SAMR model in light of the context or learning environment, rather than a linear approach to technology adoption for teaching and learning.

The student's age was another consideration in the design elements of technology-infused curriculum. Keung (2012) studied the age difference in using technology for learning among students in higher education. Keung (2012) found that older students had more confidence than younger students in using technology for learning in Hong Kong (p.310). Keung (2012) asserted that this is because older students were part-time workers who use technology at work more often than full time younger students (p.310). Nawi, Hamzah, Ren, & Tamuri (2015) reported that technical aspects, usability of applications, and the users' age were important considerations for teacher's curriculum readiness for mobile devices in the classroom. In Teixeira, Matos, &

Domingo's (2015) exploration of teacher's curricular schemas in technology integration, authors found that resources were adapted or improvised from pre-made curriculum materials. Puentedura (2009) suggested that transformative technology in the classroom, specifically at the redefinition level, involved innovation and creativity of lessons within any age span or field of discipline.

Engagement and Motivation

In a recent presentation of the SAMR model, Puentedura (2016) urged teachers to begin with three foundational questions when initiating curricular design using the SAMR model. These questions probed the personal passion of the teachers, the barriers to their student's progress, and a consideration of the student's future interests or lives outside of school (Puentedura, 2016). Contemplating these three options were meant to spur the development of curriculum that can be engaging and motivating due to the apparent relevance to the student and teacher.

Although the 1:1 initiatives held the potential to boost engagement and motivation, researchers exposed paired influences that impacted the evolving curriculum and instruction. As represented in many early and current studies in mobile learning, researchers have shown increased student engagement and motivation with digital tools (Babell & Kay, 2010; Huang, Yang, Chiang, & Su, 2016; Zheng, Arada, Niiya, & Warschauer, 2014). In other studies, researchers suggested that these devices also distract or disengage students from higher order thinking and learning (Cheema & Zhang, 2013; Dietrich & Balli, 2014; Lam & Tong, 2012). As digital tools become more prevalent in schools, additional studies will be needed to understand the long-term effects

of engagement and motivation among students and teachers (Dietrich & Balli, 2014; Zhao, 2013). Researchers suggested that understanding influences of engagement and motivation provide teachers with a deeper context to develop curriculum, set goals, and improve instruction for their classrooms (Broussard, Hebert, Welch, VanMetre, 2014).

Most researchers acknowledged that technology engages students in learning, yet is often in conjunction with other contributing factors. In one study, Maschmann (2015) found that in a 1:1 laptop environment, teachers and administrators felt that the digital tools added to engagement and interest in learning, yet this was dependent upon the teacher's comfort level with technology. Internationally, Lam & Tong (2012) used a pilot study to explore advantages and disadvantages of digital devices in Hong Kong. They acknowledged the positive effects of engagement, but noted that digital devices are often a distraction or used for irrelevant purposes (Lam & Tong, 2012). In Singapore, Looi, Zhang, Chen, Seow, Chia, Norris, & Soloway (2011) found that a 3rd grade science class using a 1:1 mobile inquiry curriculum increased engagement and shifted teacher/student attitudes, as a result their science test scores improved.

Dietrich & Balli (2014) also provided information on the motivation and engagement of students with technology. The researchers asserted that students were engaged, particularly when they have control and choices with technology. They were less engaged in a large group lesson, as with SMART boards, unless students were using the technology themselves. Despite the potential for increased engagement and motivation, Dietrich & Balli (2014) reported that teachers must monitor "off-task"

behaviors with technology. Researchers highlighted a "novelty" effect by which engagement with technology may decrease after continued use (Dietrich & Balli, 2014).

Summary of Literature Review

In the literature review, I explained the SAMR (Puentedura, 2009) model as it related to the factors of successful technology integration and the impact of mobile learning for effective teaching and learning. Researchers revealed that transformative education, outlined through the levels in the SAMR model, occurred through teacher development, a supportive school culture, leadership, collaboration, and commitments in establishing the time for curricular modification and innovation. Based on these influences, the impact of successful technology initiatives contributed to academic growth, engagement, & the development of 21st century learning and innovation skills. Researchers revealed that curriculum designs have emerged into elements of student-centered learning. This change in curriculum and instruction, from teacher-centered to student-centered, coincided with the higher levels of transformation of the SAMR model of technology integration.

In the review of literature, researchers revealed factors that impact successful 1:1 mobile learning and an understanding of how that contributes to education. Such factors included comprehensive support and/or induction programs, continuous professional development, positive community partnerships, and commitment from teachers and district leaders. Effective technology integration based on the SAMR model depended largely on the context for professional growth and support among new or novice teachers. Teacher development for the mobile learning classroom, particularly during pre-service

programs, has become a new and evolving consideration for effective teaching and learning. Professional preparation for new or novice teachers often lacked technical or pedagogical skills for the digital classroom. These teachers needed continuous professional development and support through collaboration with committed leaders and colleagues, particularly through induction or mentoring programs for new or novice teachers. Developing higher levels for transformative technology integration on the SAMR model involved an element of risk-taking and time to develop and modify, thereby reflecting the knowledge or skill of the teacher's experiences. Therefore, new or novice teachers have benefited from elements of a positive school culture, including the support and partnerships from a wider learning community. Understanding the descriptions of new or novice teachers as they relate to the context of their learning environment assisted in determining the strategies used to overcome inconsistencies in developing curriculum and instruction that coincides with higher levels on the SAMR model for technology integration.

Reviewing scholarly literature highlighted areas by which one can understand how effective 1:1 technology has been for teaching and learning. With an integration of technology into teaching and learning, researchers attributed academic achievement, particularly for sub-groups of students. Engagement and motivation were found in a successful 1:1 learning environment, but new challenges of distractions or lasting engagement with the digital tools were evidenced. Curriculum designs continued to evolve based on digital tools, the teacher's skill or commitment to using the technology, usability for students and teachers, and the presentation of new opportunities or

challenges in responsibilities. While teachers were optimistic about using the technology, curricular designs often fell into lower levels of enhancement on the SAMR model of technology integration. Considering these contributions to education, an exploration of documents or demonstrations from TRF district participants provided a deeper understanding of how or why teachers design and modify curriculum differently in their 1:1 mobile learning environment.

Implications

This project extends the opportunity to reinforce the positive strategies or capabilities at TRF district and provides guidance for other teachers in the local northwest Minnesota region, particularly those implementing 1:1 learning. Understanding the experiences from the new or novice teachers at TRF district assists educational leaders in decisions that affect the support and management of mobile learning technology at their own districts. TRF district benefits from learning problematic and positive experiences that can better inform the direction of professional learning for all teachers. Neighboring districts gain knowledge of how to establish and modify curriculum that supports transformative learning with classroom technology. Additional curricular designs, strategies toward 21st century skill development, personal usability and capabilities, and teacher technology training are all elements that local schools gain from this study.

The impact of 1:1 mobile learning provides benefits and new challenges for students and teachers. The SAMR model acknowledged that in the redefinition of technology, innovation is the highest level of curriculum modification for effective

teaching and learning. In this ideal, students engage in forms of social collaboration, mobility of learning anywhere or at any time, making abstract concepts tangible, transmitting knowledge creatively, and conceptualizing formative feedback or evaluations (Puentedura, 2014). The role of a teacher within an evolving context of technology integration continues to contribute to the direction of instructional strategies and curricular designs. Understanding how new or novice teachers describe, document, and demonstrate teaching and learning in a changing educational environment helps other professionals prepare and effectively modify curriculum and instruction within mobile learning environments.

Researchers exposed many elements that lead to a teacher's commitment and competence in modifying curriculum for technology-rich environments. Among the findings, continuous professional development through a supportive work atmosphere enhanced the opportunities to extend innovation within curriculum designs for mobile learning environments. Collaboration and community partnerships were both elements that drew a foundation for local technology implementation strategies or practices. Despite a lack of knowledge and skills from novice teachers, researchers revealed an enthusiasm and openness from teachers to apply transformative lesson designs into classrooms. With positive attitudes at the forefront, a process of building upon successful experiences with technology can be formulated. Additional consideration included how to best manage differences in teacher pedagogy, time management for continuous professional development, and the variation of skills present in districts with high teacher attrition.

Helping new or novice teachers understand how to modify curriculum, as represented through the SAMR model, positively impacts social change. By evaluating the contributing factors of mobile learning success and the impact of the success, educational leaders and all teachers better understand how to engage a network of support that continues to endorse technology innovation within curriculum design and development. Engaging all teachers with a wider learning community strengthens professional endeavors and promotes student achievement. A partnership and method of collaboration with businesses or higher education within local communities extends creative ideas and resources that help to redefine transformative education (Puentedura, 2009). These considerations assist educational leaders in efforts to promote policies and practices that benefit teacher and student success with mobile technology in the classroom. Student achievement is at the heart of these endeavors.

Summary

In Section 1, I exposed the context of the local problem at Thief River Falls School District. There were some frustrations and inconsistencies from teachers and principals in effectively modifying curriculum to meet higher levels of technology integration, as demonstrated through the SAMR model. Using TRF district as a technology model for neighboring schools, an exploration of how or why curriculum was designed or developed in a mobile learning environment helps new or novice teachers within other local schools.

The study offered a unique opportunity, through the exploration of factors related to the SAMR model, to understand strategies that assisted teachers in the development of

an effective teaching and learning through mobile learning technology. Descriptions, demonstrations, and documented evidence from new or novice teachers were used to gain a comprehensive context of the learning environment and guide research questions, as related to the SAMR model.

A variety of factors impacted the successful implementation of transformative curriculum using mobile learning. Support and professional development, through a broader learning community, provided opportunities for teachers to commit to higher levels of transformation of teaching and learning with technology. Such contributions had positive effects on student growth and skills for the 21st century, yet new challenges existed. This study has implications that continue to advance the understanding of curriculum changes in a mobile learning environment, particularly as related to transformative learning in the SAMR model of technology integration. Within Section 2 of the study, I have explained the research design and methodology used to answer the guiding research questions from Section 1.

Section 2: The Methodology

Introduction

As the primary researcher, I used a qualitative case study to explore the descriptions, demonstrations, and documents of new or novice teachers in a district expressing frustration and inconsistent curriculum and instruction implementation of the SAMR model for teaching and learning with mobile technology. In Section 1, I described the problem of frustration and inability to modify curriculum as it related to the SAMR model of technology integration for teachers at TRF district. I examined current literature to explore the factors of successful 1:1 mobile learning technology it relates to beginning teachers. These factors included comprehensive support and/or induction programs, continuous professional development, positive community partnerships, and commitment from teachers and district leaders. I also reviewed literature to determine the impact of effective 1:1 technology initiatives and how this compared in other geographic areas, locally and globally. In the review of literature, researchers provided a series of guiding research questions based on the purpose of the study. The project study served to explore the experiences of new or novice teachers on school-related 1:1 technology, with an emphasis upon the SAMR model, in regard to how these technology initiatives influenced their curriculum design and development for effective teaching and learning.

In Section 2, I described the details of the methodology and design for this project study. I selected a qualitative case study design to explore teacher perceptions of 1:1 technology as related to curriculum modification and design outlined in the SAMR

model. Research questions provided a comprehensive context of the curriculum modification, as related to the SAMR model, through descriptions, demonstrations, and documented evidence from new or novice teachers. Participants were selected by applying non-probability purposeful sampling. The researcher collected data through one classroom observation, using an observational checklist, and a follow-up semistructured interview. These tools used open-ended questions to allow data to emerge and validate the findings.

Also in Section 2, I described the role of the researcher and the relationship between the researcher and participants. I explained the procedures used to protect the confidentiality of participants. Interview data was transcribed and coded into themes immediately following the interview. Themes characterized new or novice teacher descriptions, demonstrations, and documents of 1:1 mobile learning that highlighted curriculum modification and instruction as related to the levels of the SAMR model of technology integration. The findings from the participants were used to guide educational practices and provide recommendations for the local problem in Section 1.

Qualitative Research Design

The research component of this project study was a qualitative case study (Merriam, 2009; Yin, 2008), focusing on the descriptions, demonstrations, and documents of new or novice teachers' applications and approaches to curriculum modification and development of 1:1 mobile learning as they related to the SAMR model of technology integration. Extending from a previous research outlining the impact of 1:1 curriculum and instruction, this study included factors specific to new and novice

teacher's challenges that were suggested as further research of mobile learning in schools (Charbonneau-Gowdy, 2015; Chou et al., 2012; Svihla, Reeve, Sagy, & Kali, 2015). The emphasis of the SAMR model was studied because leaders at TRF district have suggested this model as an outline for teachers to evaluate and design 1:1 curriculum and instruction for effective teaching and learning.

This design provided an opportunity for the researcher to gain in-depth understanding of a specific phenomenon (Creswell, 2012). TRF District represented a bounded system that offered a unique high technology environment in a rural region that shared professional development with neighboring school districts. New and novice teachers in this setting were the unit of analysis. This group of teachers had specific experiences, behaviors, or influences that provided insight into the challenges of curriculum modification and instruction for mobile learning. The qualitative design captured the actions, perceptions and experiences of teachers. Data emerges from qualitative designs through inductive probing. A qualitative case study informed professional practice by exploring the multiple dimensions of a phenomenon within an organization. Yin (2008) suggested, "for 'how' and 'why' questions the case study has a distinct advantage" (p.13).

I chose a case study design because 1:1 mobile learning has many dimensions that contributed toward teacher decisions to design and/or modify curriculum and instruction. In addition, case studies provide resources and skills that are appropriate for a new or novice researcher (Bogdan & Biklen, 2007). Exploring the context of a 1:1 mobile learning environment and the factors that led to successful teaching and learning for new

or novice teachers as they relate to the SAMR model had not been studied together in recent literature. A single case study provided a means to investigate the perceptions of specific teachers within a unique school environment. The activities of the community, geographic location, and influence of changing leadership provided a holistic context that is different from other studies of 1:1 learning in schools. Yin (2013) explained that a case study prevents the many dimensions of influence from shifting, thereby providing focus to the study. In this case, the dimensions of the SAMR model and new or novice teachers remained fixed elements within the study of curriculum modification and instruction with 1:1 technology.

Yin (2003) and Stake (1995) suggested that researchers must determine what the case will not include as objectives for study. By placing boundaries to a time, place, activity, or context, the research fit into a reasonable scope (Creswell, 2007; Stake, 1995). Because the purpose of the study was to explore the descriptions, demonstrations, and documents of novice teachers on curriculum modification outlined in the SAMR model, a case study design limited the setting and group of teachers that was critical to the study.

Another advantage of the qualitative case study methodology was that various sources are used to create a holistic understanding of the phenomenon (Baxter & Jack, 2008; Merriam, 2009). An in-depth analysis of multiple data sources promotes credibility to the study (Patton, 1990; Yin, 2003). This design considered data within subunits situated throughout a larger case (Baxter & Jack, 2008). A single case study had the advantage of binding the research into discovering unknown influences affecting the

design and development of curriculum for effective teaching and learning with mobile technology.

Various types of case studies can be appropriate depending on the aim for each research purpose. A multiple or collective case study analyzes a different context across many settings (Baxter & Jack, 2008; Merriam, 2009). The purpose of this research did not extend beyond one setting. This presented a disadvantage in the single case design because it decreased the transferability of findings. Stake (1995) suggested that studies of limited transferability, yet gain insight into a particular phenomenon, are considered intrinsic case studies. To address the lack of transferability, the researcher was exhaustive in the specific context and assumptions involved in the qualitative research. Merriam (2009) suggested using rich, thick description as a strategy to enable transferability to qualitative research. Researchers must be consistent and dependable with collected data in order to account for the lack of generalizability in qualitative studies (Merriam, 2009). Erickson (1986) explained, "The search is not for abstract universals arrived at by statistical generalizations…but for concrete universals arrived at by studying a specific case in great detail…" (p.130).

Other qualitative designs also did not fit into the scope of this study. Narrative designs explain the chronology of events in a person's life. The purpose of the project study was to understand effective strategies for the modification and design of curriculum and instruction with 1:1 mobile learning, not the events within teachers' lives. Grounded theory designs focus on designing or modifying an existing theory from an explanation of data. Ethnographies describe a unique cultural group through rich details collected by the

researcher participating in the setting for an extended period. This study did not intend to establish new theory. While understanding the sociocultural context of the learning community is critical, the purpose of the study was not to report on a specific cultural group. Finally, phenomenological research attempts "to understand the meaning of experiences from the perspective of the participant" (Lodico, et. al., 2010, p.148). The rationale for the research design was to collect detailed descriptions, demonstrations, or documents of curriculum modification from the perspectives of participant experiences in a 1:1 learning district. I considered a phenomenological design for this type of research because of the focus on participant experiences. However, this study emphasized rich detail on one specific phenomenon and limited the factors associated with the development of the experience. A limit to factors associated with participant experiences did not fit the goal of the study, which was to gain strategies for the challenges of effectively integrating 1:1 mobile learning technology by gaining detailed insight into any emerging factors that led to new or novice teachers' modification of curriculum and instruction outlined in the SAMR model.

Participants

Teaching positions in special education, mathematics, science and physical education have been among the hard-to-staff positions across the state of Minnesota (MREA, 2013) and within TRF district (B. Wayne, personal communication, December 8, 2015). Therefore, twelve new or novice teachers from special education, mathematics, physical education, and science positions were invited to participate. Nonprobability, purposeful sampling was used to select these participants. In purposeful sampling, the

researcher acquires a specific experience, action, or perception(s) from the selected participant (Creswell, 2012; Merriam, 2009).

Because the research design was a single case study, rather than a multi-case study, the data collected from participants had limited transferability. However, the information associated with new insights or knowledge from this bounded case nonetheless applied to the larger context of mobile learning. Merriam (2009) suggested that clear, thick descriptions help to address transferability in a single qualitative case study. Therefore, the researcher collaborated with participants to provide details and descriptions of the specific context of their perspectives. Transferability becomes the role of the reader and allows the reader to transfer the results to a similar context.

Participants were selected from special education, mathematics, science, and physical education. As there were insufficient number of new or novice teachers in those subjects, participants included any new or novice teacher, regardless of their subject matter, and two experienced teachers. To provide the most comprehensive perspective of the district and to protect the identity of participants in a smaller district, the entire district (elementary, middle school, and high school) was able to contribute to the study. The following list provided the qualifications for participants:

- Participants are from the Thief River Falls School District, preferably those serving as either in special education, science, mathematics, or physical education teachers;
- Participants are employed in a classified teaching position from pre-K through grade 12;

- Participants are in their classified teaching position for five years or less;

This list was given to building principals and the superintendent of the district. These individuals, in concert with the Human Resource Department, provided a list of qualifying teachers. All teachers received an invitation to volunteer for the study. A consent form was given to each volunteer. The consent forms were reviewed and signed after a minimum of 24 hours consideration. Ten new or novice teachers and two experienced teachers served as the sample for this study.

Data sources included semi-structured interviews, classroom observations, and any documents or artifacts that supported the SAMR model. Using an observational checklist, the one 50-80 minute classroom observation and relevant documents were collected from each participant. A follow-up semi-structured interview provided additional probing questions and clarifications needed to meet the saturation point of data from each participant (Creswell, 2012; Merriam, 2009). By collecting multiple data sources, the researcher added credibility to the study (Creswell, 2012; Merriam, 2009).

Gaining Access to Participants

Before moving forward in data collection, the Walden University's Institutional Review Board (IRB) provided permission to conduct the project study. The TRF district also granted permission. This included permission from TRF district Superintendent of Schools. For the study to meet minimum requirements in participants, I included permission from the elementary, middle, and high school building principals.

Once formal permission was obtained, all information from the proposal was available for the district administrators. By collaborating with the Human Resource

Department, an email was sent to all teachers who qualify as participants for the study. The email provided information about the study as outlined within the IRB formal review. This included any expectations, confidentiality upon participation, my role as researcher, and the purpose of the study.

Because I am not associated with the district, I provided flexibility to their schedules for any meetings. I was available to meet each individual to answer any questions or concerns. Merriam (2009) suggested establishing rapport with participants in order to help them feel comfortable to share their perspectives during interviews. During meetings, I ensured confidentiality by reviewing all aspects of the study. I explained any risk of participation, identity protection, right to withdraw from the study, and the voluntary nature of participation as it is included in the consent form. Potential participants were given at least 24 hours to review the formal consent form before signing their participation for the study. The consent forms included a brief explanation of time and activities that are required of participants. This comprised one 50-80 minute classroom observation that was used to collect any relevant documents related to implementing 1:1 mobile learning (eg. lesson plans or curriculum guides), and one 30-60 minute interview about their experiences modifying curriculum and instruction related to the SAMR model. The consent form informed participants of an additional 15-minute meeting that provided them with a draft of the findings for the viability of the setting and accuracy of the researcher's interpretation of their own data. The consent form also included information highlighting the voluntary nature of participation, any benefits and risks associated to the participants, the right to withdraw from the study at any point in

time, and efforts that kept participants identity protected and data confidential. Once signed, participants received a copy of the completed and signed form in a sealed unmarked envelope in their school mailbox.

Procedures for Ethical Protection of Participants

The researcher used an email or phone call to arrange individual meetings with each participant. These meetings allowed the researcher to explain the details of the project study and confidentiality measures in place for the study. Prior to the meeting, participants received a formal consent form via email. At least 24 hours of consideration was given to each possible participant before signing the consent form. Two consent forms were given to sign, one for the participants' records and one for the researcher. The purpose of the meeting was to verbally explain each measure that ensured participant confidentiality. I explained that the study was voluntary and that participants could withdraw at any point in the study. Their names were coded in the study to protect their personal identity. As a researcher, I was the only individual with access to the code. The coding system remains on the researcher's personal computer and is kept in a secure location of residence. Any other confidential information linking participants to data collected was not used and remains protected within the researcher's secured personal computer.

Interviews were recorded on a digital voice recorder. These were transferred to the researcher's personal computer and erased from the digital voice recorder. The semi-structured interviews were transcribed and coded into a Microsoft Word document on the researcher's personal computer. These codes were used to form broad themes found in

the literature review (Merriam, 2009). The researcher's personal computer was password protected to ensure security of all data forms. Member checks were used to confirm draft results for the viability of the setting and accuracy of the researcher's interpretation of their own data used in the findings (Creswell, 2012; Merriam, 2009). Draft results were sent to each participant for each of them to review the viability in the setting and accuracy of their own data used in the final data findings. Each participant was given an opportunity to individually discuss the results with the research if they wished to do so. A brief meeting in a private location was available for each participant if they chose to discuss the draft results with the researcher. None of the participants chose to discuss the results in a private meeting. All paper or digital records of consent forms and data were left in a secure file or computer at my personal residence.

Data Collection

The data collection for this study followed appropriate procedures and formats specific to scholarly research endeavors. Such procedures included formulating consent and permission from participants and authorities within the place of study. Data took the form of semistructured interviews, classroom observations, and collecting documents or artifacts from participants. These forms of data were used to describe, demonstrate, and document the integration of 1:1 mobile technology for teaching, learning, and curriculum modification and implementation in relation to the SAMR model.

Process of Data Collection

In this study, I intended to explore the perceptions of new and novice teachers on school-related 1:1 technology, with an emphasis upon the SAMR model, in regard to how

these technology initiatives influenced their curricular design and modification for effective teaching and learning. Nonprobability, purposeful sampling was used to select participants. I requested a list of qualifying teachers with the permission of administrators at TRF district. I sent an email to these potential participants and arranged a brief meeting with individuals to explain the purpose of the study and consent form. Each participant was given a 24 hour time period to consider signing the consent form.

Once participants signed the consent form, I emailed and called each individual to schedule a time for the 50-80 minute classroom observation and provided a copy of the observational checklist. The observational checklist included general information of the participant, a checklist table for SAMR levels, a checklist table for the impact of mobile learning, and space for additional notes. General information included the date and time of the observation, the grade level, the participant name, and the class. The checklist table for the SAMR levels included a column to indicate the presence or absence of the following categories: substitution, augmentation, modification, and redefinition levels. The general information and observational checklist table were also used as a document protocol for any curriculum guides, lesson plans, or artifacts. Finally, the checklist in the table for the impact of mobile learning included evidence for academic growth, learning and innovation skills, curriculum design and modification, and motivation. An additional space on the observational checklist and protocol was formatted for any researcher notes or reflections. After conducting these observations, I communicated with each participant to determine a time to schedule a follow-up interview in a private location

based on their flexibility. Once all the observations and documents were collected, I began to conduct the semi-structured interviews for each participant.

Each interview question addressed the research questions related to modifying curriculum and instruction for 1:1 mobile learning as represented by the SAMR model. These questions probed for strategies and supports that impact 1:1 mobile learning at TRF district. The first question determined the participant interpretation of the SAMR model and how the model was modified in their classroom. This question was used to triangulate data from any documents or classroom observations. Subsequent questions probed for strategies to modify curriculum that were found in experiences or examples of enhancing or transforming teaching and learning as interpreted by the levels of the SAMR model. In order to better understand strategies and supports for the modification of curriculum in 1:1 mobile learning, one interview question asked the participant to describe any challenges or difficulties in moving up the ladder of the SAMR model. Subsequent questions probed for any changing roles in the classroom, interactions of students or teachers, and evidence of critical thinking or problem solving skills. Another interview question was used to learn how professional development, pre-service training, sociocultural factors, and school-wide support contributed to the strategies or support of new or novice teachers. Finally, all participants were asked if they feel the SAMR should be used at other northwestern Minnesota school districts with 1:1 mobile learning. This question sought to explore the strategies or supports for local school policies and practices. Each interview lasted 30-60 minutes after school duties. The information from participants was transcribed and coded immediately after each interview. I used my

reflective journal to note any insights or reflections as well. This included descriptive notes on behavior, including verbal or nonverbal actions (Merriam, 2009). Once the information from each participant was collected, I coded and assigned themes to the data. The themes were drawn from data and the model of technology integration.

Data Sources

Researchers of case studies use multiple data sources to enhance data credibility and contribute to a greater understanding of the case (Creswell, 2012; Merriam, 2009; Yin, 2008). Data takes the form of interviews, documents, archived records, observations, physical artifacts, or questionnaires (Baxter & Jack, 2008; Creswell, 2012; Merriam, 2009). Collectively, these sources of data contributed to a holistic understanding of the phenomenon being studied. Data was pieced together as it emerged from different sources to create a greater insight into the case (Baxter & Jack, 2008; Creswell, 2012). In this study, data sources included semi-structured interviews, classroom observations, and artifacts such as lesson plans and teacher instructional notes supporting the SAMR model. Interviews are a hallmark of qualitative case studies (Baxter & Jack, 2008; Yin, 2008). They were used to draw the experiences and perspectives of participants. They limit the influence of researcher participation in the phenomena by supporting the construction of reality through the lens of the participant (Baxter & Jack, 2008; Creswell, 2012).

Classroom observations. Data collection began with a brief classroom observation of each participant during a routine classroom period. This included completing an observational checklist within the time allotted for each class period or 50-

80 minutes. Detailed notes and descriptions related to the problem, research questions, and conceptual framework were recorded in a reflective journal (Creswell, 2012; Merriam, 2009). Merriam (2009) suggested using a code sheet to record the physical setting, participants, activities and interactions, conversations, subtle or nonverbal factors, and my own behavior as an observer. Appendix B displays the observational checklist and guide that was used for collecting this data.

Documents. Any document or artifact that is relevant to the SAMR model was noted. Data collected included any lesson plans or physical traces of a change in teaching or learning. This data was recorded in the researcher's notes and computer files. The findings within the classroom observations and documents helped to reinforce the semistructured interview findings and clarified the participants' perspectives or experiences of curriculum modification and design as it related to the SAMR model.

Semistructured interviews. The semistructured interview questions were conducted in a private one-to-one setting, allowing the participant to be as comfortable and transparent as possible. Appendix C displays each of the semi-structured interview questions with additional probing questions that were used in the data collection. The semi-structured interview questions included the following:

1. Tell me how you've modified your curriculum with 1:1 technology.
2. Can you provide an example or experience that relates to technology *enhancing* teaching and learning in your classroom?
3. Can you provide an example or experience that relates to technology *transforming* teaching and learning in your classroom?

4. In what ways are you challenged to move up the ladder of the SAMR model in designing or modifying curriculum with technology?

Quite often, I reworded the questions or presented each question in a different manner in order to offer the participant a more understandable approach of sharing a response. Such adaptations were important in establishing rapport with the participant and receiving comprehensive responses to the question. A digital voice recorder was used for me to transcribe and analyze at a later time. My personal computer also had a digital voice recorder for backup purposes. Interviews varied in time for each participant, but were no longer than 45 minutes. Interview questions were used to probe and guide participants into the focus of the project study (Merriam, 2009). The results of the classroom observations and documents helped to differentiate follow-up questions for each participant. Such observations and documents provided depth, clarity, and details to the larger phenomenon being studied (Creswell, 2012). After all interviews of participants took place and were coded, data from each participant was triangulated to ensure a unified and comprehensive understanding of data patterns and themes. All interview data was securely stored on my personal computer. The computer was password protected and located at my personal residence. The coding system for participants' names was only accessible to me through my password protected personal computer.

Role of the Researcher

I chose TRF district because of the unique high technology setting in rural Minnesota and because the district remains challenged by teacher attrition like the

surrounding communities. The project study was conducted in a school district that I did not have a current role or employment position. However, I live in the community and have knowledge of the sociocultural influences within the northwest Minnesota region. Without having established collegial relationships or supervision in the TRF district, I felt participants were free to share information that assisted in the benefit of this study. I disclosed any information of my objective role as a researcher and experience working as a teacher in the surrounding communities. I informed all participants that the purpose and intent of conducting this research was to advance educational knowledge and practice.

The nature of an objective researcher is to be transparent of any form of bias while conducting this study. Therefore, having grown-up and worked in four other neighboring districts could have influenced the data in the study. I have experienced with the nuances of the rural lifestyle and culture of northwest Minnesota. In addition, the current district of my employment occasionally has collaborated professional development offered by the TRF district. Therefore, I had some social or professional acquaintances with individuals from the district. I used a reflective journal to note any of my personal bias while conducting this research. To remain objective in my research questions, I used current literature and elements of the conceptual framework to frame and guide my analysis. Any deviation from the objective role of understanding participant perspectives was recorded in my reflection notes.

Data Analysis

Data collection and analysis are a dynamic and ongoing process in qualitative research (Merriam, 2009). Yin (2008) and Stake (1995) suggested that effectively organizing data is important in developing a case study database. Baxter and Jack (2008) suggested that a database improves the credibility and trustworthiness of the study because the researcher may easily track and independently inspect each source. With easily accessible data, the analysis becomes more manageable (Merriam, 2009).

I kept a detailed record of communication arrangements with participants, reflection notes and observations of participants, and feedback from the Walden University research committee and chair. Recording personal reflections as a researcher contributed to the assessment of bias and established rigor within a qualitative case study (Creswell, 2012).

Classroom Observations

Participant data from the classroom observations was saved in a Microsoft Word document to be analyzed separately. Notes were made to each participant that was observed and then information was condensed into codes based on the SAMR model of technology integration and the guiding research questions for this study. This included codes pertaining to factors of success with 1:1 technology integration into curriculum modification and the impact of successful 1:1 implementation. These codes were further divided into sub-codes based on the themes found within the literature review (Merriam, 2009). A second phase of coding eliminated any information that would be irrelevant to the purpose of the study (Merriam, 2009).

Based on the research purpose, the classroom observations intended to explore the contribution of curriculum modification and implementation as it related to the SAMR model. The first item in the classroom observational checklist provided a format to record activities and interactions of 1:1 learning within the classroom. These observations were analyzed based on categories demonstrating higher or lower levels of technology integration as related to the SAMR model. Each bit of observational data was consolidated into a category (Merriam, 2009). The categories were divided into the SAMR model levels of substitution, augmentation, modification, and redefinition. The second item in the observational checklist was used to determine the impact of mobile technology based on the level of the SAMR model. Evidence in demonstrating academic progress, implementation of 21st century skills, modification of curriculum or instructional design, and engagement/motivations of teaching and learning was analyzed as it related to the SAMR level. Appendix D displays a model of the document analysis used by the researcher in this study.

The coding process assisted in linking similar patterns or themes within documents and semistructured interview data. Appendix D also displays how all data was filtered in the final analysis to determine how new and novice teachers' implement 1:1 learning represented by the SAMR model. The task compared these bits of data and/or categories to information found until a saturation point was established (Merriam, 2009).

Documents

The documents or artifacts collected from the participants were also saved in a Microsoft Word document and analyzed separately. This included lesson plans and curriculum guides. Additional notes were added to the document to determine the SAMR level of classification for the technology integration in the curriculum and instruction. This data was also coded into SAMR levels and factors of success with curriculum modification of 1:1 implementation for 1:1 mobile learning. Merriam (2009) suggested using a visual model to explain the data's meaning and link together the categories established from coding. Appendix D displays the process of data analysis that was used for all data sources.

Because case studies have many forms of data, the emphasis of research purpose was paramount. The research purpose intended to explore the demonstrations, documents, and descriptions of new and novice teachers in a district using the SAMR model for curriculum design and modification with 1:1 technology. Appendix D highlights the research purpose as the final product of data analysis that was used by the researcher. Each data source was organized in a manner that identified the level of implementation of mobile learning as represented in the SAMR model for effective teaching and learning. Based on these levels, the data analysis further determined the impact of the mobile learning by categorizing data into factors that contributed to successful implementation of 1:1 mobile learning.

Semi-Structured Interviews

Immediately following the interviews, I made notations about any relevant information that wasn't captured on the recording. Merriam (2009) explained that initial reflections and notes assist in understanding researcher bias or elements that may be forgotten during data analysis at a later time. In addition, I transcribed all responses from the digital voice recorder used in each interview and saved this for data analysis.

The initial analysis of interview data included formulating a general understanding of data by aggregating patterns of participant responses. Yin (2003) suggested reviewing this phase later to explore any data that was not relevant to the focus of the research questions. Merriam (2009) recommended that a novice researcher should involve other individuals in the analysis phase for feedback on the convergence of patterns. In addition to the feedback from committee members, the researcher's chair at Walden University served as an external reviewer that enhanced the credibility and trustworthiness of the study. The consistency of coding increased the dependability of the data (Baxter & Jack, 2008; Merriam, 2009). Data was sorted into emergent codes that formed broad themes based on the framework of effective teaching and learning with mobile technology outlined in the SAMR model of technology integration. A visual concept map was used to ensure the themes fit into the conceptual framework of substitution, augmentation, modification, and redefinition of technology within the curriculum. Inductive analysis provided the opportunity for a researcher to integrate all the various parts of the case study and gain a comprehensive understanding of the phenomenon. The final analysis brought together the major themes from coded data in

the classroom observations, artifacts or documents, and interview responses (see Appendix D). These themes were reported based on the original research questions that guide the project study. The findings were used to address the problem and purpose of the study outlined from Section 1.

Credibility of Findings

Many strategies in qualitative research were used to evaluate the rigor and validity of the qualitative data. This included credibility, transferability, dependability, and confirmability guidelines (Baxter & Jack, 2008; Merriam, 2009). These were considered throughout the process of the study. Because a considerable amount of data was transcribed from the interviews, member checking a draft of the findings ensured that the researcher captured the accurate intentions or internal validity of participants. Merriam (2009) explained that respondent validation is a common strategy used to confirm credibility and solicit feedback from the people being interviewed. It assisted in identifying researcher bias or misunderstanding from participants (Maxwell, 2005).

Merriam (2009) also suggested applying peer examination as a strategy to enhance internal validity of a case study. Peers include another professional with scholarly experience or colleagues that are familiar with the research topic. Such a review validates the findings as they relate to the data. To protect the identity of the participants, individuals in a peer review signed a confidentiality agreement. The comments of peers provide a confirmation or recommendation to aid the process of assigning themes or conclusive statements through the integration of all data sources

(Baxter & Jack, 2008). While a peer did not review the findings, my chair and committee did provide an external review.

Other strategies used to establish credibility of findings included data saturation and triangulation. Data reached a saturation point when I reviewed the data and emerging findings and no new information was found in the data collection (Merriam, 2009). Triangulation of data sources can be used to validate that the case study has been investigated from multiple perspectives (Baxter & Jack, 2008; Merriam, 2009). This is a form of crosschecking interview or questionnaire data to ensure different participant perspectives are compared from a fixed point or phenomenon of investigation (Merriam, 2009). By including participants from elementary, middle school, and high school level schools at TRF district, multiple sources of data were triangulated.

Lastly, the strategy of researcher reflexivity was applied to the case study. This is "the process of reflecting critically on the self as researcher, the 'human as instrument'' (Lincoln & Guba, 2000, p.183). A reflective journal and field notes were used to record my engagement with data collection and analysis (Merriam, 2009). My bias was noted in the reflective journal available for external review. Researcher bias was removed from the data analysis and conclusions to establish credibility to the study.

Summary

In Section 2, I identified that a qualitative single-case study was an appropriate design for the study of new and novice teacher perceptions of technology integration and curriculum modification for effective teaching and learning in a 1:1 mobile learning district. I applied all ethical measures for gaining access and protection of participants,

including consent forms. All data was collected after the Walden IRB approval number 02-22-17-0463969.

In this case study, I collected data by using classroom observations, documents or artifacts, and semi-structured interview to explore perceptions of participants. Multiple scholarly measures were used to enhance the credibility of the study, including triangulation and reflective notes of the collected data. Data was coded in order to develop general themes. The findings of the study were used to address the research questions framed from the SAMR model of technology integration. These results addressed the gap in practice identified in Section 1. This research holds potential for improving educational policies, practices, and support systems for beginning teachers as they navigate curriculum modification and design in a mobile learning environment.

Data Analysis Results

The results of the study addressed the four major research questions by highlighting themes drawn from the analysis of the SAMR model demonstrations and documents, the described reasons for curricular modification, and the detailed descriptions and demonstrations related to the impact of 1:1 learning. Such themes explored the strategies teachers used to modify curriculum in a 1:1 learning environment.

Teachers described their use of 1:1 technology as being beneficial for productivity and engagement. However, new challenges emerged to their classroom management that required practice in the elements of digital citizenship and a purposeful design of technology related lessons. New or novice teachers demonstrated and documented technology lessons that related to the lower SAMR levels often, but few were able to

consistently modify activities at the higher SAMR levels. Strategies that were used to adjust to the challenges of 1:1 included gaining support and collaboration from department or technology specialists in their schools. Five major themes impacting 1:1 technology modification emerged from the research questions. The themes were new distractions to the learning environment, an emphasis on their need for a supportive culture within the school, the lack of preparation from preservice training, the new role teachers and students have in digital citizenship, and the variability of curricular options available to teachers with 1:1 devices in the classroom.

Participant Portraiture

I collected data from 12 participants at Thief River Falls School District. Walt, Mary, Fern, Marilyn, and Bill were teachers at Lincoln High School. Jenny, Cindy, & Bruce were teachers at Franklin Middle School. Annie, Jordan, Katie, & Elena were teachers at Challenger Elementary School. Due to the insufficient number of new or novice teachers available, Cindy and Fern were experienced teachers. All names are pseudonyms.

With the exception of Cindy and Fern, all these participants were new or novice teachers to TRF district. To assist in the context of the project study, I will provide an overview of each of the teachers at the three schools. I will begin with the high school and proceed to the middle and elementary school teachers.

At Lincoln High School, I observed Walt. Walt had previously been a teacher at a virtual high school. Walt was eager to have me visit his Spanish II class. In our conversation, he explained that his students were a very motivated group. It appeared

that he had established a good rapport with his students. I noticed that Walt was very comfortable with the technology available to his classroom.

Mary was another novice teacher at Lincoln High School. She had worked at Franklin Middle School the previous year. This year, she was teaching FACS (Family and Consumer Science) to high school students. Initially, I noticed that Mary had two paraprofessionals in the room to help students with special needs. She explained to me that many of these students are given paper copies of assignments as an accommodation for their needs, but these students still had MacBook's and/or smartphones.

Fern was the Lincoln High School technology integrationist and media teacher. She served in various roles throughout the school year. She created and taught her own curriculum in a required careers class for all high school seniors that focused on college and career readiness and financial management. She also taught a different college and careers class to student's Grades 9-11. Fern was currently teaching media as an independent study for high school students. She was eager to explain the various professional developments that she has provided to all the high school teachers as well. I noticed that she was passionate about technology and the various projects her students were able to achieve. Fern was knowledgeable about many aspects of technology at TRF district.

Marilyn taught English to juniors at Lincoln High School. Her classroom was well organized and she played soft music while students worked on their computers. In our conversation, Marilyn acknowledged that she was born and raised in Thief River

Falls, Minnesota. I noticed that her classroom management was not very rigorous as students moved about the room and talked over her instructions often.

The last Lincoln High School teacher was Bill. He taught freshmen civics. I noticed he had a class of almost 30 students. Bill explained to me that he coached softball and that this was his first year teaching. He explained how he moved from southern Minnesota and had student-taught near the cities (Minneapolis/St. Paul). Bill was not afraid to describe the differences of living and teaching in the northwest part of the state.

Jenny was a new teacher to Franklin Middle School and taught seventh grade life science. She recently moved to Thief River Falls from Louisiana. I noticed she had a slightly different accent than the typical Norwegian-Minnesotan intonation of the locals. When I walked into her classroom she was teasing and talking with two eighth grade students. Jenny explained to me that the students were very bright and were going to be participating in the state science fair next week. It appeared that she enjoyed laughing with her students. Her classroom was full of projects and miscellaneous items related to the natural world.

Another teacher at Franklin Middle School was Cindy. I recognized Cindy because we had both taken science teacher workshops and summer education classes together in previous years. Cindy was an experienced science teacher who recently transitioned into the role of technology integrationist and media teacher for the middle school. She was all smiles and very enthusiastic about discussing all aspects of 1:1 learning. Cindy served various roles in the middle school. She taught all the media

classes for Grades 6-8. Cindy also has provided technology assistance and professional development to teachers at her school. She has taught various professional development classes at the regional learning center, called the Northwest Service Cooperative (NWSC), and the TRF district technology in-service day offered to all northwest Minnesota schools every two years.

The last teacher at Franklin Middle School was Bruce. Upon meeting Bruce, I noticed his very professional attire and demeanor. In a conversation with Bruce, he explained that this was his dream job because it was in his hometown. Bruce had taught with a variance licensure in mathematics at Franklin the year before. He displayed an enthusiasm for teaching and a deep concern for helping students stay focused during class. Bruce was involved with coaching football at the high school level the year before, but this year he was a middle school football coach.

The first elementary teacher was Annie. She taught first grade at Challenger Elementary School. Her students were excited when I walked into her room, but I noticed that she had excellent classroom management. In our conversation, Annie was very conscientious and eager to learn more ways to use iPads in her classroom.

Another Challenger Elementary teacher was Jordan. She taught fourth grade students and was focused on mathematics when I observed her class. I noticed the arrangement of Jordan's classroom right away. She explained that by receiving a grant, they were able to get a variety of chairs, stools, balls, and balance cushions around the room for her students. In our conversation, she admitted that she wanted to make sure I could observe some of the great things her students were able to do with their iPads. It

appeared that Jordan was also conscientious, but not afraid to try new ideas in her teaching.

The third elementary teacher was Katie, who also taught fourth grade students next door to Jordan. I initially noticed that Katie had turned the lights off in her classroom with the exception of the natural light of the window and a red fluorescent light on the side of the room. Katie mentioned to me that students were reading various stories on their iPads. She explained that she would have the students show me some of the apps and projects they have done with their devices. In our conversation, Katie explained how she was excited to begin a graduate program at the University of North Dakota in the summer.

The last elementary teacher was Elena. She taught second grade at Challenger Elementary School. Having a few difficulties using her technology during my visit, Elena admitted that the iPads were not used often in her classroom. In our conversation, Elena candidly explained that she did not feel supported in how they were to be used and didn't feel the devices addressed helping her students meet the basic skills needed at their age.

The teachers I've described from Lincoln, Franklin, and Challenger schools were all dedicated to participating in my project about how to effectively modify curriculum for teaching and learning in a 1:1 classroom as related to the SAMR model. During the data analysis, I've coded their data into themes of enhancing and transforming activities related to the SAMR levels of technology use (see Figure 2).

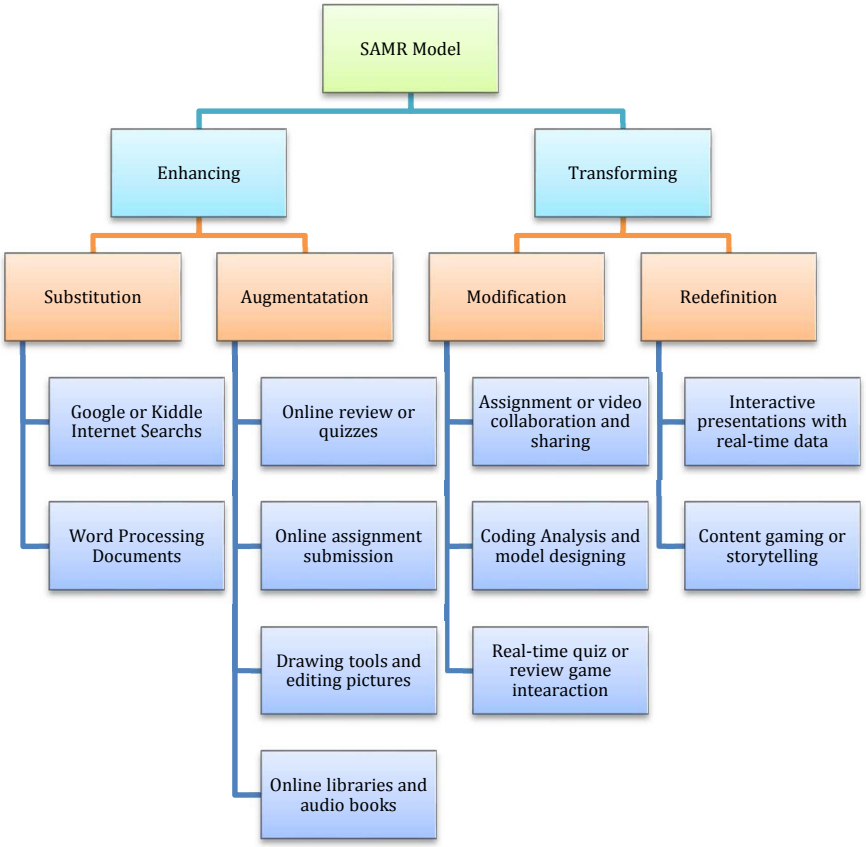

Figure 2. SAMR level activities.

These broad themes of technology activities were then sorted into each level of the SAMR model that included substitution, augmentation, modification, and redefinition. I then arranged the reasons for the teachers' choices of activities into two major themes connected to their modification of curriculum and instruction for effective teaching and learning with 1:1 learning (see Figure 3). I further divided these main themes into subthemes that are described in the following pages.

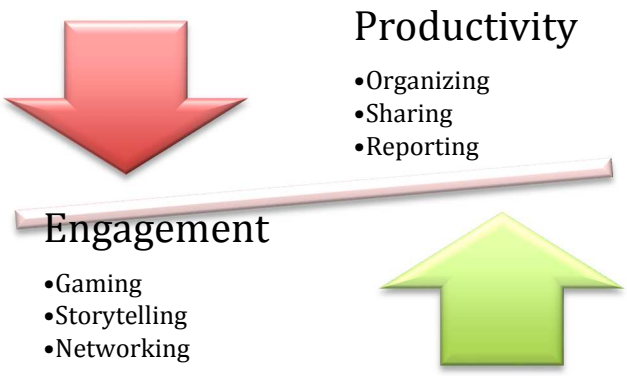

Figure 3. Reasons for 1:1 learning activities.

I also sorted the data and formulated several major themes connected to the impact of using 1:1 technology in the classroom (see Figure 4). Each of these themes will be described in detail in the next sections. The impact of mobile learning technology themes was embedded into the decisions and choices of SAMR activities described and demonstrated by the teachers. Such themes emerged from literature and the research questions related to this project.

Figure 4. Impact of mobile learning.

The case study was formulated to address the need for teachers to implement effective teaching and learning in a school district using 1:1 learning in the classroom.

The SAMR model was used to organize the technology activities and guide the direction of 1:1 learning capabilities. This hierarchal model of technology implementation provided a broader view of the current and potential direction of curricula modification for 1:1 devices in the classroom. The purpose of this study was to explore how new or novice teachers describe, demonstrate, and document the integration of 1:1 mobile technology for effective teaching and learning through curriculum modification and implementation related to the SAMR model.

Themes from the Analysis of the SAMR model

Enhancing activities. The first major theme of the data analysis for the SAMR model was to determine what activities related to enhancing curriculum for teaching and learning in a 1:1 learning environment. This theme was connected to the research questions of how teachers demonstrate and document their use of 1:1 technology for effective teaching and learning through modification and implementation of the SAMR model.

Among all participants, there were elements of enhancement in the activities of the 1:1 learning environment. The SAMR model defined these technology activities as means of substitution or functional improvement by use of a technological tool. In this case study, the technological tools used by elementary and middle school participants were iPads and the high school participants had Macbooks or Smartphones. All participants had a Smartboard in their classroom as well.

At the SAMR level of substitution, activities included uploading Word Processing documents, using Google Internet searches, or reading online books. Such activities

resolved to minimal innovation to the lessons, but presented or reflected information using the technological device. Teachers had paper copies of a document, including guided reading assignments from the textbook, writing outlines, or PowerPoint presentation notes displayed on either the student's device or the classroom Smartboard.

Examples of substitution level activities were displayed in two forms, Smartboard or individual devices. Walt presented some of his notes using a Microsoft Word table on the Smartboard. Bill and Bruce had PowerPoint notes or presentation slides displayed on their Smartboard. Bill also had a guided reading worksheet that was displayed on the student's MacBooks. Elena used an iPad app called *Kiddle* to type in animal names and upload their pictures. *Kiddle* is an Internet search engine for kids. Marilyn's students had her writing outline and guide from a Word Document on their Macbooks.

At the SAMR level of augmentation, activities included various forms of online quizzes or review games, online classrooms with assignment submission options, creating or editing visual representations of a concept or picture, and online libraries with access to audio-led books or videos. These activities provided the functional improvement to the traditional paper or pencil forms of assignments or assessments. Teachers led the students with verbal instructions to various iPad apps or online websites. Here, students logged into review games, quizzes, uploaded assignments, additional information, books, or videos. Forms of assignments or assessments were scored automatically.

Examples of augmentation level activities included online review games, like *Quizlet* or *Kahoot*. Both review games allowed students to play or practice in teams or individually. They also allowed teachers to upload their own content to the quiz or game,

including vocabulary words and definitions, or images. Most high school and middle school teachers used these review games often. Walt, Mary, Fern, Jordan, Jenny, Cindy, Marilyn, and Bill indicated that these review games or quizzes were applied to their content for review activities using the student's devices. At the augmented level of activities, students individually practiced on their devices. Katie explained the variety of educational games that her students use for review and practice purposes as well.

Online classrooms with submission or sharing options included *Google Classroom* at the high school level, *Schoology* at the middle school level, and *SeeSaw* at the elementary level. This allowed teachers and students to upload or share files. It provided access to additional information or libraries. *Epic* was a commonly used iPad app that served as an online library at the elementary level activities of research. Books found on *Epic* provided audio for Annie's younger students. Annie and Katie indicated using this often. *Peraflickr* was used by Marilyn to pull up pictures from the Internet in a PowerPoint slide format for practicing presentations. *ArcGIS* was a library of mapping and demographic data used by Bruce. Maps were uploaded with data selected by the student and used to complete a worksheet. *Edpuzzle* included opportunities for students to answer questions to a video on a topic. Jenny and Mary often used the video format with embedded questions to review or begin a unit. Individual answers to the video questions were electronically sent to the teacher.

Other augmented activities included *Doodle Buddy* and *Sculpt* iPad apps. Katie, Jordan, and Annie used these apps at the elementary school. They provided the ability for students to write on, create or edit pictures or images. These images could then be

used for additional transformational level activities or purposes, like sharing, commenting, 3-D printing, or presenting.

Transforming activities. The second major theme of the data analysis for the SAMR model was to determine what activities related to transforming curriculum for teaching and learning in a 1:1 learning environment. This theme was connected to the research questions of how teachers demonstrate and document their use of 1:1 technology for effective teaching and learning through modification and implementation of the SAMR model.

Among the participants, few teachers were consistently involved with the higher level of transformational teaching and learning based on the SAMR model. The SAMR model defined these technology activities as means of significant task redesign and innovation by use of a technological tool. In this case study, some teachers had a lesson or two that transformed teaching and learning, but few routinely applied transformational activities. In most cases, transformative activities involved a presentation or interaction with students and/or data. While some of the new or novice teachers displayed transformative learning, both experienced teachers were found to have innovative activities for their students.

At the SAMR level of modification, activities included sharing information, assignments, or assessments with other students, teachers, or parents. For instance, Annie and Jordan used Epic to take a screen shot or download an image and share those pictures or files with others. Jordan had her students record a video of them writing down their math problem and explaining how to solve the problem. Jordan and her

students were able to watch one another's video and make comments. Annie had her students label parts of a dolphin image they found from the Internet and uploaded it to their *SeeSaw* classroom webpage. Other students, parents, or teachers could view these products of learning. At the middle and high school level, Walt, Jenny, Mary, Marilyn, Bill, and Bruce used either *Google Classroom* or *Schoology* to share or upload documents that included outlines, quizzes and tests, notes, or guided reading worksheets. Such activities allowed the teacher to provide electronic feedback or view the results of an assessment. Bruce explained how *Schoology* allowed him to view the results of specific questions for a class test.

Other elements of modification in 1:1 activities included coding analysis and model designs. Katie used online coding games that display images and tasks that students must organize directions correctly in order to complete the task. For example, a student was given directions to paint the dimensions of a house. The student had to determine the angle and distances from one point to another and move the listed directions in the correct order. Upon completion, the image would reciprocate the directions the student had given to the program. If the students were incorrect, the game would allow the student to try again. Katie also explained that the 3-D printer was used to create models of insects that were created by students on the iPad app called *Sculpt*. These students later could paint the insect and present the parts of the insect model to the class.

Another example of modified levels of learning included real-time, interactive and collaborative quizzes and games. While *Kahoot* and *Quizlet* were often used

individually for review at an augmented level, teachers would often select a team mode for these content-driven games. In this mode, teams would gather together and lead one another in deciding the correct answers. With this option, the game automatically randomized names and displayed the teams on the teacher's Smartboard. Students would text or type the game code into their Smartphones, iPads, or Macbooks. For example, in *Quizlet* the questions all showed up on each of the student's devices, but only one student on the team had the correct answer to select. Therefore, the students had to collaborate ideas and share their computer-generated choices. If a team member selected the wrong answer, the game changed their points back to zero. All teams' total points were displayed on the teacher's Smartboard. *Kahoot* functioned in a similar manner and offered pre-made games that would match the teacher's content. The game displayed the results of each choice after all student's answers were typed into their devices. Walt was able to pause the game and explain why the student's selected answers were wrong.

At the SAMR level of redefinition, activities included interactive presentations with real-time data or images and content-specific gaming or storytelling. The two experienced teachers, Cindy and Fern both explained some of the high level SAMR model activities that included student collaboration and presentations. Such activities reflected the use of creativity, imagination, and invention. The redefinition level of activities could be applied to individual students or group based learning. Few new or novice teachers included a consistent application of redefining activities. Bill admitted that the transformational activity he used, an interactive presentation, had recently been

taught to him from an experienced teacher. He acknowledged that it was the first time he tried using it during my observation of his class.

Examples of redefinition level activities included *Peardeck* at the high school level or *Nearpod* at the middle school level. Cindy explained that the *Nearpod* app was best suited for iPads, whereas *Peardeck* worked well on MacBooks. Both of these technology tools provided teachers and students with student interaction and real-time assessments during presentations. Bill used *Peardeck* to prompt student communication during his classroom lecture on capitalism. For example, students typed the access code into their Smartphones or Macbooks and then the students had all of Bill's slides available on their device. When the slide prompted a question, students could type in their responses. On Bill's computer, he could view all the responses. The real-time formative assessments guided the direction of his lecture. Bruce used a similar presentation interaction with students. He applied *Poll Everywhere* during his lecture presentation on globalization. Bruce did not get individual responses, but could adapt his lecture based on the formative assessments built into his presentation slides.

Other interactive presentations at the redefinition level included project-based forms of storytelling or gaming. Fern explained that her media students were collecting images of the school using a 360-degree camera to upload into a Google virtual tour onto the school website. At that time, the school website did not have any type of map or pictures. Allowing students to create this feature on the school website displayed the innovative aspect of the redefinition SAMR level of teaching and learning. Likewise, Cindy explained that her students had just completed a project on iMovie. These students

had to make a trailer of their favorite book in order to persuade another student to read it. This highlighted the aspects of creativity and imagination at the transformational level of the SAMR model. At the middle school level, Jenny explained that she had her students take pictures of their group members as they carried out a lab procedure. Students added these images or videos to their science journals. At the high school level, Mary made a video demonstration of her following the steps of a lab using her Document Camera. These video files were used later for assessment or presentations that could be retrieved anywhere and at any time on the student's device.

Finally, both Fern and Cindy explained that they were in the process of learning the *Escape* classroom game. This redefinition level of technology activity allows teachers to implement their class content into a game format. The game provides clues and prompts that students are to follow in order to complete a task. While this was not displayed to the researcher, Fern and Cindy were beginning to learn the activity and explained that they were going to share this activity with all the teachers at their schools.

Themes from the Analysis of Reasons for Curricular Modification

Productivity. The first major theme of the data analysis for the SAMR model was to determine reasons for modifying curriculum for teaching and learning in a 1:1 learning environment. This theme was connected to the research questions of how teachers describe their use of 1:1 technology for effective teaching and learning through modification and implementation of the SAMR model. The theme of productivity was further refined to highlight subthemes that include organizing, sharing, and reporting.

In describing why new or novice teachers chose certain activities with technology, all the teachers presented similar explanations leading to the advantages of productivity with the use of 1:1 learning. In the subtheme of organization, high school teachers explained the various benefits of student and teacher usability and management. Having an electronic space for working extended beyond the physical walls of the classroom and assisted in an organized system of managing assignments and projects. Bill articulated:

> I definitely see the benefit and how more organized I've been and the students have been since implementing 1:1. I mean, just how much easier it is to get them assignments; there's really no excuse for them to not turning stuff in on time. They [students] can't use "I wasn't here." They can turn it [assignments] into the Internet at any time.

Mary also explained how *Google classroom* helped her manage assignments and provide instant feedback:

> When anything is submitted through *Google classroom*, it's so much easier to grade. As far as written answers, it's a lot easier to skim them on my computer. Then I can give them instant feedback. It goes right to them, so I give them way more feedback. I can copy and paste in correct answers so they have the correct answer instead of going over it all in class the next day. And I can grade and do stuff anywhere without carrying giant stacks of paper with me.

Bill also explained how 1:1 technology has helped him manage documents or activities students have completed:

> I think, especially when it comes to a lot of worksheets, it [1:1 technology] keeps them from losing them or using it as an excuse, I have due dates on there always, so they are able to make sure and to go back and double check when things are due.

Marilyn described the advantage in English writing assignments, "It makes it, especially being an English teacher, a lot easier. You know, they type. We don't have to go to the media center and spend three days in there." Bruce also noted, "It [*Schoology*] corrects automatically and saves all the time." For students and teachers, Microsoft Word documents that contain notes, assignments, or references were always available at any time or any space. There was no need to lose papers, edit papers, or grade physical forms of documents when students and teachers have an organized space for electronic copies. In speaking of *Google classroom*, Walt explained, "It's easier for us to keep track rather than documents sent to our email or Google folders." Fern reported, "It's just logical for me to carry around my computer instead of a 20 pound textbook."

In the subtheme of sharing, teachers explained the benefit of being able to collaborate with other students, teachers, or parents. In explaining the iPad mathematics activity, Megan stated:

> It's just been nice to have that [student's video explanations] on there and for even their parents to see. And they get a chance to show that they know it. I'm not sure if that's at redefinition still or if it's at modification but I think it's getting there.

Megan continued to explain the benefit to collaborating with the parents by sharing what her students have done, "They can comment on that and they can send a message back throughout the day, "Oh, you're doing so wonderful." So, it really helps out with the kids. They're liking it and I've loved it." Annie also explained the advantage of sharing activities with parents. She noted, "I think if they know what we're doing in here with these types of things, they're more likely to support you when they know it's going towards student growth and learning."

Additionally, teachers related the importance of choosing activities with technology because of the advantages in efficiently reporting information of their students to the teacher. Participants explained the value held in formative assessments when they use the 1:1 devices for teaching and learning. For example, Jenny explained:

> I can see what kids were able to turn things in and what questions were hard for them. I get immediate feedback and it's more of a time saver for me as a teacher to be able to give that feedback to the kids. Like right now I'm looking at the *Edpuzzle* scores and I can see that one question, 11 out of the 27 kids missed it. So, that's definitely a question that we will have to re-address tomorrow to make sure they understand. And if I didn't have the technology, I'd be grading a million papers before I figured out they didn't get it.

Marilyn summarized as well, "I'm able to see whether or not the kids are actually learning what they're supposed to be learning." She continued, "It's a lot of formative [assessments]. Like, if I put up a question and half the kids immediately get it wrong, then I know I need to continue or go back to it or something like that." Additionally, an

experienced teacher like Cindy also reflected, “Less of your time is spent on correcting and you can put more time into the planning the lesson and making them fun.” Bruce summarized the practical advantage of these formative assessments and grading:

> It’s not just my time saving, it’s that I can get percentages of questions they answered wrong as a class. So, if there’s something I screwed up on in explaining, I see it write there and I can go and actually reteach it before moving on. It’s a quick assessment and as a teacher you evaluate your own performance based on those results. So, the tests that correct themselves are pretty neat to be able to see because I wouldn’t notice if I was going through correcting papers, you know, it seems like a lot of kids got number 13 wrong. It would take a while for you to notice that if you’re doing it by hand.

Novice teachers Bruce, Mary, Jenny, and Bill found that the efficiency of reporting student information was a significant advantage to the direction on their instruction and reasons for choosing technology activities in their curriculum. As long as the technology could be learned easily, these teachers were willing to implement the tools into teaching and learning.

Such benefits were observed, but not always chosen consistently. While admitting her reluctance to using Ipads all the time, Elena also explained the advantage of technology in helping gauge her student’s mastery of skills. She noted, “It isn’t something we’ve dug into in second grade, so we know it’s [1:1 technology] there, we just haven’t really tackled that piece. But talking about it [1:1 technology], we can see how it would be really beneficial and less paperwork.” Despite some hesitancy or

consistency in using technology, the practicality and usability of technology formats were major incentives for new or novice teachers to choose to modify teaching and learning with technology in the classroom. The value in productivity for classroom assignments, feedback, and assessments were major influences in the descriptions of how teachers modified their 1:1 environment.

Engagement. In the data analysis for determining reasons for modifying curriculum for teaching and learning in a 1:1 learning environment, engagement was another major theme. While technology offered various forms of productivity for students and teachers, new or novice teachers chose activities with technology that engaged or motivated teaching and learning. Again, this theme was connected to the research questions of how teachers describe their use of 1:1 technology for effective teaching and learning through modification and implementation of the SAMR model. The theme of engagement was further refined to highlight subthemes that included gaming, storytelling, and networking.

In describing why new or novice teachers chose certain activities with technology, all the teachers presented similar explanations that led to the advantages of engagement with the use of 1:1 learning. Teachers explained that activities with technology were used to reinforce or review major concepts or terms. Participants acknowledged that students were naturally drawn to using their technology. Walt described his high school student's infatuation with their personal devices:

> You know a lot of students still prefer their phones to their computers. But, I know they were pretty engaged with their phones. If they do have their phones

> out, my philosophy has kind of been, I hate to say, "If you can't beat them join them." If they're really into their phones, then I try to come up with activities everyday where phones are appropriate to use.

Elena also noted how much more captivated her younger students are when they get to use the iPads. Shaking her head, she explained how different kids are with their free time. Elena said, "They're just enthralled with these iPads. I mean, it really doesn't have to be anything all that fun. They just love it." Jordan similarly asserted that whether or not it's the same worksheet, her students like when it's on the iPads or Smartboard better.

With teachers aware of the influence the technology devices have on their students, participants realized the value in using them as a catalyst for learning. Annie explained, "You know, we're really trying to use it as an engagement tool." While not familiar with the SAMR model, Mary summarized her decision to use the technology by reinstating her value in the usability and motivation for her students. She said, "I look at what I can learn easily, and then I figure out what is really going to engage the kids. It has to be engaging for them and it has to fit with my curriculum." As documented and demonstrated, many of these teachers used gaming as a format for motivating students to learn their material. Mary continued:

> It has helped them learn the vocabulary a ton. We have a lot of vocabulary in this class, which they are not motivated to learn on their own. But, when we play the *Quizlet* game once a week, and they're competitive, that will inspire them to learn their vocabulary.

Bill explained that he chooses various review games in his classroom to "keep it fresh." He described, "I think more than anything, it just allows me to change things up in my room so it's not the same thing every day." Likewise, Katie admitted that choosing technology became a real incentive for her younger students:

> They are definitely more engaged using technology. I use it as an incentive many times too. You know a lot of times, for example like for reading, we normally don't start out with technology, but then I say, "If you do super well at reading then you can get on *Epic* or ed. [educational] games." It's an incentive for them to do well.

As these teachers described, Lacey, Gunter, and Reeves (2014) asserted the importance of finding the right app to positively influence the engagement students.

New or novice teachers explained the value in engaging students by means of using the technology to tell a story or interactively present information. While traditional in her note-taking format, Marilyn explained the value of presenting background information for her English students using technology applications. She commented:

> If they're just reading something and they need to know about a cold war before we read it, I'll do something quick like go through some Google slides. They don't have to memorize it. It's more a means for information to be past and it's just good for them to know in order to understand for the text that we're reading.

Bill and Bruce also explained that they have used *YouTube* video clips that are content based to hook the students into meaningful and engaging discussions on a topic.

In addition to igniting interest for students in a storytelling format, Jenny summarized the importance of differentiating learning with students. She highlighted the value in the technology capabilities for her activities in a storytelling format for lab activities or reports. She explained:

> I have kids who learn better visually. They like to make picture notes in a pic collage and things like that. So, I think it helps the learner be more aware of what they like and how they like to learn. They have different options on the iPad. It's not just your traditional pen and paper.

When asking Jenny specifically about her changes in science curriculum, she highlighted both themes of productivity as well as engagement aspects of modifying teaching and learning in a 1:1 environment. Jenny discussed:

> I've used the technology to my advantage with the hands-on. So, when we do labs that I want them to be hands on, I have them like take pictures of each step. Then they put together our lab report using pictures and so they're able to do both [hands on and technology]. I think it's important for those hands on learners and it also helps me with classroom management. I don't have to go around and check every step or check every piece before they move on. If they take a video of it or a picture of it, they can send it to me through *Schoology*. A three-day lab now becomes a day and a half. They're not waiting for the next step from me or waiting for that approval which is often needed in those labs.

Cindy, who has guided many new teachers like Jenny, explained the value in both productivity and engagement through storytelling or presentation formats:

> I know for some of the things, I would have to repeat myself over and over. As far as the process of how to do something, I found myself creating little videos and having the kids watch those. So, I would say, "Okay, watch this and ask if you have questions." You're able to kind of clone yourself so that you have more time to spend with those kids who just need a little more.

Fern also admitted that her media students have really enjoyed putting together the Google Virtual Map of their high school. She explained the independence and creativity that students were able to capitalize on when using these technology capabilities available at their school. While not using formats like iMovie, Bruce and Jenny were impressed with the engagement and presentation products produced by Cindy's media students and hoped to implement transformational levels of learning in the future.

These teachers understood the impact that technology will make in their student's future and admitted that networking is a piece of the engagement elements for their students. Annie explained the value in using her iPads for networking and social development purposes:

> They have helped students with collaborating with each other, I mean even just with the simple skills of "sharing" and really opening their ideas to other possibilities. They are kind of "me, me, me…" in this age, so it's giving them this abstract thought that things are all over the world and they are really right at our finger tips. With technology, we can research anything. We can talk to an author that lives across the globe. We communicate with other people and allow kids to

know that it's all right here. The world is huge and we can explore it in many ways.

Jordan also described the value in choosing technology as a networking piece for her curriculum. She stated, "When we've been learning our parts of speech, it's a lot more motivating for them to make a picture collage and then to put it up on *SeeSaw* and everyone start commenting on them." At the middle school, Bruce explained that he creates a learning objective for any implementation with technology, like his *ArcGIS* in the classroom. He was aware that networking must seek an end goal. Bruce commented, "It's got to be engaging, but more so, it has to have a purpose."

Many of these new and novice teachers decided to use a form of engagement, but realized that it must fit into the curriculum map or meet the standards of their content. Engagement was a component that brought the elements that could drive student development, differentiated learning, and enrichment to their classroom.

Themes from the Analysis of the Impact of 1:1 Learning

Distractions. The first major theme in the data analysis of how new or novice teachers have been impacted by modifying curriculum with technology was the insight into new forms of classroom management, in particular, addressing the distractions to teaching and learning. This theme was connected to the research question related to the ways in which new or novice teachers have been challenged in designing or modifying curriculum with technology. This theme addressed how students interact with technology and one another. It also related to the various roles that have changed both teachers and students in a classroom with 1:1 technology.

In demonstrating and describing how teachers modify curriculum with 1:1 technology, all participants explained that technological devices brought new challenges to the classroom (Godfrey, 2016). As Lindqvist (2015) asserted, the student's infatuation for technology often brings distractions to effective teaching and learning. At the high school level, Walt, Mary, Marilyn, and Bill all expressed how students have difficulty either within activity transitions or staying on task. Walt highlighted that the major challenge he dealt with was having the students move from one activity to another, especially if the activity involved technology to no technology. Walt explained:

> A big issue that I found at this school was the transition times. They were a lot more difficult when students had computers out and it took me quite a while to realize that you have to tell students when you're changing activities.

Walt was comfortable using his technology and very aware of his students need to be focused. Therefore, he tried to incorporate their devices into the lesson goals. Walt described these new challenges:

> It used to be just, "Eyes and ears up here!" Now it's, "Close the computers," and wait. You'll say "close" and you'll here, "Well, I'm typing and I'm just about done." You have to be really cognizant of students that are really engaging in that technology piece before you continue and transition. If you don't, you'll lose half the class if you let them remain on their computers. You know, the distraction piece is going to be there.

Mary also explained, "I think it's just the extra management. You walk around a lot more; you check their screens and phones. They [student devices] have been a real

struggle." When asked about his challenges, Bill noted, "Just making sure they're doing the right thing. That they're on the websites they're supposed to be and not on *Facebook* or *Netflix*. I think the biggest issue is students going on *Netflix*, you know, watching movies." In observing Bill and Marilyn's classes, students were "Snap-chatting" and watching movies or videos on *Netflix* and *YouTube* during structured work time. Bill explained, "I try to catch it when they have it out during lectures and discussions. This class is my biggest class, so sometimes it's tough to make sure I'm catching everyone."

Middle school and elementary teachers also found distraction as a major impact to their classroom teaching and learning. Jenny said, "It's a huge distractor to have an Ipad in the class, especially for this age of middle school." Bruce said, "The challenges have been gaming. I give them plenty of warnings and I just preach the importance of having the ability to control yourself." Annie explained, "It's another thing to manage. We have to make sure that they're on the right apps, that they're following directions, that they're not going where they're not supposed to go." Katie affirmed, "Sometimes students don't always use them appropriately. We have to have that talk, otherwise they just try to go in and go on whatever apps they want during free time. So, sometimes it can be challenging to have it."

In addition, teachers admitted that cheating has also been a challenge to modifying their curriculum in a 1:1 environment. Mary explained, "It's way easier to cheat with the technology. It's easier to plagiarize, to copy, all of that stuff." Cindy and Jenny explained how this recently has occurred at the middle school level. Jenny summarized:

> The new apple update allows them to have to multiple screens open, even when kids are taking quizzes in *Schoology*. It used to be that if you go out of *Schoology* when taking the quiz, it would close it out and you couldn't get back in. But now, with the side-swipe screen, it doesn't register in *Schoology* that they're looking at something else. So, they can look up the answers.

These challenges reflected the impact mobile devices have taken in the planning and execution of teaching and learning for new or novice teachers.

Support Cultures. The second major theme in the data analysis of how new or novice teachers have been impacted by modifying curriculum with technology was within their personal support systems. This theme was connected to the research questions of the ways in which new or novice teachers have been challenged in designing or modifying curriculum with technology. Such a theme addressed how the role of teachers and students has changed within a 1:1 learning environment.

For most of the participants, support for advancement on the SAMR model involved communication and learning from their colleagues. As Grundmeyer and Peters (2016) noted, teachers with more training can better adapt to challenges and pass along new ideas to other teachers. These supportive cultures not only helped give the new or novice teachers ideas of how to incorporate technology into their curricula, but also modeled how technology was used in their classes. It was apparent that all the demonstrations I observed were activities with technology that had been passed from a mentor or experienced teacher to the new or novice teacher. Walt described his colleague, "She's very tech-savvy and I'm nowhere near to the level that she is. But, I've

learned a lot just through the job and through the kids. If you don't know something, they will show you." Mary asserted that many staff members know more than she does, and she asks them questions often. Marilyn also explained the knowledge found within other staff members. She described Fern as a valuable resource for most high school teachers, including experienced teachers. Marilyn explained:

> We definitely have a lot of people in the building that are not afraid to try something new. A lot of people go to conferences, which has been kind of cool to see. So yeah, I do feel supported and think that's probably helped the older teachers who felt really overwhelmed with technology.

Bill affirmed that Fern has been helpful in showing teachers how to get started with some options of how to use technology in the classroom. He also explained how his principal had recently shared the interactive presentation, *Peardeck*, to him within the last few days. In explaining how Bill was supported, he revealed some inconsistency of technology use among staff members, "They give us ideas and different ways to do it if we could, but definitely it's not a requirement per se. Some teachers use it more than others." Fern affirmed, "There are pockets of good stuff." Such a consideration highlighted the variations demonstrated within the SAMR model for technology activities.

Middle school teachers, Jenny and Bruce, found Cindy to be a valuable asset in learning how to use technology in their curricula and assisting them with any questions. Foltos (2014) noted that teachers who are already technology leaders, like Cindy or Fern, could serve as a technology coach for the school district. Cindy described how she has

implemented a *Learning Lunch* to allow time for teachers to be updated on new apps or technology programs that would fit into education. Jenny explained, "Cindy has been great. Once a month she just tells us, this is a cool app that's out right now, this is how it works, try it if you like it." Bruce also explained that his mentor teacher and Cindy were his primary resources for technology ideas or concerns. He stated, "Anything I don't know, I ask them. Anything I've learned, for the most part, I've asked." Teachers were not afraid to ask their technology and media specialist or mentor teachers. It was the relationships within this supportive culture that gave them the ideas and direction to apply technology into their classroom curricula.

Elementary teachers Annie, Jordan, and Katie voiced similar sentiment of their supportive cultures. Katie confirmed the importance of finding the knowledge or ideas from other staff members. Katie explained the value in her school's technology specialist, "She helps us right away. At different instruction days, there are always technology workshops we can do. There are so many people who know so much about different apps." Annie explained the elementary technology committee as an additional support:

> We have a whole committee that makes us feel supported and we have other teachers that when we ask they let us know of free apps. So, I guess I would just say my grade level has been supportive through sharing and helping each other out.

Jordan confirmed the importance of her current mentor teacher, "Well, I was able to watch her when I was student teaching to see how she uses it. Just having a mentor that knows what they're doing. It's been very helpful for me."

In addition, nearly all the participants recognized that administration has been supportive in the form of discipline and communication with staff. With the exception of Elena, these teachers felt supported by leadership in their schools. Walt explained, "Administration is very supportive if you need a little help or if you want us to talk to somebody about their phone use, but they lean towards definitely incorporating the technology as much as you can." Katie also said, "They really encourage using technology in the classroom. And they're great if we tweet on twitter, they tweet back and all that stuff." Fern explained that at the time 1:1 was first initiated, administration recognized the variation in technological competence of staff. They just wanted the staff members to make some effort at growth and use of technology that was different from where they started at the beginning of the year. According to Fern, a high emphasis was placed on technology training in the first year of implementation, but currently the priority has morphed into a series of curriculum mapping of state standards and learning goals.

Despite the positive perception of administration by most teachers, Elena described the difficulty in understanding what administrators expected for the frequency of using iPads at the elementary level. She explained that teams of teachers, depending on their grade level, would use them more than others. She admitted that her grade level

team didn't have a lot of ideas on how to use them and didn't feel the devices fit with the skills for their student's age and development.

The majority of new and novice teachers decided when and what technology applications to use in their classrooms only with assistance from other staff members. As Grundmeyer & Peters (2016) explained, these teachers need effective modeling and training from teachers who have had positive and successful experiences. It appeared that for the most part, staff leaders in technology gave new or novice teachers enough communication or ideas to implement some form of the enhancement to teachers' lessons. Administration played a role in supporting the discipline of student misuse or distractions with technology but didn't emphasizing specific recommendations for teachers to follow.

Preparation. The third major theme in the data analysis of how new or novice teachers have been impacted by modifying curriculum with technology was the frequency and type of preparation from past educational experiences. This theme was connected to the research questions of the ways in which new or novice teachers have been challenged in designing or modifying curriculum with technology. Preparation for changing classroom teaching and learning with 1:1 technology addressed the evolution in the role teachers and their students, including how technology can support critical thinking or problem-solving skills.

New or novice teachers indicated that their prior experience in using technology in the classroom was minimal. Grundmeyer & Peters (2016) recommended that preparation courses in education programs must give preservice students practical

applications for classroom technology. The teachers' descriptions of preservice experiences implied that college programs did little to explain to these teachers how to use the technology for educational purposes. When asking Bill about what his preservice experience with technology entailed, he replied, "Not a whole lot. In my student teaching, we had mobile lab, but we never used it." In some instances, these teachers had negative experiences. Walt explained, "There was not a lot there for how to incorporate technology into teaching. But there was a lot of how to deter it." Marilyn described her experience student teaching:

> The experience I had with it was just a little bit negative. She [supervising teacher] had two college classes and a regular English 11 class. She tended not to let her English 11 students use the laptops as much because they were more of the troublemaker group. She was terrified of them breaking them or something. Which, fair to say, her college kids were definitely more respectful of the technology and more responsible.

Middle school teachers, Jenny and Bruce, described preservice experiences that had some aspect of Smartboard training, but nothing related to 1:1 learning. Jenny explained:

> There wasn't a lot of technology integration. Our big technology was learning how to use the Smartboard in the classroom, so I'm very Smartboard proficient. I can make you a notebook file in a second. However, as far as the kids having technology at their finger-tips, that is fairly new to me.

Bruce revealed that a close mentor instructor at college influenced his own philosophy of using technology in the classroom. He described:

> You know, I had supportive professors. Great with theory and all that, but I just don't think I learned as much as I did from John [mentor educator]. He had offered so much of that practical stuff. He wasn't just like, "Oh, we're going to use technology to use it." His philosophy was just because you use it, doesn't mean you're a good teacher at all. Do you know what I mean? You know it might be the right way, the way our world's going, but it doesn't make you a good teacher. There's something to be said with pencil paper if you want to do that.

Bruce continued to describe how important it was for districts not to simply have a goal of "going paperless," but that teachers need to have an educational purpose for all activities that include technology.

Elementary educators echoed similar responses. They explained how they might have had some Smartboard training, but not anything on how to use technology for educational purposes. Annie described, "My first experience with iPads was my first job. I had my own if I wanted to use it, but I didn't have any experience or training." Jordan said, "Programs don't include it. I didn't think they did I great job when I was in school." Kim explained her student teaching experience, "They had two iPads for the whole school to use. So, not near the experience here." As described, these new or novice teachers were not given any tools to help them understand how to incorporate effective teaching and learning with 1:1 devices in the classroom. These teachers weren't prepared to know any forms of best practice with 1:1 devices in the classroom (Hutchison & Colwell, 2016). While they might have known Smartboard technology skills, they weren't given ideas of how to incorporate critical thinking or problem solving into

technology-driven lessons. For preparation of any SAMR level of activities, new or novice teachers were not given ideas from past experiences, but from their colleagues at school.

Digital Citizenship. The forth major theme in the data analysis of how new or novice teachers have been impacted by modifying curriculum with technology was found within the progress of digital citizenship. This theme was connected to the research questions of the ways in which new or novice teachers have been challenged in designing or modifying curriculum with technology. Digital citizenship addressed how teachers and student's responsibilities have evolved; including the impact technology has had on the interaction of students with technology and one another.

From the perspectives of new or novice teachers, students face new responsibilities in how to conduct their behavior and interact with one another. Gazi (2016) and Godfrey (2016) also noted the variety of interactions and conduct that must be examined in a mobile classroom environment. Middle school teachers particularly emphasized the new challenges in social development of adolescent age students who are immersed in technology. Teachers recognized the importance of helping students control impulsive interactions or staying focused on educational tasks and assignments.

High school and middle school teachers admitted that every classroom teacher had a different policy on how students can use their devices. Because of this, teachers were encouraged to guide students into properly using their technology for educational purposes. High school teachers admitted that their school policy placed an emphasis on a post-secondary school climate. Walt explained:

> At college, everyone has computers out and taking notes. You're allowed to have your phone out but, if you're using it inappropriately, even once, that could be the end of your college. You could get on academic suspension if you're cheating during the test or if you're tweeting or snapping inappropriate things. That can be the end of it for you, so it's really teaching that responsibility piece.

Each teacher described their policy as related to learning responsible behaviors with technology. For example, some classrooms were more lenient than others in their expectations of devices in managing teaching and learning. In some cases, students were allowed to listen to music or even watch movies while they are working on an assignment. Marilyn explained that she would not bother to "babysit" students, but allow them to face their consequences if they are not getting work done or inappropriately using the technology. Mary explained, "If they aren't working, I take the device away." Bill and Bruce described that sometimes they will use their phones in class and can be an opportunity to model when or when not to use the devices. Bruce admitted that there are always challenges to learning responsible behaviors with digital devices, "I give them plenty of warnings. I just preach the importance of having the ability to control yourself. I feel like that's more important than having a "No iPad "or "iPad face down" policy."

Technology leaders, like Cindy and Fern, explained that with all new changes to curriculum, there would inevitably be new challenges. Gazi (2016) noted the importance of understanding all levels of responsibility with mobile devices. Like Gazi (2016), Cindy explained how important it becomes to teach kids the skills that will help them as

future citizens who will be interacting with technology in the future. She described her perspective of learning 21st century skills of digital responsibility:

> They're going to make mistakes and so it's learning to train them and to encourage them to make sure that they're realizing that some things online are permanent mistakes. Their brains aren't fully developed and they're impulsive and all those sorts of things. They're seeing parents make some of those same mistakes, unfortunately. So often times, we have to train both ends of it by keeping those lines of communication open.

Cindy mentioned how she would like to incorporate a badge system, like a driver's license, in order to account for responsible behaviors with their iPads. She explained that iPads get broken or misused. In the badge system, students would be restricted from iPad use until they watched a video and/or passed a quiz or test on digital citizenship.

While collaboration through social networking might be a skill of the 21st century (Gazi, 2016), Jenny explained how technology has become a challenge to student's self-identity and social development. Jenny described her concerns with adolescent-age students, "Whenever there's pressure of knowing or finding yourself, you can often times find those kids retreating to their iPads. They're blocking out the world around them. That worries me a little bit for their social aspect of school." Bruce also explained students need to learn that when they say, "dumb stuff" about others, those comments do not always go away in a digital world.

Other challenges to digital responsibility were reflected the concerns in communication and writing. Gazi (2016) and Godfrey (2016) noted a variety of elements

that should be promoted for safe, lawful, and ethical use of digital communication or information. From an elementary level, Jordan described the importance of needing to understand how to keep her students safe. She mentioned how important it was to not put last names of her students on blogs or restricting certain websites to the general public. Jordan explained that she did not teach this to her students or practice digital responsibility initially, but learned through trial and error.

From a secondary level, safety and communication in writing or blogging were also concerns to effective teaching and learning with 1:1. Mary, Marilyn, Jenny, Cindy, & Fern admitted that it has become much easier with technology to plagiarize. They admit that students lack skills in proper communication, finding and reporting accurate resources, and applying correct grammar and punctuation in their writing. As a former English teacher, Fern described how it "hurts my heart" when she observes the deficiency of such skills. She admitted that students are doing presentations in almost all their classes now. While presentations can be beneficial, they also don't allow students to incorporate core-writing skills. Fern explained that teachers have an easier time grading presentations than papers. She noted, "You're not quoting, paraphrasing, or having to have a lead in and all that. So, we've really gone away from writing." Such skills as correctly citing sources or applying correct grammar to documents have been a challenge to effective teaching and learning with 1:1 devices. It was clear that all teachers were aware of the new challenges facing 1:1 classrooms in terms of safety, social development, communication, and academic focus in the 21st century (Gazi, 2016; Godfrey, 2016).

Curricular options. The final theme in the data analysis of how new or novice teachers have been impacted by modifying curriculum with technology addressed the variations in educational tools and activities that were used in the classroom. This theme was connected to the research questions of the ways in which new or novice teachers have been challenged in designing or modifying curriculum with technology. In addition, this theme addressed whether or not technology supports critical thinking or problem solving and the dynamic role of teachers and learners in a curriculum based on 1:1 technology.

New or novice teachers placed great emphasis on the many opportunities technology offered to teaching and learning. When teachers were asked specifically what those opportunities looked like, few were able to describe activities or lessons in the transformational level of the SAMR model. While optimistic on their options with 1:1, most felt that it would be an option if they had the time to "look" for those activities or if a colleague "showed" them. Many expressed fear or hesitation for implementing a lesson that had not been modeled to them before. Despite a few transformational ideas, most were comfortable and realistic about adding enhancement level activities into teaching and learning.

Lindqvist (2015) asserted that the 1:1 environment provides more possibilities for teaching and learning. Walt described that advancement or innovation in technology could incorporate elements of classroom management into student's devices. Walt admitted that to move up the ladder on the SAMR model, he envisions having a better classroom management with technology tools. He explained:

> Opportunities are endless. You know, I've always thought about how could I use it more as a classroom management piece. I just think if you could use it more constructively for that classroom management piece, then it would be a vital tool. There are so many ways you could explore with that.

In terms of productivity, Walt also described the need for all teachers to have one consistent cyber space for students to submit or upload assignments and gain teacher resources. He described the various textbook websites, Google folders, and classroom websites that students at TRF district must go through to access each teacher's resources. With frustration, Walt explained:

> I oftentimes feel too though that there are students have so many platforms for technology that they kind of get lost. All these things that you throw out to them, just turns into a big blob and so you have to be careful like that. I think sometimes, the simpler the better.

In terms of engagement options, Annie and Jordan expressed additional communication they'd like to have in their classrooms by *Skyping*, *Instagram*, or *Twitter*. Other teachers expressed some ideas, but many admitted that they are apprehensive or fearful to explore those options. Mary described, "I'm waiting on it until I'm braver." Jordan expressed, "I've just been nervous to go that far." While at a transformational level, Bruce explained that his idea for using a drone in mapping activities was "way out there." He explained:

> I just get hesitant. You know, with technology, all the options; it's sometimes the fear that holds you back a little bit. You just don't know where it can go. It could be an absolute disaster. I've had a few of those."

Marilyn admitted that she does not want to try new ideas until she knows they will work for her students. She explained, "I like to just wait, give it some time. A lot of times I think they get the kinks out later."

Bill, Bruce, Katie, and Annie felt that technology was simply another tool for learning, but it did not need to be the only way for designing effective teaching and learning. They explained the importance of avoiding technology without an educational purpose. Annie said, "It's important not to use it as a time filler or a toy. I don't want them to think of it as just this toy that we play on whenever we have time. I want them to know that it's a learning tool." Katie also echoed this sentiment; "I use it as a support, a resource, not just as the whole lesson." Bruce explained that options available for technology are very engaging, but they must be incorporated with a specific purpose and connected to a standard. He described how he was able to connect student learning to a local issue that was being discussed at the city council. Bruce's students were able to create a presentation that was brought before the council. He described the excitement and additional research or editing his students accomplished after knowing they were going to present to the city council. Bruce admitted that "real-life" scenarios and community issues brought learning and technology options to a new and engaging level for his students.

Finally, technology specialist's Cindy and Fern explained that curricular options are always changing and students are always changing. They described the importance of training teachers continually with new ideas for how to incorporate content specific skills with a variety of evolving technological resources (Gazi, 2016). Fern described the importance of understanding that the way students critically think about solving problems is different from adults. She described this mindset:

> I always give this example. My kids got one of those rainbow looms for Christmas a few years ago and the instructions with that thing were terrible. We're looking at this thing and we have no idea how to use it. We said let's just go to the rainbow loom website, maybe they have some directions. So, I type in 'rainbow looms' and I'm looking literally on the website for the instruction manual. My kids are like, "Click on that one, you know, the video one." And I said, why? I'm looking for directions here. Hello? But then they clicked on the video. They made so many. They'd just watch it and they'd stop it. They would keep pausing it, doing it, and repeating.

Fern continued to explain that when understanding how to incorporate technology, she pays special attention to the needs of students as much as what is offered by technology. Both Fern and Cindy described the importance of keeping technology practical and usable for teachers to explore and adjust for specific students' needs or classroom outcomes. Both technology specialists realized that 1:1 has brought many more options that can address students from all backgrounds. Cindy noted, "I think the 1:1 has leveled

the playing field for students that were the "have's" and "have not's." We can provide that service to everybody."

The impact of mobile learning comprised the themes of distraction, support cultures, preparation, digital citizenship, and curricular options for new or novice teachers at TRF schools. These themes represented the variations to the challenges and interpretations of applying SAMR level activities into teaching and learning in the 1:1 environment. Teachers demonstrated using the technology mainly for engagement or productivity purposes, but remained at lower levels of the SAMR model. They documented lessons that were engaging for students, but needed additional ideas and guidance of another staff member to move into consistent lesson planning based on transformational levels of the SAMR model. Their descriptions summarized the importance of a supportive culture, as well as the new challenges and benefits to technology in the classroom.

Conclusion

In Section 2, I provided a detailed overview of research methodology and descriptions of the findings. I designed a case study to explore how new or novice teachers describe, demonstrate, and document the integration of 1:1 mobile technology for effective teaching and learning through curriculum modification and implementation related to the SAMR model.

Twelve participants provided data in the form of documents, interviews, and observations. Data was coded and themes emerged. Themes were addressed in the analysis and conclusion about the findings related to my research questions addressed in

Section 1. In demonstrating the SAMR model, teacher's activities were found to be at an augmented or modified level for technology related teaching and learning. Participants all used technology at a substitution level, but few demonstrated redefinition consistently. In documenting and demonstrating the integration of 1:1 mobile technology, new or novice teachers modified curriculum based on two themes. These themes included implementing technology for productivity or engagement benefits to teaching and learning. Finally, detailed descriptions from participants provided five major themes to the challenges and impact of 1:1 technology in their classrooms. These themes included new distractions to the learning environment, an emphasis on their need for a supportive culture within the school, the lack of preparation from preservice training, the new role teachers and students have in digital citizenship and the variability of curricular options available to teachers with 1:1 devices in the classroom.

The teachers described their use of 1:1 technology as having new benefits and challenges to teaching and learning. New or novice teachers demonstrated and documented the engagement SAMR levels often, but only occasionally were able to transform teaching and learning for specific lessons or curricular goals. In order to adjust to the challenges associated with 1:1 technology, new or novice teachers practiced elements of digital citizenship, collaborated with colleagues for support and lesson ideas, and created different approaches to classroom management.

In Section 3, I have described the project outcome as related to my findings and an additional literature review related to the findings. The project was intended to

address the problems related to my findings within this district and as it relates to the education profession.

Section 3: The Project

Introduction

The project study consisted of a qualitative single case study that explored how new or novice teachers modify curriculum for effective teaching and learning based on the SAMR model for technology use in the classroom. These perceptions were gathered through documents, descriptions, and demonstrations. Classroom observations, curriculum guides and lessons, and semistructured interviews were analyzed to understand how curriculum in a 1:1 school district was modified based on the SAMR model. In the findings, the participants' descriptions explained benefits and challenges that led to the modification of their curricula. This included emerging themes of productivity and engagement. Participants' documents and demonstrations highlighted a substitution and augmented form of enhancement on the SAMR model, but an inconsistent application of transformational levels. The findings indicated that teachers adapted to the challenges of 1:1 technology through the support and collaboration of their departments and the technology specialists at their schools.

In Section 3, I have described the role of collaboration in 1:1 environments and recommendations for new or novice teachers to move from enhancement to transformation levels based on the SAMR model of technology in the classroom. In addition, I highlighted the details from the literature review that guided my project development. Within this review, I described what supports were needed for new or novice teachers to implement effective teaching and learning with 1:1 technology by following the technology integration planning (TIP) model (Roblyer, 2006) and

Boogren's (2015) recommendations for collaboration through mentoring figures, like technology coaches.

In response to the findings that revealed the need to support teacher collaboration and the required emphasis for strategic planning of technology integration found in the Section 3 literature review, I have formulated a professional development plan as the project outcome of this study. The goal of this plan is to set up a structure of professional support for new or novice teachers in districts with 1:1 technology. The outcome of this endeavor is for teachers to grow professionally in designing effective technology-integrated curricula. Sequential professional development activities for teachers will be used to meet specific objectives in attaining the outcome goal of the plan. Teachers will demonstrate their understanding about the implementation of a technology integration-planning model through comprehensive and integrated lesson plans for specific learning objectives. In addition, teachers will describe and document the conditions and/or resources that best assist their development of technology related lesson plans. Learning outcomes will be measured by a continuous format of specific assessments.

The structure of the professional development plan provides specific knowledge to consistently guide teachers in providing an effective 1:1 learning environment for students. In addition, it addresses innovation and development for technology-related curriculum and a design for additional technology coaches at TRF district. The professional development plan is connected to the findings from the project study.

Appendix A contains the proposed project. Following the data collected by new or novice teachers at TRF district, I have constructed a professional development plan

that includes background information, three professional development sessions, handouts, PowerPoint presentations, and evaluation tools for assisting schools in the implementation of 1:1 technology for effective teaching and learning. The professional development plan was created in response to the needs of new or novice teachers, as well as any technology specialist or school administrator who intend to successfully reshape 1:1 technology into classrooms. While designed for new or novice teachers, the project may support all educators in the modification of curriculum and instruction for effective teaching and learning with 1:1 technology based on the SAMR model.

Description and Goals

By choosing professional development plan as the project for this study, the over-arching goal is to set up a structure of professional support for new or novice teachers in districts with 1:1 technology. The outcome of this plan is for teachers to grow professionally in designing effective technology-integrated curricula, which ultimately allows students to succeed in the classroom. The specific objectives of the plan support the attainment of the outcome goal through structured and sequential professional development activities for teachers. Teachers will demonstrate their understanding about the implementation of a technology integration planning model through comprehensive and integrated lesson plans for specific learning objectives, in which learning outcomes will be measured by specific assessments. Teachers will describe and document the conditions and/or resources that best assist their development of technology related lesson plans as measured by a continuous format of specific support assessments.

The first objective is for teachers to demonstrate using the TIP model to integrate lesson plans with specific learning outcomes. Professional development sessions from technology coaches at the beginning of the school year will provide instruction and practice for teachers to demonstrate using the TIP model to modify technological activities beyond the enhancement level to the transformational level of the SAMR model. The second objective is for teachers to describe and document the conditions of support that will be needed for their performance in designing technology integrated lesson plans. This includes developing a continuous format for teachers to describe or report needed resources or constructive feedback of their planning and integrating of technology-rich lessons in their classroom. To attain these objectives, the project will detail the responsibilities and roles of establishing technology coaches and creating an annual schedule for professional development opportunities in technology. In addition, the project offers a specific strategy for reflection and analysis of curricular designs that lead to growth and achievement for new or novice teachers.

The first objective of the plan is supported within Section 3 of the project. The literature review in Section 3 highlighted the importance of pedagogical competency, comprehensive curriculum awareness, collaborative support and reflection in lesson planning and designs for 1:1 technology in the classroom. Such values are based within the TIP model and Boogren's (2015) framework of support for new or novice teachers. While Boogren outlined the comprehensive aspects of support, Roblyer's (2006) model consisted of five phases of teacher analysis and reflection for instruction and planning with technology. In Phase 1 of the TIP model, teachers determine the relative advantage

of applying technology. In Phase 2, 3, and 4, teachers decide on objectives, integration strategies, and prepare the instructional environment. In Phase 5, teachers can reflect, evaluate, and revise integration strategies. Each of these elements connects to the descriptions and demonstrations that impacted teachers' decisions to use of technology in Section 2, including the need for a beneficial purpose and guided strategy for technology use in lesson designs. To meet the first objective, sequential professional development sessions will introduce and assist teachers in practicing the use of the technology-planning model to sustain and enhance learning in a 1:1 classroom by aligning lesson objectives, instructional strategies, and assessments with various forms of technology. A technology integration planning document, highlighting elements of the TIP model, will guide teachers in demonstrating their understanding of this model at the end of the professional development sessions.

The second objective of the plan is supported in the findings of Section 2. This objective included having teachers describe and document the conditions and/or resources that best assist their development of technology related lesson plans. The findings highlighted several elements of the SAMR model that were demonstrated, documented, and described to show an enhancement level of technology activities at TRF schools. Although teachers chose to use technology for productivity or engagement, few teachers consistently used technology to redefine teaching and learning based on the SAMR model. Some of the challenges to curriculum modification using 1:1 technology included an increase in student distractions, a lack of pre-service training, and classroom management. A strong emphasis in digital citizenship, supportive cultures, and the

opportunities for innovative activities impacted the use of classroom technology. These findings also supported the contributions of 1:1 learning found in the Section 1 literature review. The Section 2 findings emphasized the need to continuously collaborate with colleagues and share resources. A format to continue this collaboration can guide new or novice teachers in their planning and designing effective technology-related lessons for a 1:1 learning environment. Implementing this project objective supports the value of collaboration, resource assessment, and feedback that provide the most appropriate conditions for effective teaching and learning with 1:1 mobile devices.

These objectives will have specific measurements to determine the outcome of this plan, which is for teachers to grow professionally in designing effective technology-integrated curricula. The first objective will be measured by a three participant surveys and each participant's technology integration planning form that will be completed by each teacher at the end of the sequential professional development sessions. The second objective will be measured by summative and formative assessments by teachers and technology coaches throughout the school year. These elements will address the overall project goal, which is for teachers to grow professionally in designing effective technology-integrated curricula through the establishment of a structure of support for new or novice teachers.

Rationale

The collaboration and support of colleagues are elements that assist new or novice teachers (Lindqvist, 2015; Teague & Swan, 2013). The assistance of technology leaders was found to effectively link technology activities to learning goals defined by teachers

(Foltos, 2014; Sugar & Slagter van Tryon, 2014). Participants in this study described their use or disuse of technology as it related to the benefits of productivity or engagement or challenges within the classroom management, including distractions or pedagogical competencies. They described a lack of knowledge or guidance with technological activities from preservice training and the significant influence of staff collaboration as a means to modify curriculum for 1:1 learning. They demonstrated and documented the lower levels of the SAMR model and indicated inconsistent application and planning for transformational levels of the SAMR model. Designing a structure for teachers to demonstrate how to effectively plan technology activities based on the TIP model and implementing a continuous format for describing and documenting the conditions or resources needed in the development of technology-integrated lessons will address many of the needs participants shared in this project study.

Review of the Literature

This subsection contains a review of literature on professional supports for technology integration and planning, including strategies for the success of new or novice teachers. Themes in the literature described the benefits of technology coaches and curriculum planning as related to their influence on classroom technology applications for new or novice teachers. The findings described in Section 2 from this project study, including the conceptual framework of the SAMR model and the TIP model, were connected to the emerging literature themes to design a professional development plan that provides embedded technology coaches to support new or novice teachers. This literature review provided a background of scholarly research about technology coaches

and strategies that assist teachers in technology integration and planning. In the additional subsections, I have described the process of searching literature to connect themes to my project findings and the conceptual frameworks of the SAMR and TIP model.

Strategy Used for Searching the Literature

The review of scholarly literature included a comprehensive search on technology coaches and planning professional development to support new or novice teachers. Numerous articles were found using the search terms *technology coaches, technology integration, technology planning, curriculum planning, curriculum mapping, professional development for technology, professional development for new teachers, induction, continuous professional development, 1:1 learning and professional development, 1:1 learning, 1:1 technology, one-to-one professional development*. Databases that were used to find articles on these terms included ERIC, Education Research Complete, Proquest, and Sage. Articles were categorized based on reading each abstract. Upon analyzing these abstracts, articles were then printed and read entirely.

Conceptual Framework

One of the findings of the project study was the lack of preservice preparation and planning in the use of technology for new or novice teachers. Most of the participants relied on the collaboration of their colleagues to prepare or design technology applications for teaching and learning in a 1:1 environment. These participants expressed the need for technology tools to have a purpose or specific learning goal, yet most

teachers weren't able to sustain transformational levels of the SAMR model or eliminate the distraction elements found in a 1:1 classroom. Therefore, an embedded teacher-training program that follows a structural model for innovative technology planning will benefit teachers in a 1:1 learning environment. Roblyer (2006) proposed a helpful model to address these challenges. In this model, teachers are given several questions to reflect and analyze before incorporating technology into their lessons. In a five phased process of planning, Roblyer (2006) outlined why they should use technology, how students will demonstrate learning, teaching strategies that would be effective, and places or people that would support the technology integration. Reflection and evaluation were also considered in the final phase. This strategic model allowed the teacher to determine both instructional and institutional resources as related to the learning goal of the lesson, needs of the students, and capabilities of the teacher's skills and vision.

In the Roblyer's (2006) conceptual framework for technology integration planning, technology coaches and teachers were able to consider how to appropriately integrate technology into their classroom activities. By using this framework, supports and resources for enhancing or transforming learning from the SAMR model could be evaluated. In the first critical phase, new or novice teachers determine the relative advantage of using the technology. Teachers clarify the benefits and determine whether the technology is valuable to the learning goal (Ozel, Yetkiner, & Capraro, 2008). Phase 2 involves deciding on the learning objectives. Phase 3 provides an analysis of various integration strategies. Phase 4 considers the preparation or resources of the instructional environment. Finally, teachers are encouraged to evaluate or revise integration strategies.

The advantage of the TIP model was that it could provide a broad guide toward curricular planning that doesn't involve only one instructional strategy (Kebritichi, Hirumi, Kappers, & Henry, 2009). This holistic planning model can give technology specialists and teachers a general framework to consider an instructional strategy that is most appropriate for the competency of the teacher or needs of the students. Such a planning model may lend to innovative and dynamic curricular designs that could be applied to transformational levels of the SAMR model.

Professional supports for new or novice teachers contained many dimensions and structures (Boogren, 2015). Boogren (2015) highlighted both instructional and institutional supports that may address the needs revealed by participants in this study. Participants described the value of staff collaboration and digital citizenship, as well as time for planning purposeful lessons with technology. In order to design higher levels of transformation from the SAMR model and embed technology coaches, I followed Boogren's support structures as they related to the TIP model for effective technology integration and planning. The following subsections contain a review of literature used to guide this project.

Instructional Support

Much of the literature reviewed on the support for teachers' uses of technology applications in a 1:1 environment focused on strategic planning, feedback, and reflection (Archhambault & Masunaga, 2015; Chikasanda, Otrel-Cass, Williams, & Jones, 2013; Ramorola, 2010). Understanding the purpose and direction of the learning was critical to the role technology played in the classroom (Salpeter, 2016). Even though technology

has become increasingly more prevalent in schools, teachers do not necessarily know how to implement activities effectively (Jaegar, 2012; Ramorola, 2010). Therefore, a 1:1 learning environment will require a target-oriented strategy (Lindqvist, 2015). Professional development that focuses on site-specific instructional support for new or novice teachers could be effective in the success of 1:1 learning environments. The following subsections reviews literature that highlighted the value of supporting teachers through the strategic consideration of curriculum mapping, pedagogical skills, and commitment to innovation and change.

Curriculum Mapping

Shillings (2013) admitted that a teacher's actual curriculum often varies from their written curriculum. Researchers reported that a teacher's work is based on their experiences, knowledge, and classroom dynamics (Shillings, 2013; Timperley, Wilson, Barrar, & Fund, 2007). As technological and pedagogical knowledge of teachers evolve with the ever-increasing classroom technology and digital student, curriculum development and modification will become central to the direction and sustainability of effective teaching and learning (Jaegar, 2012; Shillings, 2013). To address emerging challenges, continuous training on curriculum procedures and learning goals was recommended, especially for supporting new or novice teachers (Hale & Dunlap, 2010; Hutchinson & Dolwell, 2016; Shillings, 2013).

Curriculum mapping was described as a means to connect instruction with broader goals and increase awareness of content (Archambault & Masunaga, 2015; Belanger & Oakleaf, 2013). This will benefit strategic planning because it keeps teachers

focused when sifting through educational resources and data (Naraian & Surabian, 2014; Shillings, 2013). In this information age, there are many opportunities for educational activities with technology. The size and scope of apps or software available to teachers will continue to increase (Anderson & Rainie, 2012; Herro, 2015). In addition, teachers work to align curriculum with state and national standards. Curriculum mapping provides a tool for setting up short-term and long-term goals that can be aligned to state standards (Naraian & Surabian, 2014; Powell, 2014). Such processes allow for monitoring and reflecting on learning tools and their capabilities in contributing toward such goals (Archambault & Masunaga, 2015; Shillings, 2013).

Technology devices are to be used as tools of learning and should be evaluated, selected, and integrated based on supporting the best instructional practices (Bruhn, Hirsch, Vogelgesang, 2017). Such considerations required that teachers examine and reflect upon these elements when considering the alignment of an application (app) to their curriculum map. In one study, researchers discussed a variety of mobile technology apps that were available for increasing engagement within content specific curriculum (Bruhn et al., 2017). Herro (2015) acknowledged that in the 21st century, logic and problem solving should be viewed as primary learning goals and proficiencies when designing a technology-based curriculum. Other researchers developed guidelines for teachers to evaluate apps based on state standards (Powell, 2014). Bruhn et al. (2017) suggested aligning these apps to the three C's of motivation. Lane, Menzies, Bruhn, & Crnobori (2011) explained the three C's of motivation to include challenge, context, and control. In game-based learning, planning was focused on engaging student skills in

design, programming, and collaboration (Herro, 2015). Studies like these acknowledged the importance of selecting apps based on instructional opportunities or student needs.

One study revealed that preservice teachers lacked focus in planning for technology integration as related to curricular goals (Hutchison & Colwell, 2016). This included letting technology direct instruction and changing or misaligning instructional goals with lesson content. When selecting apps for their curriculum, preservice teachers chose apps for additional guidance or as structure for representing ideas (Hutchison & Colwell, 2016). Researchers recommended providing additional support in planning, including encouraging collaboration to select digital tools that are aligned to lesson content and pedagogy (Hutchison & Colwell, 2016).

Researchers highlighted that curriculum mapping was a means to enhance collaboration, openness, and collegiality among staff members (Archambault & Masunaga, 2015; Shillings, 2013). These benefits were also linked to supporting new or novice teachers (Boogren, 2015). Shillings (2013) reported that curriculum mapping was a practical tool for both new and experienced teachers. Archambault & Masunaga (2015) admitted that systematic review could advance new staff partnerships. Collaborative reflection from colleagues garners the potential for further integration of technology and new insights into understanding technology's comprehensive role in curriculum (Schillings, 2013; Wilkerson, Andrews, Shaban, Laina, & Gravel, 2016).

Pedagogy

Much of the progress for technology integration involves a commitment to increasing pedagogical knowledge and skills for technology activities (Campbell, 2014).

Gerard, Varma, Corliss, & Linn (2011) suggested that professional development for technology tools should be integrated with curriculum, pedagogy, and content. Many new or novice teachers entered their profession without knowing how to apply technology to a learning goal (Liu, Tsai, & Huang, 2015). Sarhandi, Khan, Buledi, & Asghar (2016) acknowledged that technology integration involves reflecting on the pedagogical and contextual elements of teaching and learning. Mentors who guided teachers in pedagogical knowledge enabled teachers to develop technology ideas faster (Liu, Tsai, & Huang, 2015). These mentoring relationships provided critical feedback that allowed teachers to reflect and revise teaching and learning for successful applications of technology. In addition, teachers should be given time to practice learning new skills in professional development training (Al Mulhim, 2013; Alkanani, 2012).

In one study of professional development for technology integration, researchers focused on modeling and pedagogical skills to understand how teachers best incorporate technology for their classrooms (Wilkerson, Andrews, Shaban, Laina, & Gravel, 2016). Researchers introduced a model-based inquiry that included exploring content, representation for content, evaluation for representations, and revisions (Wilkerson et al, 2016). Participants expressed various views on the role technology played in their classrooms and were found to incorporate all areas of inquiry for computer-based simulations rather than animation toolkits (Wilkerson, et al., 2016). Technology was viewed as a way to test, share, or show ideas (Wilkerson, et al., 2016). These researchers implied that model-based inquiry captured teacher's knowledge and pedagogical goals

for designing and supporting advances with technology-based tools (Wilkerson, et al., 2016).

In another study on teachers' perceptions of professional development for technology integration, researchers used the TPACK–in-Action model to understand best practices to support teachers (Sarhandi, Khan, Buledi, & Asghar, 2016). Despite reporting a solid knowledge of pedagogy and skills at the beginning of the training, teachers admitted that they were less confident or even discouraged when actually applying technology in their classrooms later (Sarhandi et al., 2016). These researchers reported that professional development training must consider both the operation and pedagogical aspects of using the technology application. Sarhandi et al. (2016) concluded that technology applications need a clearly defined context and pedagogical awareness. This study highlighted the need for teachers to evaluate and reflect on the learning goals of their lessons and personal competency before deciding to integrate technology. Such a study highlighted the importance of strategic planning when choosing a technology application for a specific context.

Because professional development is often a one-shot effort at understanding the operation of technology, teachers can be disconnected from discerning their professional growth needs (Naraian & Surabian, 2014; Summey, 2013). Careful and thoughtful planning must remain continuous in order to allow time for teachers to practice skills and process feedback (Summey, 2013). Ongoing professional development should target the specific needs of teachers, including the support of innovation and pedagogical skills (Cifuentes, Maxwell, & Bulu, 2011; Crompton, Olszewski, & Bielefeldt, 2016). In a

study of the perceptions of professional development needs for teachers in a 1:1 environment, Crompton et al. (2016) found that teachers desired time to plan, process, and coordinate efforts to effectively change their teaching practice. These researchers recommended structures of mentorship and policies that allow for professional development during school hours as a possible means for continuous teacher development in technical and pedagogical skills (Crompton et al., 2016). In addition, they suggested focusing on digital age learning standards (Crompton et al., 2016) to assist teachers in efforts that would lead to innovation related to transformational levels of the SAMR model.

Commitment

Successful 1:1 environments have proven to incorporate a committed schedule of continuous professional development for teachers (Salpeter, 2017). For successful changes to be made in a district, teachers and leaders must be committed through a shared vision and strategic plan (Crompton et al., 2016; Hall & Hord, 2010; Salpeter, 2017). This commitment must be meaningful and purposeful for teachers to make effective changes (Croswell & Elliott, 2004; Msila, 2013).

There are a variety of factors that may confound commitment to change initiatives, like 1:1 technology. Negative school climate or culture, leadership styles, teacher stress or workloads, and self-efficacy were all elements that prevented new or novice teachers from effectively committing to technology innovation in their teaching and learning (Milner & Khoza, 2008; Msila, 2013). Jonsson (2013) asserted that attitudes and beliefs might change based on experiences. Berckemeyer (2015) argued that

optimistic attitudes were what kept teachers thriving within changing or challenging conditions at their schools. Collaborative support and thoughtful designs of pedagogical and technical training offer promises to boosting confidence, positive experiences and attitudes that can build commitment and dedication of teachers to their teaching and learning (Buabeng-Andoh, 2012, Zalah, 2016). In a study of teacher commitment to 1:1 initiatives, Stanhope & Corn (2014) found that schools that offered a technology facilitator to bolster collaboration and training increases positively increased their commitment, both in attitude and behavior.

In a study on professional development to enhance technological pedagogy, researchers found that changing a teachers practice required building ideas and a positive concept of technology in education (Chikasanda, Otrel-Cass, Williams, & Jones, 2013). Mart (2012) highlighted that teachers need to be passionate and believe in their work in order to be committed to teaching and learning. Chikasanda et al. (2013) suggested the value of collaboration was needed in order to broaden the views and influence beliefs for new or novice teachers. Chikasanda et al. (2013) recommended that efforts to modify curriculum must focus on transforming teacher perceptions of technology as well as enhancing appropriate pedagogy for the learning goal. Without the knowledge of positive experiences and a solid understanding of the role technology plays in supporting learning, teachers may withdraw innovate efforts and revert to traditional practices (Chikasanda, 2013).

One recommendation that allows new or novice teachers to leverage commitment to using technology is to provide practical applications for technology integration within

continuous professional development. In one study, Grundmeyer & Peters (2016) found that teachers who had more classroom management training were better able to address the challenges of 1:1 technology, like distractions from gaming and social media. McKim & Velez (2015) also found a significant relationship between professional commitment and the perceived efficacy of a teacher's classroom management. Grundmeyer & Peters (2016) suggested that purposeful and differentiated professional development offers a pathway to the continued success for enhancing teacher effectiveness in a technology-rich environment. Likewise, McKim & Velez (2015) recommended that new or novice teachers be given professional development experiences that can build self-efficacy and reflect on successful classroom management. These researchers also suggested observing colleagues that have been effective at classroom management or providing videos that model different management strategies (McKim & Velez, 2015). Such efforts could be used to increase career commitment that is vital to new or novice teachers (Ingersoll, 2012).

Institutional Support

Boogren (2015) noted that new or novice teachers should be supported in physical, emotional, and professional needs within their school or district. This included understanding the policies or procedures of the building, validation and encouragement from staff, and fostering involvement and relationships within professional organizations, extra-curricular activities, or colleagues (Boogren, 2015). Roblyer's (2006) model for technology integration planning highlighted the value of engaging in a thoughtful strategy of these supportive resources. Technology integration and innovation have been

successful when the school supports continuous professional development, particularly in mentoring opportunities, and builds an infrastructure of support and resources from committed teachers and educational leaders. The following sub-sections highlight the value of job-embedded professional development, technology coaches, and infrastructure used to support teachers in technology-rich districts.

Job-embedded Professional Development

Effective schools incorporate both ongoing and comprehensive professional development (Althauser, 2015; Fullerton, 2013; Salpeter, 2017). In districts implementing 1:1 technology, a commitment to ongoing professional development that extends beyond the first year of implementation was vital to the initiative's success (Salpeter, 2017). Without a continuous effort to reinforce or practice technological and pedagogical skills, teachers were not likely to improve their current practice (Bentley, & Kehrwald, 2017; Crompton et al., 2016). Job-embedded training provides a practical approach to continuous learning and collaboration (Fullerton, 2013; Liu, Tsai, & Huang, 2015).

Researchers reported that professional development that is intentional and purposeful to teachers creates the most effective transformation of curriculum (Carlson & Gadio, 2002; Morewood, Ankrum, & Taylor, 2012). Ultimately, teachers are still the primary source for implementing knowledge of research-based practice into teaching and learning. Investing time and resources through job-embedded training was proven to be successful both to teachers and student achievement (Althauser, 2015). Teachers must be committed to engaging in professional growth and the time to process these skills

(Althauser, 2015, Morewood et al., 2012). As new technologies and resources emerge, a demand for additional training will increase (Carlson & Gadio, 2002). Therefore, careful attention to professional development for technology integration should remain an essential element within institutional support strategies (Fullerton, 2013).

There are various benefits and processes to job-embedded professional development that can help support new or novice teachers. Professional development allows teachers access to a variety of educational resources, knowledge, or skills that can offer improved teaching practice and productivity in the classroom (Carlson & Gadio, 2002; Morewood et al., 2012). Especially for new or novice teachers, professional development offers collaboration with colleagues that is vital to their emotional, physical, and pedagogical needs (Boogren, 2015; Teague & Swan, 2013). Carlson & Gadio (2002) explained that professional development should be highly cooperative and social in order to capitalize on transformative classrooms. Likewise, Morewood et al. (2012) reported that action research is a practical framework to engage success in job-embedded professional development. These researchers highlighted the value action research presents as a tool for reflection and revision of instruction. Such a process accentuated Roblyer's (2006) model on technology integration planning. Morewood et al. (2012) asserted that teachers should be able to disseminate the knowledge they acquire in professional development from engaging in "explicit, deliberate, and intentional" (p.199) teaching practices. These changes could elicit an improvement in awareness and responsiveness toward teaching and learning goals.

In a study on the impact of job-embedded professional development, Althauser (2015) found that teachers' self-efficacy improved. In addition, this directly impacted student achievement in mathematics (Althauser, 2015). This research implied that training in research-based practice and its relations to core academic standards should align to appropriate technology (Althauser, 2015). As highlighted from this study, Roblyer's (2006) model for technology planning also incorporated the importance of finding instructional strategies that are best suited to meet the learning objectives. Althauser (2015) asserted that job-embedded training provides a practical means for incorporating both content and pedagogical strategies to improve student achievement and strengthen teacher competency. The researcher recommended that additional time to practice, reflect on instructional practices and engage with mentor teachers are all important constructs to job-embedded professional development (Althauser, 2015).

Finally, researchers reported that job-embedded professional development should remain comprehensive to instructional and non-instructional elements. Professional development should combine all aspects of curriculum, content, infrastructure, and technology reforms (Althauser, 2015; Carlson & Gadio, 2002; Fullerton, 2013). Woodland & Mazur (2015) suggested a tiered framework of job-embedded professional development that incorporates both professional learning communities (PLC's) and educational evaluation (Ed Eval). This integrated approach addressed the importance of a holistic effort at school improvement though job-embedded collaboration and support. Woodland & Mazar (2015) asserted that designing professional development with a

system to support teachers' opportunities and challenges "could enable school leaders to reach key organizational goals" (p.21).

Technology Coaches

Researchers have suggested that mentoring and induction programs provide valuable support for new or novice teachers (Boogren, 2015; Teague & Swan, 2013). Mentor-mentee relationships allow teachers to leverage commitment, provide reflection & emotional support, and professional growth as they take on new challenges or initiatives in a school (Lewis, 2016; Slagter van Tryon & Schwartz, 2012; Teague & Swan, 2013). As technology continues to emerge in more schools, technology coaches can be used to engage and support technology integration plans by providing resources and professional development to teachers (Cooper, 2015; Foltos, 2014; Udesky, 2015).

Sugar & Slagter van Tryon (2014) defined a technology coach as "personnel that provide technology support found in a school or a school district, such as a technology facilitator" (p.54). Foltos (2014) described the valuable role technology coaches serve in supporting schools. One of the most important contributions technology coaches provide to teachers is the ability to link learning goals or activities from a teacher to the technology tools available (Foltos, 2014). Coaches do more than share apps or software; they investigate how to align the educational needs, learning objections, and pedagogy to the most appropriate technological tool available (Foltos, 2014). This supporting role offers new or novice teachers an opportunity to analyze, reflect, and revise instruction related to Roblyer's (2006) technology integration planning model. Technology coaches are collaborators who serve to communicate, gather information, organize ideas, express

outcomes, and inform teachers of the opportunities available through technology integration (Foltos, 2014). Technology coaches, many whom are also library or media specialists, may lead ongoing professional development at their schools (Cooper, 2015). The International Society for Technology in Education (ISTE) standards for the role of technology coaches emphasized empowering teachers through visionary leadership, modeling, collaboration, digital citizenship, and content knowledge for professional growth (Cooper, 2015). Job-embedded technology coaches assist in maximizing the success of technology-rich schools (Cooper, 2015; Foltos, 2014).

Additional researchers have highlighted the opportunities for virtual technology coaches (Elford, Carter, & Aronin, 2013; Sugar & Slagter van Tyron, 2014). With schools that are limited financially, a virtual coach could be used to harness the support for technology integration in a more cost-effective manner (Sugar & Slagter van Tryon, 2014). In relation to supporting classroom management with technology, Elford et al. (2013) reported that feedback from a coach using Bluetooth technology has shown to be beneficial with assisting teacher's responses with student avatars. Despite the redirection and cueing of the coach, the teachers later used guided reflection to review and analyze best practice. Teague & Swan (2013) argued that new or novice teachers value the wisdom and experience that is shared from working alongside job-embedded mentors and coaches. With classroom management as one factor affecting new or novice teachers, it is unknown how a virtual technology coach could adapt to the dynamics of real-time classroom instruction or aspects of school climates and cultures (Teague & Swan, 2013).

What is known, however, is that technology coaches have increased the planning and frequency of technology use for teachers in 1:1 initiatives (Stanhope & Corn, 2014).

Researchers argued that collaboration yields the best results for technology integration (Liu, Tsai, & Huang, 2015; Slagter van Tryon & Schwartz, 2012). Technology coaches can provide such interactions through sharing knowledge and skills (Stanhope & Corn, 2014). Lewis (2016) & Neumerski (2013) acknowledged that the role of a technology coach should be part of an instructional team. Levin & Schrum (2013) reported that some award-winning technology schools have response teams available to support teachers if technology coaches are unavailable.

With the technology coach's knowledge and feedback, curricular alignment, and reflective processes, new or novice teachers can be supported and encouraged to design technology suitable to their student needs and learning goals (Foltos, 2014; Slagter van Tryon & Schwartz, 2012). The mentoring structure found in the role of a technology coach will continue to be an effective support for new or novice teachers (Mangione, Pettenati, Rosa, Magnoler, & Rossi, 2016; Ingersoll, 2012).

Infrastructure

Spires et al. (2012) reported that technology implementation, like 1:1 learning, will inevitably require systemic changes that pose new challenges for schools. Both the teacher's instruction and the school's infrastructure require strategic planning and consideration (Salpeter, 2017; Stanhope & Corn, 2014). Initial efforts to improve connectivity, bandwidth, and network security must be continually updated as technology itself changes. In addition, teachers must adapt to these changes by incorporating

elements of digital citizenship and professional training to explore these modifications and developments. Maintaining this institutional infrastructure requires that teachers support and commit to the culture of technology in their schools (Stanhope & Corn, 2014).

Assessing the school climate can be the first step in understanding how to change behavior of teachers and garner support for technology integration within the school (Gruenert, 2008; Msila, 2013). Bush et al. (2009) defined this assessment as gaining insight into the morale of teachers and the interests of the parents or community. Msila (2013) explained that healthy school cultures allow teachers to express failures, fears, desires, and share knowledge or interact with one another. Teachers can be positively or negatively affected by either the presence or absences of these factors (Msila, 2013). Schools implementing a technology facilitator or coach can serve to assist in transforming these factors into positive attitude and behaviors of teachers (Stanhope & Corn, 2014).

While administrators are also critical to initiating change efforts in a school, the vision and direction of initiatives must be shared with teachers. Msila (2013) argued that educational leaders are only as good as the commitment of their teachers. In order to support and sustain innovative efforts within technology, there must be an active team of key stakeholders (Bocconi, Kampylis, & Punie, 2013). Hulpia, Devos, Rossel, & Vlerick (2012) reported that effective leadership was ultimately team-oriented. In order to support teachers in professional growth, educational leaders must focus more on identifying the context or knowledge the teacher has to build upon, rather than identify

their deficiencies (Wilkerson, Andrews, Shaban, Laina, & Gravel, 2016). These efforts encouraged and validated a common goal and strategic plan for progressing through the new challenges of 1:1 technology. Effective 1:1 initiatives offer sustainable development of both internal and external infrastructure in their school (Bocconi, et al., 2013; Salpeter, 2017).

As more research emerges on supporting teacher's efforts toward 1:1 technology innovation and pedagogy, researchers highlighted the value in understanding the responsibilities of digital citizenship in their schools (Bocconi et al., 2013; Gazi, 2016; Godfrey, 2016). This awareness supports teachers and leaders in the process of modifying curriculum and school policies (Gazi, 2016; Meyers, Erickson, & Small, 2013). In addition, teaching these skills may empower students to establish an appropriate digital footprint for future success.

Edwards (2015) explained that today's technology impacts the quality of global citizens that students will become. Researchers argued that the educational system should be responsive to the development of a digital society and the integration of multiculturalism that is available through technological innovations (Edwards, 2015; Pashby, 2015, Watson, 2010). Responsible behaviors should also include dealing with the safety of online behaviors and gaining the knowledge of coping with the social values of the digital society (Gazi, 2016).

In a recent study on digital literacy skills, Gazi (2016) found that education on digital citizenship assisted teachers and students in understanding and adapting as a global citizen. Professional development and training were valuable to the awareness of

"digital roles, respect, empathy, reliability, readability, responsibility, personal rights, ethical consideration, attitudes, and obeying rules in the digital age" (Gazi, 2016, p.147). Godfrey (2016) also recognized that digital citizenship involves not just creating safety on the Internet, but learning to make wise choices in behavior and use of technological devices. Gazi (2016) concluded that technology competence must be connected to pedagogical knowledge in order to expand the awareness of global worldviews in a digital culture. Teachers and parents are at the center of promoting, modeling, and establishing policies that uphold these elements (Sheninger, 2014).

Finally, Ribble (2015) noted that supporting teachers in digital citizenship required thoughtful practice. While many technology coaches or educational leaders can help teachers promote digital citizenship, ultimately each individual must self-reflect on their practice. Ribble's (2015) reflection model for teachers included becoming aware of their skills, determining the appropriate uses of technology in practice, modeling good digital habits to students, and analyzing their classroom environment (Ribble, 2015). This reflective practice also coincided with the Roblyer (2006) model of technology planning that can assist teachers in technology integration for effective teaching and learning.

Summary of Literature Review

In the summary of the literature, I reported several themes that were associated with supporting new or novice teachers in effective technology integration for teaching and learning. By following Boogren's (2015) areas of instructional and institutional support structures for new or novice teachers, I have highlighted literature that connects

to the value of analysis and reflection established in Roblyer's (2006) technology integration planning model.

The major themes revealed the importance of establishing supportive frameworks for each individual teacher and throughout the entire school. Such frameworks empower individuals to form a network of support through collaboration and reflection practices. These themes exposed both comprehensive technology planning and strategic analysis of individual teaching and learning found in the TIP model. This included providing specific guidance for each teacher and motivation that allows him or her to grow professionally. Sub-themes identified the need for a comprehensive reflection of how technology may assist in meeting curricular goals, the value of establishing pedagogical skills in the use of technology integration, and a commitment to change and professional learning. An additional support framework highlighted the significance of a broader learning community. This included establishing continuous professional learning and institutional development that values the culture of technology. Sub-themes explained the advantage of establishing on-going professional learning through job-embedded professional development, collaboration of technology coaches, and infrastructure that promotes digital citizenship.

Participants in the study understood the importance of individual support as well as a culture of collaboration when designing or implementing technology into teaching and learning. Many admitted that instruction with technology should be purposeful and intentional. They revealed that technology was chosen for productivity or engagement advantages, but with more time and guidance, they may implement technology more

frequently. Participants shared that technology coaches are instrumental elements to further innovation and commitment toward professional growth. This revealed the need to align technology coaches to further professional development that can promote reflective practice and feedback for successful teaching and learning in 1:1 environments. Roblyer's (2006) model for technology planning may guide these teachers as they modify their curriculum to innovative teaching and learning. Their strategic goals and planning will be consistent in supporting new or novice teachers at both the instructional and institutional levels (Boogren, 2015).

As explained above, the review of literature supported the need to establish a professional development plan that highlights additional technology coaches to address strategic and reflective planning for teachers and throughout the school. Findings from this study point to the need for job-embedded technology coaches that serve to support individual technology integration planning and digital citizenship development for the entire school. For new or novice teachers, this collaboration may affect the commitment to professional growth and effective pedagogy for teaching and learning in a 1:1 environment. Therefore, I've developed an extensive professional development plan that may promote transformational curricula with technology and positively influence the school climate.

Project Description

Formulated from a review of recent literature, details within Section 2, and the project study findings, a professional development plan was created to serve as a structure of support for new or novice teachers at TRF district or any school district that

is modifying curriculum for 1:1 technology. This project includes three sessions that relate to the TIP model for technology integration planning and Boogren's (2015) framework for providing instructional and institutional support to new or novice teachers. The first session will present an overview of the project study findings and themes found in the literature review related to professional support for technology integration based on the TIP model for technology planning and Boogren's response strategy for instructional guidance to beginning teachers. The second session will introduce collaborative support that can be gained from curriculum alignment related to the TIP model for strategic technology planning and technology coaches represented in Boogren's recommendations for institutional support. The final session will provide guided inquiry integration preparation and reflection of practice (Roblyer, 2006). This session incorporates an evaluation of both instructional and institutional (Boogren, 2015) elements for effective teaching and learning.

The comprehensive professional development plan will be applied to the beginning of the 2018-2019 school year in order assist new or novice teachers into the district's development of 1:1 learning throughout the school year. Through such a timeframe, administrators may provide the resources to support and sustain additional technology coaches for effective practice.

Potential Resources and Existing Supports

Within TRF district, there are a few existing supports for new or novice teachers. Some teachers have taken advantage of a mentor-mentee system during their first year at the school, however no formal policy or practice is in place. In addition, each school has

one technology specialist. Additional technology coaches could be extended to this existing support. Teachers are given opportunities to collaborate through professional development offered from the Northwest Service Cooperative at various times during the school year and a local technology in-service day is offered bi-annually at the district. Despite these opportunities for professional growth, there's no district-wide schedule or coordinated time for job-embedded professional development related to technology development and innovation. New or novice teachers are given a brief overview of technology related elements for teaching and learning at the start of the year, but do not have a scheduled opportunity for follow-up sessions. A systematic schedule of job-embedded professional development, that is specific to technology innovation, could be provided as an additional resource and framework for consistent support. In addition, a document that highlights a proposal for additional technology coaches could be a potential resource for school board members and administration to consider for future development of professional support throughout the district.

Potential Barriers

A potential barrier for supporting teachers through the establishment of job-embedded technology coaches was recognized in the semistructured interview data analysis. In reviewing the comments from current technology specialists, there may not be enough staff members with technology training to coach others without additional professional development for these job-embedded coaches. In addition to this barrier, technology training is typically located far away from the district. Registration and

additional travel expenses may factor into the decisions of school board members or administrators to approve staff attendance at these workshops.

Another potential barrier for supporting teachers in technology integration planning through the establishment of job-embedded technology coaches is the time structure needed for collaboration. This was also identified within the semistructured interview data analysis. Participants explained that the district has currently used collaboration time for curriculum mapping and state standards alignment, but has not intertwined technology integration planning into these efforts. In the first two years of the 1:1 initiative, the district had a series of early-out days built into the school calendar to allow teachers to learn and develop curriculum with 1:1 technology. Currently, additional job-embedded training or collaboration has not been scheduled in the school calendar for continuous development in technology innovation and practice. Adding more time for professional development that includes job-embedded technology training and collaboration may be perceived as an additional contract issue between the teachers and the district. One solution to this barrier may include negotiating a stipend to teachers who serve the role as technology coach within their school. Combining the current curriculum cycle review with an emphasis in technology applications could be an efficient use of time for professional learning as well.

Proposal for Implementation and Timetable

As a continuation of this project study, school administrators and participants at TRF district may consider implementing the professional development proposal. This project may be presented as an effective addition to the support resources and personnel

currently in place. I anticipate that as long as the proposal considers the compensation benefits of technology coaches and the district, professional learning and technology development for new or novice teachers will continue to be supported.

Timetable and Content Distribution

The professional development plan was created for new or novice teachers at the beginning of the school year. While additional professional development will continue throughout the year, the initial efforts for strategic planning and collaboration with technology coaches was constructed for the three in-service days at the start of the academic school year. The first element of the plan involves selecting teachers to fill the role of a technology coach. The selection of additional technology coaches may begin earlier in order to distribute roles and responsibilities for effective support. Technology coaches should be selected based on their experience, training, and/or competency with technology in the classroom (Cooper, 2015). With more positive experiences and skills, these teachers can guide others to develop similar practice (Jonsson, 2013; Stanhope & Corn, 2014). Appendix A displays a checklist of suggested indicators to consider when selecting mentors.

In the second element of the professional development plan, background information for independent study can be found throughout the Appendix A materials. This information highlights the value of technology coaches and strategic technology planning structures for new or novice teachers. An outline of the anticipated PowerPoint slides also reflects the scholarly literature review that emphasizes the importance of pedagogy and reflective planning processes as related to the TIP model. A document

containing an annual timeline is included to display how to implement the professional development plan and aspects related to creating and sustaining a positive technology culture in the entire school.

The last element of the professional development plan includes the three daily sessions to be implemented during the beginning of the school year's in-service days. The goal of all three sessions is to have teachers demonstrate specific knowledge of current practice by designing a lesson with the technology integration-planning document and to describe conditions or resources needed to continue developing technology-rich lessons. Each session includes a brief formative evaluation. Teachers will also complete a summative evaluation in the form of the technology-integration planning document at the end of the three-day sessions. Both evaluations are included in Appendix A.

The first session will introduce the TIP model and present an overview of instructional and institutional support needed for a technology-rich school culture. The outcome of this session is to demonstrate an understanding of using the TIP model and technology coaches as a means for support structures that can influence classroom instruction in a 1:1 learning environment. The session provides an opportunity to reflect on best practice and how current practice could be influenced by technology integration. The information presented in this session may assist new or novice teachers as they determine the advantages of using technology to meet a learning objectives that can be specifically assessed. This foundation was a critical element found within Roblyer's (2006) model for technology planning. Upon reflection in the teachers documented technology integration plan, teachers will be able to discern their current level on the

SAMR model and/or clarify the benefit toward transformational levels on the SAMR model. The overview of support structures and the TIP model will be presented to a large group in the morning. The guided reflection component will take place in the afternoon with a technology coach leading each small group discussion.

The second professional development session will specifically address the first three phases of the TIP model. Implemented in the second in-service day at the beginning of the school year, this session will administer a comprehensive exploration of curriculum as it aligns toward technology applications for teaching and learning. Technology coaches will provide guided inquiry to help teachers demonstrate how to integrate the TIP model in a small group format. This component will include formulating effective learning objectives in their design plans (Roblyer, 2006). In addition, teachers and technology coaches will analyze various strategies technology can offer to meet the learning objective in their lesson plan. The session will coordinate the knowledge, skills, and experience of technology coaches with new or novice teachers as they design lessons and align technology toward learning goals within their curricula. In the morning, technology coaches will highlight various technology applications that have been effective in their classrooms. They will model a lesson and define the learning objectives they've created. In the afternoon, new or novice teachers will align one or two lessons from their curricula to a technology-integrated or transformational lesson design. With the guidance of the technology coach, they will formulate lesson objectives and discuss the advantages or disadvantages of various technology applications that could be used. The teachers will use the remainder of the time to practice using technology with

other teachers and resolve any challenges through the assistance of the technology coach. An example of this practice would be aligning the *PearDeck* app to PowerPoint notes. The technology coach would model using *PearDeck* app in a simulated lesson. They would explain their learning objectives and highlight why it was effective in their classroom. In the afternoon, each teacher would determine the lesson content and objectives, determine the most appropriate strategy to meet the learning goal (*PearDeck* app or something else), and practice using the technology application with the collaboration of other teachers or the technology coach. This instructional support (Boogren, 2015) will help to lead teachers in the formulation of curricula that meets transformation levels of the SAMR model.

The final session of the professional development plan involves preparing any additional resources for technology-integrated lessons and revising any components of the lesson based on the practice time in session 2. As framed by phase 4 & 5 of the TIP model, this session explores the institutional resources (Boogren, 2015) available and opportunities that allow teachers to further define or evaluate their progress for the future school year. The outcome of this session is to have teachers demonstrate how to adapt their current lesson to a specific instructional strategy and reflect on the lesson strengths and weakness. This provides teachers with time to discuss and anticipate any further challenges toward technology integration and planning for effective teaching and learning. In the morning, technology coaches will meet with their small groups to discuss lesson ideas they'd like try throughout the school year or the lesson plan they created in session 2. Through guided inquiry, technology coaches and teachers collaborate by

brainstorm instructional strategies that would be effective in meeting various learning objectives for different technology applications. They also evaluate one another's technology implementation ideas in order to gain constructive criticism from one another. In the afternoon, technology coaches will discuss any digital citizenship concerns and recommendations for effective classroom management. For example, technology coaches could highlight how they eliminate distractions in their classrooms or provide resources that support a wider-community of technology innovation beyond the local community.

For technology coaches to be most effective, their responsibilities will continue throughout the school year. To gain commitment from new or novice teachers, it is recommended that technology coaches build respect and rapport with the staff. This includes helping new or novice teachers understand policy, personnel, and resources available in the community. It may also involve allowing new or novice teachers to voice their frustrations in confidence or celebrating their success. Attending school or community events as a department or staff group may promote open and trusting relationships. Such relationships build a positive school culture and climate. The extended mentoring effects of technology coaches may increase the confidence, competence, and commitment of new or novice teachers needed to sustain the district-wide goals.

Therefore, the complete timetable for the professional development project would start at the end of the previous school year. This would allow time for school administrators and staff to select additional technology coaches and attain the school

board approval in providing a stipend for their job-embedded work. It would also grant additional time during the summer break for technology coaches to attend conferences or training to help them lead small groups in any innovative lessons or resources they've used in the classroom. These coaches may use the week or two before the scheduled school in-service days to review the background information for this project or analyze curriculum and technology applications that could be introduced to the new or novice teachers during their job-embedded professional development.

In the first week of the school year, technology coaches would introduce themselves and address any aspects of technology productivity for new or novice teachers. This may include helping them with *Google Classroom* or *Synergy's* online grading and attendance. They would introduce any resources or additional personnel that are available throughout the school and/or district. The three sessions of professional development would also take place during this time. Based on the reflections of their planning, technology coaches may offer to schedule a time during the school year to co-teach a new technology application or lesson with the new or novice teacher until they feel comfortable. Technology coaches and their small groups could plan to attend a lunch together or go to a school event as a group. These social functions provide the opportunity to build trust and rapport that may extend throughout the school year.

During the first few weeks of school, technology coaches would establish a time to briefly meet with the new or novice teacher. I would recommend this time period to occur during the teacher's prep hour or after school. This would create a routine and scheduled time for the teachers to ask any questions or solve any problems they've faced

in their classroom. It would also allow for a time to commit to reflection and additional technology planning that aligns toward curricular learning goals. The technology coach would guide the teacher in additional planning as related to the TIP model that was reviewed during professional development sessions at the beginning of the school year. Any success with technology-related lessons would be noted, celebrated, and shared with the other technology coaches.

Each month, all technology coaches would meet to discuss the challenges or success from new or novice teachers and their own classrooms. During this time, they may identify resources or strategies to continue to support their small network of teachers. Based on monthly evaluations and discussions, the technology coaches would determine additional training they would attend to address the concerns of the new or novice teachers.

A monthly meeting with departments or grade level teachers would allow time for technology coaches to share content specific resources with the staff. During this time, teachers would also complete a monthly evaluation form. This formative evaluation is displayed in Appendix A. The form highlights the technology application used and the support obtained from the technology coach. After the first year of implementing the professional development plan, these formative evaluations will be collected and analyzed. A summative evaluation will be given to each teacher at the end of the school year in order to gain a perspective of how technology was used and supported through the implementation and direction of technology coaches. The summative evaluation is also found in Appendix A. This evaluation can serve to document the movement of curricular

modification as it relates to the SAMR levels. Participants will be asked to rate how they've modified their curriculum based on SAMR levels. The summative evaluation also documents any of the teachers' positive or negative experiences in their planning and execution of technology related teaching and learning.

After the first month of the school year, technology coaches would check-in on a weekly basis to provide any support in the form of innovation, curricular alignment, or encouragement for the efforts teachers have made in technology integration and planning. In addition, the technology coaches would plan to lead at least three small group professional development sessions a year. The job-embedded professional development would provide the opportunity for teachers in all content areas to be trained and practice with innovative applications. A sample of this yearly schedule for continuous job-embedded professional development is included in Appendix A.

Roles and Responsibilities

To execute the professional development plan, various roles and responsibilities must be assigned. One school administrator or technology specialist would be needed to serve as the project coordinator. In this role, the individual would be responsible to inform the staff of the technology coaching opportunities and then to select these individuals based on the indicators listed in Appendix A. It would be advised that this individual should not have full-time classroom duties. In addition, this role requires leadership and organizational skills. The coordinator must be responsible in getting approval from the school board for technology coaches and their stipends, job-embedded

professional development days in the school calendar, and travel expenses for sending technology coaches to various training conferences.

The project coordinator will be responsible for connecting the various technology coaches with a small team of teachers at each school. These teams of teachers could include the beginning teachers or a grade level/department team. The project coordinator is responsible for staying informed on current 1:1 research and its impact on teaching and learning. This individual must be willing to adjust to staffing changes and report any quality supports available for all teachers. As the author of this project, I may serve as an assistant to this project coordinator in order to further clarify questions or concerns as it is implemented.

Additional school leaders, like the superintendent of schools and other principals or assistant principals, will be required to review and approve the project as well. They will be responsible for discussing how to appropriately fund and garner support for the project. The school secretaries and the curriculum director will also be required to help coordinate resources and classrooms for the implementation of the professional development sessions throughout the school year. Secretarial duties may include finding substitute teachers, providing stipends for technology coaches, and determining travel expenses or training fees. The curriculum director would need to be in continuous communication with technology coaches and the project coordinator.

Finally, the technology coaches role and responsibilities will be flexible to various needs found in each group of teachers. Every technology coach will be expected to help plan a lead district staff development throughout the school year. Again, these sessions

will be scheduled and approved professional development days on the school calendar. They must also be involved in leading the beginning of the school year professional development sessions outlined in this project. The technology coaches will visit each teacher in their group every day for the first month and then continue on a weekly basis. Each month, the technology coaches will meet to discuss needs, achievements, and resources that may further support the teachers in their groups. It may be necessary to hire a substitute teacher for these monthly meetings. The technology coaches will track their reflections and experience in the project's monthly evaluation. Their efforts will be compensated by the school district during a two-year cycle. The district will provide a small stipend each year to their salary and will cover all the expenses related to attending the TIES conference every year and the ISTE conference every other year.

The teachers' roles and responsibilities also involve being flexible and adaptable to the information or recommendations that are implemented in the professional development project. While analyzing and reflecting on their learning goals and use of technology, these individuals must be honest and open to new ideas or strategies. They will need to complete formative evaluation and summative evaluation that includes how their technology coach supported them throughout the school year and the changes they've made in modifying curriculum for effective teaching and learning in a 1:1 environment. The formative evaluation will be completed once a month and the summative evaluation will be completed at the end of the school year. This collaboration and feedback will be instrumental in the assessment of the technology culture throughout the district.

Project Evaluation Plan

The goal of the professional development project is for teachers to grow professionally in designing effective technology-integrated curricula. To meet this goal, two learning objectives are presented. The first objective is for teachers to demonstrate understanding how to use the technology integration planning model through comprehensive and integrated lesson plans for specific learning objectives, in which learning outcomes will be measured by specific assessments. The second objective is for teachers to describe and document the conditions and/or resources that best assist their development of technology related lesson plans. These objectives are supported through the findings of Section 2 and the review of literature in Section 3. To measure the progress of meeting professional development project goal, a goal-based evaluation plan was formulated to address these outcomes. Data will be collected in the form of a technology integration planning document and online questionnaires with some open response questions. Such data will be used to determine the teachers understanding of technology planning for effective technology curricula at the end of the sequential professional development sessions. Data will describe and document teachers' perceptions of the condition of resources and collaboration they need to be effective in designing technology integrated lessons throughout the implementation of the professional development plan.

To capture ongoing progress and a cumulative outcome of the project, technology coaches and teachers will complete online evaluations and technology planning forms.

Kirkpatrick (1959) four-level training evaluation model was used to structure the evaluation plan. Figure 5 highlights this model below.

Figure 5. Kirkpatrick's four-level training evaluation model.

In this model, participant reactions, learning, behavior, and results are all considered. Formative evaluations are used to determine the current progress or reaction of attaining project objectives (Lodico et. al., 2010). These documents will allow the program coordinator to make adjustments or modify the execution of the project objective as its being implemented. Both technology coaches and teachers will complete formative evaluations to describe and document their reactions and learning as represented in Kirkpatrick's training model. Teachers will also complete at least one technology-integration planning form at the end of the professional development sessions in order to demonstrate learning based on Kirkpatrick's (1959) training model. The summative evaluations will be used to determine the final outcome of attaining project goal (Lodico et. al., 2010). Teachers and technology coaches will complete these evaluations at the end of the school year. As represented in Kirkpatrick's (1959) model, these evaluations will measure the behavior and results of the conditions and resources

needed for teachers to develop effective technology lessons. The project coordinator may analyze this data to further develop the professional development plan for the following school year. All evaluations and the technology planning form are found in Appendix A.

The three professional development sessions will include both formative and summative evaluations. Formative evaluations assist leaders by providing specific feedback while the project is being carried out (Lodico et al., 2010). This will not only capture the reactions of technology coaches, but also assist in measuring the learning or behaviors of participants (Kirkpatrick, 1959). The learning outcome of the first session of professional development will include teachers describing and documenting their perceptions of the technology-integration planning model and the support of technology coaches to assist their curricular designs for 1:1 learning. A brief online survey will capture these reactions by including open-ended questions for teachers to complete. The learning outcome of the second session will include demonstrating how to align a specific curricular lesson plan to learning objectives and assessments. As framed from the learning tier of Kirkpatrick's (1959) model, teachers will demonstrate adapting a current curricular lesson to phases 1, 2, and 3 of the TIP planning model. Survey questions will measure the reactions and learning of participants as they adjust lessons to the TIP planning model. The learning outcome for session three of the professional development includes teachers demonstrating how to adapt their current lesson to phases 4 and 5 of the TIP model. The survey questions at the end of this session will also demonstrate participant reactions and learning. To measure the participant's behavior and results, based on Kirkpatrick's (1959) model, the completed technology planning form will be

used as a summative data source that is specific to the learning objectives of the professional development sessions. All the formative survey documents for the professional development sessions and the technology planning form are represented in Appendix A.

To describe and document the teachers understanding of the overall project objectives, teachers will complete a monthly formative evaluation that measures the progress of the professional development plan as it relates to assisting teachers strategic plans for technology use in the classroom. A documented technology planning form will also be completed on a monthly basis to track the lesson innovation and delivery of modified curriculum plans. The learning objectives of the professional development plan included demonstrating understanding how to implement the TIP model and document or describe the conditions needed to support the development of technology-integrated lessons. Therefore, technology coaches will also complete a monthly formative evaluation that records their reactions and learning experiences in working with teachers to plan and integrate technology in the classroom. Together, these measurements present documented reactions, learning, behaviors, and results for the program coordinator to review and analyze as suggested by Kirkpatrick (1959). The program coordinator may triangulate these data sources to determine a theme related to additional support or resources needed to improve or modify the professional development plan. Technology coaches may also use the teacher's formative evaluations and the completed technology planning form for discussions during their monthly meetings. Such efforts will consider

the reactions, learning, behaviors, and results as suggested by Kirkpatrick's (1959) model for training evaluations.

Summative evaluations will be used to measure the goal of the professional development plan, which includes having teachers grow professionally in designing effective technology-integrated curricula. In Kirkpatrick's (1959) model, results are an instrumental piece in measuring the effectiveness of training. Based on the feedback from technology coaches and teachers, this data can be used to measure the learning objectives (Lodico, et al., 2010). The summative evaluation will be completed at the end of the school year in order to reflect on all aspects of support used throughout the year. This includes the survey reactions by teachers at the beginning of the year professional development sessions, formative and summative evaluations by technology coaches and teachers throughout the school year. The summative evaluation highlights the effectiveness of the professional development plan in demonstrating teachers understanding of using the TIP model to integrate lessons and documenting or describing teachers conditions needed to support the development of effective technology-related lessons in a 1:1 environment. The project coordinator may analyze the results and determine themes. The assessment of learning outcomes can be used to determine any improvements that need to be addressed the following year. The project coordinator may also use this data to garner support or financial assistance from the school board.

Technology coaches, teachers, the program coordinator, and administration are all key stakeholders in the execution of the professional development plan. Their reflections, resources, and experience will be critical to evaluating the goal in the

professional development project. I anticipate a positive evaluation for both teachers and technology coaches as they begin implementation. If any negative feedback results in the summative evaluations, the participants' reflections should be considered and addressed in order to improve the technology culture of the school district.

Project Implications

This project study explored how new or novice teachers modified curriculum as related to the SAMR model for effective teaching and learning. One of the major findings was that teachers exemplified lower levels of technology integration on the SAMR model. Their use of technology was chosen for productivity or engagement opportunities. While demonstrating transformational levels of the model occasionally, these teachers relied on the experience or ideas given to them from staff members. Therefore, I developed a project to help new or novice teachers grow professionally in their designs of effective technology-integration curricula. The outcomes of the project allow teachers to demonstrate their understanding of using technology integration planning and documenting their conditions or resources needed to further develop technology lessons in their classrooms. The project components are built from the participant data and recent literature addressing beginning teachers and technology integration. Providing this support will help to establish a positive technology culture throughout the district. Such a culture assists in successful learning for students and positive experiences for the teacher's technology integration and classroom environment.

Building successful experiences of technology-integrated lessons may improve the commitment of additional innovation of technology in the classroom. Technology

coaches will be used to mentor and guide new or novice teachers as they develop a strategic plan for technology use in their lesson objectives. Technology coaches past experiences, knowledge, and skills will help to eliminate unsuccessful or unmanageable factors of technology in the classroom. By decreasing the negative influences, new or novice teachers will build more successful experiences that alter further commitment. This will extend beyond the classroom as teachers collaborate and share experiences with other staff.

All teachers in 1:1 schools can benefit from the supportive structures found in this project. Strategic planning and the insight of technology coaches offer a mentoring structure that develops positive collaboration to meet specific needs of teachers in a 1:1 environment. Such a process helps teachers make social connections to resources and personnel that offer support and encouragement. When teachers are encouraged and respected, they will be more satisfied with their efforts. This will help to boost school climate and cooperation will all district stakeholders.

Finally, the application of technology integration planning and use of technology coaches will help to shape additional research on 1:1 teaching and learning. The project components are comprehensive in nature and could be used in other districts with 1:1 technology. The project can be adjusted in scale to meet the various needs of teachers at a different school district. In such a case, the effects of this project are far-reaching and may influence additional teachers in supporting technology planning for effective teaching and learning in 1:1 schools.

Conclusion

In Section 3, I created a professional development plan that addressed the findings of the project study. A comprehensive literature review was conducted in order to determine how to assist new or novice teachers in technology integration planning for effective teaching and learning in 1:1 schools. Such a review revealed the importance of establishing a reflective process for aligning technology with curricular learning goals. It also highlighted the importance of establishing a collaborative culture to inform and guide practice through the assistance of technology coaches. The TIP model for technology planning provided a conceptual framework for developing the professional development sessions focusing on analysis and reflection for planning a lesson with technology. Boogren's (2015) framework for supporting new or novice teachers through instructional and institutional resources also influenced the establishment of technology coaches in the professional development plan. A detailed evaluation plan that highlighted Kirkpatrick's (1959) training evaluation model was reviewed. Section 3 also considered how to implement the professional development plan, the timeframe, roles and responsibilities of all stakeholders, and the implications for social change.

Section 4 of the project study highlights the strengths, limitations, and recommendations for alternative approaches to the study. A discussion on scholarship, project development and evaluation, leadership, and implications for future research will be addressed. In conclusion, I consider my scholarly efforts to the project and its application toward educational practice.

Section 4: Reflections and Conclusions

Project Strengths and Limitations

In this project study, I explored how new and novice teachers modify curriculum using 1:1 learning as related to the SAMR model. This section describes the project strengths and limitations. It discusses how the project study addressed the problem of frustration and lack of knowledge for teachers to effectively use 1:1 technology in teaching and learning. Section 4 highlights scholarship, social change, and the direction for potential future research. Finally, the section concludes with a comprehensive reflection on my personal journey as a novice researcher, scholar, and practitioner in the field of education.

Project Strengths

The conceptual framework of the SAMR model for implementing technology into teaching and learning guided this project. Throughout data collection, participants demonstrated, documented, and described teaching and learning with 1:1 technology as related to SAMR levels of technology implementation of curriculum. They were able to express effective strategies and challenges they've experienced in their schools. The research findings led to the development of a detailed professional development plan for implementing recommendations of strategies and supports for new or novice teachers in schools with 1:1 learning technology.

One of the strengths of this project is that implementation of the professional development plan could increase teacher collaboration and therefore positively influence the school climate for effective technology-driven lesson plans. Azano and Steward

(2015) noted that novice teachers desire professional and personal connections in the communities they teach. Teachers with connected social and professional networks may support and empower one another to further modify and redefine curricula for a changing educational landscape using 1:1 technology (Foltos, 2014; Kihoza, et al., 2016). Such networks may provide a comfortable setting to engage frustrations and develop innovative solutions for professional growth and development (Azano & Steward, 2015; Foltos, 2014).

Another strength of the project includes the adaptable and usable planning model that connects pedagogy with technology-integrated curriculum. This allows teachers to build skills and competency in all aspects of teaching and learning. A planning model stretches teachers toward analyzing current practice and instructional strategies that may or may not be effective with their students (Archambault & Masunaga, 2015; Shillings, 2013). When a teacher understands that the curricular content is easily adaptable to technology or effective in meeting learning goals, the teacher could be more likely to utilize the technology. In the process of curricular modification, the planning model allows the teacher to reflect on challenges and successes. Bruhn et al. (2017) explained that many of the technology applications in the classroom should be continually evaluated, especially as it correlates to specific learning goals. In turn, new or novice teacher's experience, understanding, and competency may increase and develop into further applications of curriculum enhancement with 1:1 technology.

The final strength of this project is the practical solution to continuous professional development. Salpeter (2017) noted that effective schools must have

ongoing training for their teachers that target specific needs. Job-embedded professional development is one of the most practical means for collaboration among teachers (Fullerton, 2013; Liu, Tsai, & Huang, 2015). Through job-embedded training and the application of technology coaches in strategic planning with other teachers, districts have the ability to continue training and supporting teachers as the technology changes. The technology coaches serve as mentors for new or novice teachers to build relationships with other professionals, help design and plan purposeful lessons with 1:1 technology, guide teachers to effective resources, and implement specific training based on district needs. Teachers can grow professionally in a cost-effective manner, especially for rural districts. As a result, new or novice teachers can lead students to become successful citizens in a technology-driven world.

Recommendations for Alternative Approaches

The exploration to new or novice teacher's demonstrations, descriptions, and documents for curricular modification related to the SAMR model are limited to the participants at TRF school district. A different group of new or novice teachers at TRF district may promote different findings, especially if higher education modifies teaching and learning for preservice teachers in the future. Therefore, an alternative approach would be to replicate this study to determine if different findings result from different participants at TRF district. In turn, this would create a larger sample size over a longer period of time. Larger sample sizes produce more reliable results due to greater external validity or generalization (Merriam, 2009).

Another limitation of the project study is the amount of time spent with participants. Although these participants were able to provide observational data, the study limited data collection time to one classroom period. Due to this limitation, participants could only describe other modifications to their lessons. Additional observational data may form different findings, especially as it relates to the impact of 1:1 technology or challenges that have resulted from implementing a technology-driven lesson. An alternative approach would be to extend the classroom observations by including two or three more throughout the school year. Again, the additional data may produce more reliable results and increase internal validity or credibility of the study (Merriam, 2009).

Finally, the professional development plan is limited to the competence, commitment, and skills of teachers already in the district. Experienced teachers must be willing to commit to the roles and responsibilities of the technology coach. Mart (2012) highlighted that committed teachers have passion for their jobs. This includes attending professional development training outside the school district. Without their knowledge or skills, the project would be unsustainable. This could be especially challenging in even smaller school districts then TRF district. An alternative approach would be to outsource technology coaches from nearby school districts. This may help extend professional relationships and collaboration for further technology related lesson innovation and change at a regional level.

Scholarship, Project Development and Evaluation, and Leadership and Change

There is a lot I have learned during my efforts to produce this project study. One of the most challenging aspects of this process has been the level of commitment needed to plan and execute the problem studied. When beginning this scholarly journey, I did not anticipate the amount of time I would spend reading, writing, and analyzing information. While my educational background was helpful in this process, nothing quite prepared me for the challenge of persistence that this project required. The residency I experienced early during the doctoral journey provided some insight into the challenge of time and commitment, but I had to experience it to really understand. Entering this doctoral program was a level of risk that pushed me to a new level of professional competence. I am very proud of my efforts and the dedication to pursuing a higher purpose in my profession.

Such a high level of dedication required a lot of motivation. When visiting with others about this doctoral journey, a local scholar encouraged me at a time I needed it the most. This individual awaked in me the real value behind efforts at this level of scholarship. Our efforts, we concluded, didn't result in simply earning a degree, but acknowledged a deep passion for something more than ourselves. I realized, once again, that I cared deeply about wanting to help teachers and students. I wanted a great future for students in our schools and the people I work alongside every day. My efforts really were a part of making a better future in education. This passion is what drives a scholar to be persistent and committed to their study. When this scholar stirred up this insight

again, I was motivated to continue working through the challenges and frustrations throughout the study.

Another aspect of scholarship that I learned was the value of integrity in research. While I was aware of this importance, my doctoral journey has given me great insight into the many forms of ensuring the most honest and reliable product of research. From my science teacher background, I had always understood the empirical process of determining truths through the scientific method. Therefore, I began my doctoral journey without accepting or being willing to execute any type of qualitative study. I can remember reading many resources during my doctoral journey that explained how to attain valid and reliable results in qualitative research. I soon realized that these studies maintained integrity, just in different ways. I was very impressed with all forms of scholarly research efforts and knew I needed to be sure I was following these methods as well. In fact, I surprised myself to carry out a qualitative study in the end.

Today, I have a higher respect and awareness of scholarly work. When reading peer-reviewed research, I can anticipate the methods or processes that establish a high degree of integrity in research. I have developed a sense of passion and dedication that extend beyond my own interests or personal goals. I see scholarly research as a commitment to something beyond myself or any other scholar.

Project Development and Evaluation

One of the most valuable lessons I've understood as I developed this project study was the significance of building a study through a conceptual framework. I can remember thinking I could carry out a study by simply formulating a few research

questions, without reading through any conceptual frameworks to guide the research. This was an awakening moment when I realized that having a conceptual framework really did help to direct what my research questions would be and how I would pursue answering these questions. I remember being most relieved of having this framework in place after I collected all my data. I needed a focus and direction in order to interpret the results. The conceptual framework gave me the pathway to incorporate my findings and discuss the results. This "lens" was a significant structure for the development of the study and professional development project that resulted from my topic.

Another lesson I learned in the execution of the project study was the positive feedback I received from key stakeholders at TRF district and the willingness of individuals to participate in the study. I was very apprehensive that teachers or the administration would not want to commit to the time or be intimidated by the rigor of the study. I soon learned that my community shared my passion for educational integrity and the pursuit of curricular change through 1:1 technology. This motivated me to research practical applications for a professional development plan that could be fully welcomed by these individuals. I knew the importance of making teaching and learning better for their daily lives could filter into all the nearby schools, including my own school district. I learned to be flexible to their needs and be open to ideas or research that would be the best for northwest Minnesota communities.

Finally, I learned that developing a project of this caliber requires higher order thinking and problem-solving. I had to be aware of my community and all the influences for which the problem originated. Although I read and considered many solutions found

in research, I analyzed and interpreted these ideas as they related to my community. I needed to be organized and thorough so that I could establish the most effective project design for these individuals. Knowing how to analyze data and research for the benefit of a particular audience was an essential skill I learned through the development of this project.

Leadership and Change

While developing this project study, I came to realize the importance of being willing to learn from all perspectives in education. I have been fortunate to have experiences from educational leaders with the humility to admit their inadequacies or weaknesses. If they are honest enough to admit to the challenges of an initiative, teachers will appreciate their openness and be more willing to try another strategy or approach to change. Such leadership moves the commitment to change toward a team responsibility rather than an individual.

In the professional development plan, I have designated experienced teachers to serve as technology leaders for other teachers. Such teachers have many ideas, past experiences, or skills that can boost the confidence and attitudes for establishing teacher commitment for effective teaching and learning with technology (Buabeng-Andoh, 2012, Zalah, 2016). I've gained an understanding that distributing leadership throughout a staff is more effective than a top-down approach in working through any type of initiative. Participants from the study acknowledged the importance of having leaders admit struggles and accept the various strengths found in teachers throughout the district. My participants were very willing to work with others to be supported and reinforced that

many ideas or technology skills could be drawn from experienced teachers in their schools. Emphasizing a collaborative team approach toward new initiatives and change should be a consideration for all leaders.

As I have learned throughout this doctoral journey, the challenge in changing status quo involves commitment and persistence. But more importantly, it is the passion and drive for moving beyond one's interior motives that are most effective in building success. Being honest and open to other perspectives or ideas will unite efforts that produce positive social change.

Analysis of Self as Scholar

When I began my doctoral journey at Walden University, I was naïve in my interpretation of doctorate-level work. I felt my Master's degree was manageable and that this journey would be more of the same. I remember someone who had just finished his doctorate program saying that earning a doctorate was "a whole other game." I never took that to heart until I began my program and realized the dedication needed in scholarly endeavors.

Today, I understand that a journey on this scale requires more than motivation and persistence. It requires just as much emotional support as physical support. I needed to be willing to lean on people I could trust for encouragement and strength. Likewise, I learned to be honest and open about needing help from others in the profession. Throughout my educational background, I prided myself in being able to learn independently. During this journey, I've learned how to reach out to my instructors and

Walden assistance without apprehension or pride. I realize that Walden University has many resources available if I simply seek the wisdom and advice from others.

Most importantly, I have gained respect for the doctoral process. Earning a degree at this level highlights the intensity and integrity of these programs. It is a long and tedious challenge because that is the nature of scholarly endeavors. For quality research to be produced, it requires a process of quality work. Now, I critically analyze current practice and research because of how I have learned and maintained a scholarly nature during my doctorate program. I am much more open to new ideas when I reflect on my own profession, but turn to the research for evidence and interpretation. I feel fortunate to have drawn these skills from my doctoral journey and hope to reflect this integrity with my colleagues.

Analysis of Self as Practitioner

When I started my doctoral program, I was apprehensive in telling my administrators and colleagues. The biggest reason for this was because I feared failing. I did not want to start the program and explain why I did not finish it. At the time, I was unsure I would have the ability to complete it while working full-time. Despite my personal apprehension, being a "quitter" was not the type of character I had developed as an athlete in college and I wanted to carry this demeanor into my academics and professional endeavors as well. In communicating my doctoral intentions to colleagues, I had mixed responses. Some were very encouraging and others did not say much at all. Some colleagues just didn't seem interested unless I spoke about my academic journey and how it related to helping challenges or frustrations in their classroom. Sometimes I

questioned if individuals may have resented my endeavor, felt intimidated, or simply wanted to make sure my classroom duties were still going to remain my priority. Looking back on this process, I realize that I should have shared more with my colleagues about the knowledge and skills I learned throughout the program. Withholding my academic journey from others simply does not move anyone forward professionally.

I feel that I have gained confidence in my abilities as a scholar practitioner. Most people would recognize my strength in organization and attention to details. However, this doctoral program has allowed me to capitalize on this skill, as well as learn how to become a problem solver, critical thinker, and leader in my school. I welcome challenges with a bold determination to draw from my experiences and seek the recommendations research may offer for these situations. During the beginning of my program, I was unable to understand research jargon and felt somewhat overwhelmed by the intensity of interpreting research or conceptual frameworks. Now, I feel as though I have a better handle on research methods and procedures that connect to the every-day challenges of teaching and learning. I am more willing to take risks in my own classroom or share the knowledge I have gained with my colleagues.

Most importantly, I have developed a comprehensive perspective of the educational profession. I feel that as the only classroom science teacher in a K-12 building, I have a lot of everyday experience that I can utilize in my future endeavors. I also realize that I have gained valuable insight into critically analyzing peer-reviewed research for practice in the daily classroom. I have built my experiences as scholar

practitioner because I can make connections to theories or frameworks in a practical manner. I remember being very excited at how my students responded to changes in my own teaching and learning, especially as I began to integrate more technology into my own lesson plans. My level of optimism and commitment for my profession grew and I took on more risks and responsibilities in my daily work. I feel that my students, classroom climate, and relationships with staff improved as a result of the skills and insight I have gained from this doctoral journey.

Analysis of Self as Project Developer

As a classroom teacher for six different science classes in Grades 7-12, I understand the value that time holds for teachers in their planning and construction of lesson plans. I admit that my own preparatory time is critical to the execution of any innovation to teaching and learning in my classroom. In addition, I understand that school districts must be practical in their solutions for initiatives and are often limited in financial resources. In particular, rural or smaller schools may have cultural nuances and priorities that develop from community's visions. With all these influences, I attempted to construct a project that could effectively consider these aspects and move educational practice forward.

When I began my doctoral studies, I wasn't sure exactly the direction I would take in my final project. I reflected on a lot of considerations, but ultimately began to understand that technology was reshaping and redesigning the curriculum in the local region. Therefore, I wanted to acknowledge both the benefits and struggles teachers have experienced as this transition endured. While apprehensive at first, I began to immerse

myself in scholarly literature that kept me both interested and focused on the needs of my community. My organizational skills were instrumental in keeping me on track throughout this process.

Today, I see the requirements of the doctoral program in a broader perspective. I gained understanding in a lot of areas of education that were built into the framework of my final study. Such insight evolved as I began developing a plan to address a local problem in my learning community. I feel that through the diligence of reading current literature and constructing a research plan with a project goal, I was able to use my problem-solving skills and passion for change to benefit my community. I'm grateful for the opportunity to impact regional schools in northwest Minnesota, especially in an area of education that will continue to evolve in the future.

Reflection on Importance of the Work

At the beginning of the doctoral program, I recognized that the vision of Walden University was to allow students to attain a higher degree for a higher purpose. Using the knowledge and skills from student programs is meant to drive positive social change and leadership in our local communities and beyond. I value this vision and direction that Walden University tries to attain. I feel that through my academic journey, I have just begun to shape the direction of education by working to solve local problems and serving in my own community.

I appreciate the opportunities I have had to connect with students and instructors at Walden University and various educators throughout my region. I have learned that collaborating with others has been very important in the progress of attaining any type of

goal in life, including the vision at Walden. I have also learned that offering critical analysis and encouragement are valued aspects of work. In this journey, I am especially grateful for instructors that challenged me in my coursework and project. Without a high regard for student work, I would not have developed the character and determination for future endeavors. I know that I have transformed my own actions and perspectives through this academic process. I hope that the skills I have attained academically, my respect for diversity, and my passionate commitment to serving others will continue to effectively influence those around me. It is the small changes in us that create the biggest impact on others.

Implications, Applications, and Directions for Future Research

While determining the best approach toward assisting teachers in this study, I realized that teachers needed a support system within the school itself. Despite various outside opportunities for professional learning, it was the collaboration of teachers in their own departments or teams that offered the most practical help. Through the addition of technology coaches within their own schools, teachers could be given the tools to be effective with technology in their classroom. Using a model for analysis and reflection that can be passed from technology coach to the teacher created a framework for new or novice teachers to begin curriculum modification for effective teaching and learning. The system of support was designed for teachers, but ultimately will influence the quality of the classroom environment and student achievement.

The project design was applied to a district in northwest Minnesota, with a large number of new or novice teachers for its size. However, the application of the project

plan could be transferred to other districts with difficulty in modifying curriculum and instruction with 1:1 technology. The project could be effective for any group of teachers that are having difficulty in modifying curriculum using 1:1 technology. However, executing this project in another district would be dependent on the population of teachers that could serve into the role of technology coach. Under the wisdom and guidance of an educational leader, this could be established a few years into the implementation of the 1:1 initiative. In doing so, teachers would gain knowledge and experiences from using technology in their own classrooms before they assist others.

Due to the limitations of having experienced teachers available to serve as technology coaches, I recommend further research into implementing technology coaches from nearby schools. Researchers could duplicate this study, but incorporate experience and knowledge from teachers in another district. This may be especially effective in smaller, rural schools or districts that combine professional development throughout the school year. The results from such a study would help to uphold external validity of this study.

Another direction for future research related to this topic would be to continue exploring the documents, demonstrations, and descriptions of new or novice teachers as they develop into experienced teachers. Additional research that follows participants through a longitudinal case study would add insight into the progression of support needed as teachers develop skills or knowledge in curriculum modification in 1:1 environments. Educational leaders would be able to adjust resources at various times for

teachers if they understand when supports are needed most. Such an understanding could be helpful for the development of preservice teacher programs as well.

Conclusion

Section 4 of the project focused on the strengths and limitations of the project. I considered the implications, applications, and directions for future research related to this project study. I described my recommendations for alternative approaches to the study and how the project developed. Section 4 highlighted my personal reflections on scholarship, leadership, and social change related to my doctoral journey at Walden University.

As highlighted in this project, curriculum will continue to evolve in education as long as technology continues to increase and change as well. Teachers must be deeply tied to the essential skills and knowledge of technology in order to implement effective teaching and learning for digital students. Through the project, I was optimistic that improvements in teaching and learning will continue as long as teachers have the support and collaboration from one another. This will be an essential component for any school system to address as the technology continues to overwhelm our daily social lives and economic future. Students deserve to have teachers with the pedagogical knowledge to apply technology in the classroom with a purposeful goal. Ultimately, the support teachers receive will filter to the success of students. This is the vision and passion I have for all the efforts I have made throughout the doctoral program.

I am very grateful for the opportunity to grow and learn throughout this doctoral program. Through the challenges, I have gained strength in character and perseverance.

I appreciate the collaboration and help of many individuals during this process. My participants were very accommodating and really helped me gain insight into the curriculum of a 1:1 environment. I was very fortunate to have the support of administrators and colleagues as I developed the project. My instructors at Walden have guided me toward understanding the value and importance of positive social change in my community. I look forward to continuing a professional journey of positive change and service in the future.

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Appendix A: The Project

Professional Development Plan for Supporting New or Novice Teachers in a 1:1 School

Overview of Project

This professional development plan is the outcome of a comprehensive empirical research project that found that new or novice teachers remain at lower levels of the SAMR model for technology integration in 1:1 learning environments, using classroom technology as a means of productivity and engagement purposes. Such findings revealed benefits and challenges in their curriculum modification, including the need for a supportive culture of collaboration. In addition, a targeted literature review supported the need for strategic technology integration planning and collaboration through job-embedded professional learning. These elements were used to frame the goals and objectives in the professional development plan. The goal of this professional development plan is for teachers to grow professionally in designing effective technology-integrated curricula. The specific learning outcomes or objectives of the plan support attainment of the goal through structured and sequential professional development activities for teachers. Teachers will demonstrate their understanding about the implementation of a technology integration planning model through comprehensive and integrated lesson plans for specific learning objectives, in which learning outcomes will be measured by specific assessments. Teachers will describe and document the conditions and/or resources that best assist their development of technology related lesson plans as measured by a continuous format of specific support assessments. The

project includes a timeline, PowerPoint slides, and handouts that can be used by participants. The professional development plan establishes a framework of support through the TIP model and the integration of additional technology coaches in each school. This provides a structure for continuous curricular development and support throughout the school year. The project includes a series of formative evaluations, a technology planning form, and one summative evaluation that can be used to assess project goal at the end of the school year.

One objective of the plan is to have teachers document and describe conditions for the further development of technology-related lessons. The first element of the project includes two documents that can be used by the project coordinator as they begin to implement the plan. The first document is a checklist for the selection of technology coaches. The checklist guides the project coordinator in creating an effective team of support for new or novice teachers. Quality indicators will help to maintain a positive and productive relationship between these individuals. The second document is an example timeline for the annual implementation of the project. This document can be changed to fit any school calendar if needed.

Another objective of the professional development plan is to have teachers demonstrate their understanding about the implementation of a technology-integration planning model through comprehensive and integrated lesson plans. The second element of the project provides an example of the sequence of three professional development sessions for technology coaches and teachers to use at the beginning of the school year. The learning outcomes for these sessions include having teachers (1) describe and

document their perceptions and reactions of the technology-integration planning model and the additional support of technology coaches to assist their curricular designs for 1:1 learning, (2) demonstrate how to align a specific curricular lesson plan to learning objectives and assessments, and (3) demonstrate how to adapt their current lesson to a specific instructional strategy and reflect on the lesson strengths and weakness. PowerPoint slides and handouts are included as support resources for the participants. Formative survey questions are included for teachers to complete after each session.

The first session highlights the influences and impact of a 1:1 learning environment with support from professional references from the literature review and findings of the study. An introduction of the conceptual framework and time for collaboration with technology coaches is provided. The outcome of the session is to (1) have teachers describe and document their perceptions of the technology-integration planning model, including the addition of technology coaches to assist their curricular designs for 1:1 learning. This session will allow teachers to gain insight into the influence of classroom instruction in a 1:1 learning environment and connect this to their use of technology in lesson designs or experiences they have had with technology in the classroom. PowerPoint slides will be used for the large group presentation in the morning and handouts are given for small group discussion in the afternoon. The PowerPoint slides highlight the review of literature and conceptual framework. The handouts include the technology-planning document that was reviewed in the large group presentation. These questions allow for reflection on connecting the literature and conceptual framework to their own practice or experiences.

The second session includes an entire day of collaboration with the technology coach to highlight instructional and institutional resources (Boogren, 2015) that support effective technology integration planning and supportive structures throughout the district. This session emphasizes the first three phases of the TIP model. The learning outcome of the second session will include (2) demonstrating how to align a specific curricular lesson plan to learning objectives and assessments. Technology coaches work with a small group of teachers throughout the day by guiding them through technology planning and providing ideas, strategies, or resources that would be effective based on the teacher's individual learning goals and objectives. Teachers are encouraged to design at least one lesson plan by following the TIP model with their technology coach by the end of the third session.

The third session includes an entire day dedicated to practice and reflection of technology applications. Emphasizing the final phases of the TIP model, technology coaches provide guided reflection questions to discuss with teachers after they have practiced using the technology application or formulated their lesson design. The learning outcome of this session also includes (3) teachers demonstrating how to adapt their current lesson to phase 4 and 5 of the TIP model. Teachers and technology coaches will discuss and anticipate any further challenges toward technology integration and planning for effective teaching and learning. The session also considers the wider learning community that can help manage effective teaching and learning recommended through Boogren's (2015) support structures for new or novice teachers. A handout of the technology planning form will be given to participants to finish completing.

The final element of the professional development plan includes a series of formative evaluations and one summative evaluation. The documents can be used to measure the progress and outcome of the project. They can be adjusted into an online survey format, like *Survey Monkey*, in order for participants to easily access and complete them during a convenient time. Formative evaluations will be completed monthly by technology coaches and teachers to document and describe the conditions for the development of technology related lessons. The summative evaluation measures both project objectives, to demonstrate teachers understanding of implementing the TIP model for technology planning and documents or descriptions of the resources needed to support technology-integrated lesson development for teachers.

Materials

The following materials are part of the professional development plan:

- Checklist for the selection of technology coach
- Annual school year timeline for implementation
- PowerPoint slides for background information on the influence of 1:1 learning and conceptual framework (TIP model)
- Handouts for professional development sessions, including technology planning form or any resources from technology coaches (example: a list of educational technology apps that have worked well for the technology coach)
- Online professional development survey questions
- Summative and formative evaluations
- Technology planning form (Session handouts)

Roles and Responsibilities

The following roles and responsibilities for participants are described below:

- **Project Coordinator:** This individual will coordinate the program by gaining approval from the school board and school administrators. Their responsibility as a leader is to select technology coaches and inform them on their role throughout the school year. They will adjust the professional development plan in a manner that can be arranged on the school calendar, including considering early-out times for teachers to gain job-embedded professional development from technology coaches throughout the school year. The coordinator will lead the large group discussion during the first professional development session by highlighting the influences of 1:1 learning, including supporting teachers through collaboration with technology coaches and the technology-planning model. This individual should not be a full-time teacher, but may include a technology or media specialist.
- **Technology Coach:** This individual is responsible for leading small groups during the first three sessions of professional development at the beginning of the school year. They must complete daily check-ups on their assigned team during the first month of the school year. After the first month, these are scheduled weekly meeting times with the teachers. The responsibility of the technology coach is to stay informed on current practice with technology by highlighting positive experience, resources, or ideas that can be passed to their teachers. To do so, they will be required to attend the TIES Conference each year or the ISTE

every other year. They must lead staff development throughout the school year and meet with other technology teachers once a month. These individuals will also complete monthly formative evaluations and a summative evaluation at the end of the school year. They will be committed to serving as a technology coach for a two-year minimum and will receive a stipend as negotiated by the school board.

- **Teacher:** The role and responsibility of the teacher is to remain open, honest, and flexible to the feedback or recommendations of technology coaches.
- **School Administrator/Principal:** This individual must approve and support the professional development plan by providing financial and personal resources.
- **Curriculum Director:** This individual will work with the program coordinator and technology coaches to purchase or modify resources based on technology integration planning. Their role also includes aligning all personnel and resources needed for job-embedded professional development.
- **School/Administration Secretary:** This individual will provide stipends and purchase resources for technology coaches, teachers, program coordinator, or administrators. This may also include hiring substitute teachers for the technology coaches monthly meetings.
- **School Board:** These individuals will support the professional development plan by approving any expenses related to the project, including training and stipends for the technology coaches.

Project Timeline

Week 0: The program coordinator will be responsible for presenting the plan and the schedule of job-embedded professional development days to the school board for approval. Based on the number of new or novice teachers in the district, the coordinator will select technology coaches for each school as reflected on the checklist. The technology coaches and program coordinator may review the background information of the impact on 1:1 technology for effective teaching and learning and begin to review the professional development session handouts and PowerPoint slides.

Week 1: The program coordinator will present the background information to all the teachers as a large group during the first professional development session. Technology coaches will meet in small groups for the remainder of the three sessions. These sessions will help new or novice teachers establish relationships and promote instructional guidance for technology integration planning. They will schedule times to meet teachers on a daily basis. Technology coaches will take a mentoring role by reviewing where to find resources or any other school assistance for their lesson planning.

Week 2-4: Technology coaches will continue to meet with teachers on a daily basis to assist in strategic planning and curricular modification for 1:1 learning. During these scheduled meetings, technology coaches will assist teachers in solving any problems or encouraging their efforts. This will help build competency and confidence for their integration of technology-related lessons.

Week 4: During this week teachers and technology coaches will decide on a weekly schedule of meetings. Again, these meetings are used to reflect on experiences, encourage teachers, promote innovation, and provide strategic plans for effective teaching and learning with 1:1 technology. Both the technology coach and teachers will complete an online formative evaluation. In addition, all technology coaches will schedule a time to meet and discuss these evaluations. Their analysis and reflection will gauge the direction of resources or job-embedded training that is needed for teachers. This collaboration will help formulate ideas for the scheduled professional development days throughout the year.

Week 5 and beyond: Technology coaches will continue to meet on a monthly basis to reflect on the process of supporting new or novice teachers as they design and integrate technology into their lesson plans. Teachers and coaches will complete the formative evaluation online every month. The program coordinator will continue to be in contact with these coaches in order to help establish additional job-embedded training or make any adjustments to the professional development plan. During the final week of the school year, teachers and coaches will complete a summative evaluation. Technology coaches and the program coordinator will assess the outcome of these measures to determine the effectiveness of the professional development plan.

Evaluation

Formative: Technology coaches and teachers will complete a monthly evaluation about the process of integrating the TIP model and conditions needed for the support and development of technology integration into lesson plans. The program coordinator will be able to determine how the technology coaches are providing support. Likewise, the technology coaches will be able to determine how they are supporting the teachers. The teacher will also complete a monthly technology planning form. Together, these documents will be able to measure how teachers demonstrate understanding of how to integrate technology planning and document or describe their conditions for support of technology development throughout the school year.

Summative: At the end of the school year, technology coaches and teachers will complete a summative evaluation. This evaluation will measure the effectiveness of meeting the professional development goal for teachers to grow professionally in designing technology-integrated curricula. The project coordinator will analyze the results of the evaluations. Based on the findings, the coordinator could make recommendations for any improvements. This may include changing technology coaches or adding more of them. The summative evaluations provide critical feedback to the continuation of the professional development plan. Ultimately, both district administration and the school board will consider the program coordinator's suggestions.

The following pages display the various documents of the professional development plan. This includes the checklist for the selection of technology coaches, the timeline for implementation in a school calendar, formative survey questions from the

professional development sessions, formative evaluations for technology coaches, formative evaluations for teachers, summative evaluations for technology coaches, summative evaluations for teachers, an outline for PowerPoint slides, and a list of document handouts for participants.

Checklist for the Selection of Technology Coaches

In order to provide quality support for new or novice teachers in the design and implementation of technology in a 1:1 classroom, the following indicators will be used to select technology coaches. Technology coaches may have variable skills or knowledge, but each coach should meet at least 5 of the criteria below.

1. Technology coaches must be chosen from existing staff.
2. Technology coaches must be full-time teachers and/or specialists.
3. Technology coaches should have attended the TIES or ISTE Conference at least once.
4. Technology coaches should be willing to continue attendance at the TIES or ISTE Conference at least once a year.
5. Technology coaches should have a two-year commitment to their role, with the ability to re-apply.
6. Technology coaches must have excellent collaboration skills for a diverse staff.
7. Technology coaches must be able to lead activities in small group or any technology related professional development time allocated by the district.
8. Technology coaches must be able to assist with technology integration in their schools by demonstrating effective technology integration in their own classroom.

Timeline for Implementation on a School Calendar

June	• Present and approve professional development plan • Present and approve job-embedded professional development days • Determine number of technology coaches needed • Select technology coaches
July	• Review literature and background information • If available, attend training on technology
August	• Review literature and background information • If available, attend training on technology • Project coordinator and technology coaches meet • Plan for professional development sessions • Execute professional development sessions • Compile professional development sessions 1,2, & 3 survey responses from participants • Weekly meetings with technology coaches and teachers
September	• Daily meetings with technology coaches and teachers • Online formative evaluations are completed by technology coaches and teachers • Monthly meeting with all technology coaches

October	• Teachers and technology coaches meet on a weekly basis • Online formative evaluations are completed by technology coaches and teachers • Monthly meeting with all technology coaches • Technology coaches attend training, if available
November	• Teachers and technology coaches meet on a weekly basis • Online formative evaluations are completed by technology coaches and teachers • Monthly meeting with all technology coaches • Technology coaches attend training, if available • One full day of job-embedded professional development training by technology coaches
December	• Teachers and technology coaches meet on a weekly basis • Online formative evaluations are completed by technology coaches and teachers • Monthly meeting with all technology coaches

	• One early-out, job-embedded professional development training by technology coaches
January	• Teachers and technology coaches meet on a weekly basis • Online formative evaluations are completed by technology coaches and teachers • Monthly meeting with all technology coaches • Technology coaches attend training, if available
February	• Teachers and technology coaches meet on a weekly basis • Online formative evaluations are completed by technology coaches and teachers • Monthly meeting with all technology coaches • One full day of job-embedded professional development training by technology coaches
March	• Teachers and technology coaches meet on a weekly basis • Online formative evaluations are completed by technology coaches and teachers • Monthly meeting with all technology coaches

	• One early-out, job-embedded professional development training by technology coaches
April	• Teachers and technology coaches meet on a weekly basis • Online formative evaluations are completed by technology coaches and teachers • Monthly meeting with all technology coaches • Technology coaches attend training, if available
May	• Teachers and technology coaches meet on a weekly basis • Summative evaluations are completed by technology coaches and teachers • Program coordinator analyzes and reflects on program outcomes • Recommendations from program coordinator are discussed with administration and school board • Technology coaches are provided stipends

Formative Evaluations for Professional Development Sessions

Session 1

Instructions and activity schedule: The presenter/program coordinator will pass out the following formative evaluation document at the end of the large group presentation or format questions into *Survey Monkey* online and provide a link to the survey in the presentation. Teachers will complete the evaluations at the end of day 1, session 1. If using a paper document, technology coaches must collect all evaluations from their small group and give them to the program coordinator at the end of day 1, session 1. Responses will be discussed with the presenter/program coordinator and technology coaches during an arranged meeting.

Session 1 Handout – Teacher Reactions Survey

1. Describe why you would use the technology planning form to modify your curriculum?
2. What is the intended impact of technology planning?
3. Describe how you could be supported in technology planning.
4. What is the intended impact in the assistance of technology coaches for your curriculum?

Session 2

Instructions and activity schedule: The presenter/program coordinator will pass out the following formative evaluation document to the technology coaches or format questions into *Survey Monkey* online and provide a link to the technology coaches for distribution in small groups. Teachers will complete the evaluations at the end of day 2, session 2. If using a paper document, technology coaches must collect all evaluations from their small group and give them to the program coordinator at the end of day 2, session 2. Responses will be discussed with the presenter/program coordinator and technology coaches during an arranged meeting.

Session 2 Handout – Teacher Learning Survey

1. Describe the advantages of technology that could be used in your classroom.
2. How did determining objectives and assessments impact your lesson design?
3. What forms of instruction can you use with different types of technology?
4. Did your technology coach help you in this planning process? Why or why not?

Session 3

Instructions and activity schedule: The presenter/program coordinator will pass out the following formative evaluation document to the technology coaches or format questions into *Survey Monkey* online and provide a link to the technology coaches for distribution in small groups. Teachers will complete the evaluations at the end of day 3, session 3. If using a paper document, technology coaches must collect all evaluations from their small group and give them to the program coordinator at the end of day 3, session 3. Responses will be discussed with the presenter/program coordinator and technology coaches during an arranged meeting.

Session 3 Handout – Teacher Behavior and Results Survey

1. Do you feel you have the resources to support your lessons? Why or why not?
2. What are the strengths and weakness of your technology-integrated lesson?
3. Will you continue to use these planning strategies in the future? Why or why not?
4. Did your technology coach help you in this planning process? Why or why not?

Monthly Evaluations

Instructions and activity schedule: Technology coaches will give each teacher in their assigned small group a monthly evaluation to complete and return to them. These evaluations will be used for technology coaches and the program coordinator to discuss at an arranged monthly meeting. Responses will be discussed and used to determine the pathway of support and professional development throughout the school year.

Evaluation Handout 1

Formative Evaluation for Teachers

1. Describe your overall experience with technology integration planning throughout the month.
2. What form of support has been most effective in helping you integrate technology? (Circle all that apply)
    a. Following the TIP model
    b. Feedback from my technology coach
    c. Professional development outside the district
    d. Job-embedded professional development from all the technology coaches
    e. Other

    _____
3. Provide any suggestions that may help your technology coach improve supporting you next month.
4. Place a checkmark in the blank if the following apply:

a. _____ I have aligned lesson objectives in my curriculum to a new technology application.

b. _____ I have analyzed and reflected on instructional strategies for technology- integrated lessons.

c. _____ I have found strategies that help me adapt to the challenges I experience with technology.

d. _____ I feel confident in my abilities to design another technology-integrated lesson.

5. Provide any other feedback or suggestions below.

Monthly Evaluations

Instructions and activity schedule: The program coordinator will give each technology coach a monthly evaluation to complete and return to them. These evaluations will be used for program coordinator and other technology coaches to discuss at an arranged monthly meeting. Responses will be discussed and used to determine the pathway of support and professional development throughout the school year.

Evaluation Handout 2

Formative Evaluation for Technology Coaches

1. Describe your overall experience with supporting teachers in technology integration planning throughout the month.
2. What form of support has been most effective for your guidance with teachers? (Circle all that apply)
    a. Following the TIP model
    b. Sharing my ideas or experiences
    c. Professional development outside the district
    d. Job-embedded professional development from all the technology coaches
    e. Other

    _____
3. How are teachers implementing your recommendations and feedback this month?
4. Place a checkmark in the blank if the following apply:

a. _____ I have helped teachers aligned lesson objectives in their curriculum to a new technology application.

b. _____ I have helped teachers analyze and reflect on instructional strategies for technology-integrated lessons.

c. _____ I have helped teachers find strategies that can help them adapt to the challenges they experience with technology.

d. _____ I feel that I've helped teachers become more confident in their abilities to design another technology-integrated lesson.

5. Provide any other feedback or suggestions below.

Annual Evaluations

Instructions and activity schedule: Technology coaches will give each teacher in their assigned small group an annual evaluation to complete and return to them at the end of the school year. These evaluations will be used for technology coaches and the program coordinator to discuss at an arranged meeting at the end of the school year. Responses will be discussed and used to determine the pathway of support and professional development for the next school year.

Evaluation Handout 3

Summative Evaluation for Teachers

1. Describe your overall experience with technology integration planning throughout the school year.
2. Do you have any suggestions for improvement in technology integration planning for the next school year?
3. What elements of support were most effective for you throughout the school year?
4. What elements of support were needed for you throughout the school year?
5. How did these supports modify your curriculum and classroom climate throughout the school year?
6. How did the formative evaluations guide the process of support throughout the school year?
7. Do you feel that your technology coach was effectively guiding you throughout the school year? Explain why or why not.

Annual Evaluations

Instructions and activity schedule: The program coordinator will give each technology coach an annual evaluation to complete and return to them at the end of the school year. These evaluations will be used for program coordinator, other technology coaches, and the curriculum director or school board to discuss in an arranged meeting at the end of the school year. Responses will be discussed and used to determine the pathway of support and professional development for the next school year.

Evaluation Handout 4

Summative Evaluation for Technology Coaches

1. Describe your overall experience with supporting teachers in technology integration planning throughout the school year.
2. Do you have any suggestions for improvement in technology integration planning and support for the next school year?
3. What elements of support were most effective for teachers throughout the school year?
4. What elements of support were needed the most for teachers throughout the school year?
5. How did these supports modify teacher's curriculum and classroom climate throughout the school year?

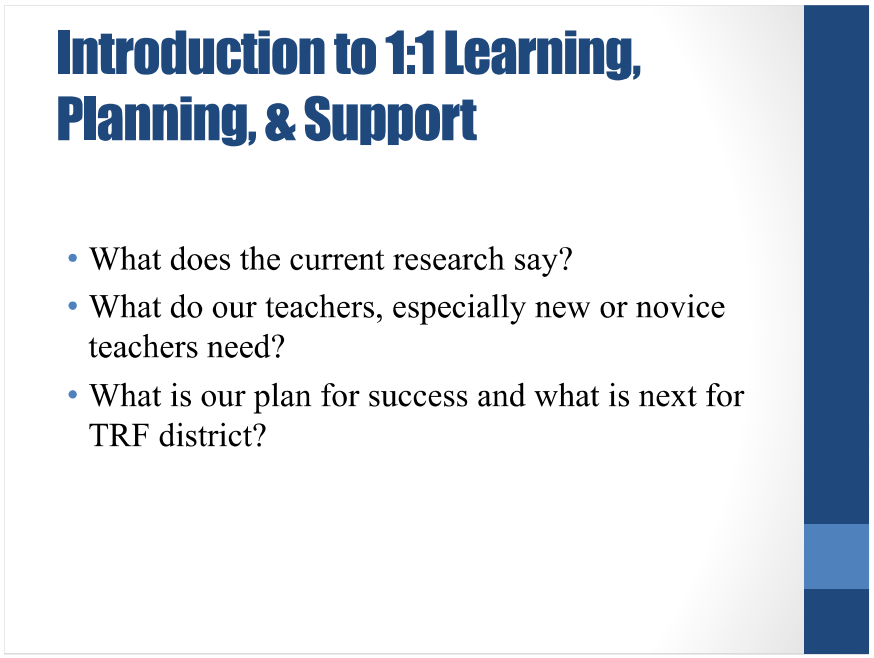
6. How did the formative evaluations guide you in supporting teachers throughout the school year?
7. Do you feel that your role as technology coach effectively guided teachers throughout the school year? Explain why or why not.

Session 1: Presenter/Program Coordinator PowerPoint Slides

Instructions and schedule: The presenter/program coordinator should use the following PowerPoint slides to guide a large group presentation (Session 1) of current research by highlighting the influences and impact of a 1:1 learning environment with support from professional references from the literature review and findings of the study. This presentation should be used as a guide for introducing background information on mobile learning, the conceptual framework, and additional collaboration expectations with technology coaches and teachers in the upcoming sessions. The presentation is to be used in Session 1 for the large group morning presentation.

Slide 1:

Slide 2:



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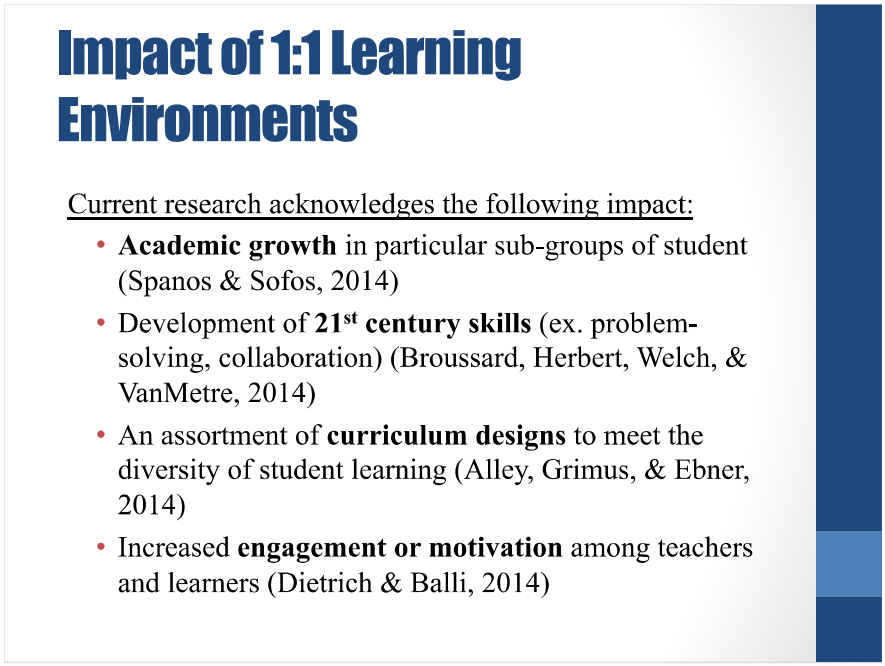
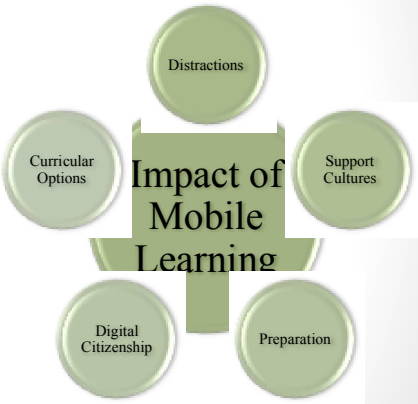


Slide 4:

Impact of 1:1 Learning Environments

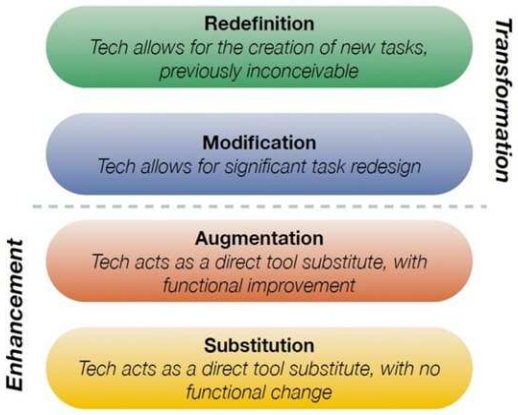
Themes found in TRF classrooms:

- New distractions from learning goals
- Need for a more supportive technology culture and sharing
- Lack of pre-service preparation for 1:1 technology
- Need for understanding and supporting digital citizenship
- Enthusiasm and support for various curricular options available through collaboration



Slide 5:

What is the SAMR Model?



Puentedura, R.R. (2009). SAMR: Framing the goals of transformation. Retrieved from [Web log post]. http://www.hippasus.com/rrpweblog/

Slide 6:

Slide 7:

Slide 8:

Factors of Success in 1:1 Learning Environments

Current research acknowledges the following factors:

- **Professional development** (Hunt-Barron, Tracy, Howell, & Kaminski, 2015)
- **Pre-service preparation** (Charbonneau-Gowdy, 2015)
- **School environment/sociocultural factors** (Agyei & Voogt, 2014)
- **Leadership** (Goh, S. & Zhen-Jie, 2014)
- **Collegial support, collaboration, & time** (Downing & Dyment, 2013)

Slide 9:

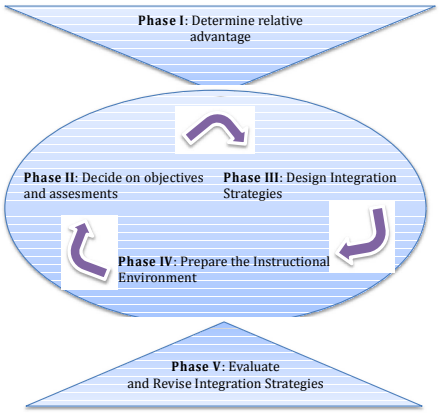
What do we need now?

Current research acknowledges the need for:

- **Instructional Support (Boogren, 2015)**
  - Curriculum mapping and alignment (Archambault & Masunaga, 2015)
  - Enhanced pedagogical skills (Crompton, Olszewski, & Bielefeldt, 2016)
  - Responsibility and commitment to technology (Zalah, 2016)
- **Institutional Support (Boogren, 2015)**
  - Job-embedded professional development and collaborative support (Althauser, 2015)
  - The use of technology coaches in supporting teachers (Foltos, 2014)
  - Supportive infrastructure and continual improvements (Stanhope & Corn, 2014)

Slide 10:

What is the TIP model?



Roblyer, M.D. (2006). *Integrating educational technology into teaching (4th ed.).* Upper Saddle River, NJ: Prentice Hall.

Slide 11:

Technology Coaches and the Professional Development Plan

- Session 1 (Mon afternoon)…
  - Meet with your designated technology coach and discuss the influence of technology in the classroom, including past experiences and lesson designs.
- Session 2 (Tues)...
  - Implement strategic planning (phase 1,2, &3 of the TIP model) to to align a specific curricular lesson plan to learning objectives and assessments.
- Session 3 (Wed)...
  - Time with your technology coach to practice and reflect (phases 4 & 5 of the TIP model) on technology applications aligned to your curriculum goals.
- Throughout the school year...
  - Meet, reflect, and attend PD with technology coach
  - Complete evaluations

Slide 12:

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Archambault, S.G. & Masunaga, J. (2015). Strategic planning and assessment. Journal of Library Administration, 55(1), 503-519. http://dx.doi.org/10.1080/01930826.2015.1054770.

Boogren, T. (2015). *Supporting beginning teachers.* Blommingfield, IN: Marzano Research.

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Crompton, H., Olszewski, B., & Bielefeldt, T. (2016). The mobile learning training needs of educators in technology-enabled environments. Professional Development in Education, 42(3), 482-501. http://dx.doi.org/10.1080/19415257/2014/1001033.

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Spanos, D. & Sofos, A. (2014). Digital literacy of students participating in a one-to one laptop initiative in Greece. *Open Education - The Journal for Open and Distance Education and Educational Technology, 10(1),* 69-76.

Stanhope, D.S. & Corn, J.O. (2014). Acquiring teacher commitment to 1:1 initiatives: the role of the technology facilitator. *Journal of Research on Technology in Education, 46(3),* 252-276. http://dx.doi.org/10.1080/15391523.2014.888271.

Zalah, I. (2016). Acceptance and use of e-learning technologies by Saudi secondary teachers. *Proceedings of the European Conference on e-Learning,* 758-764.

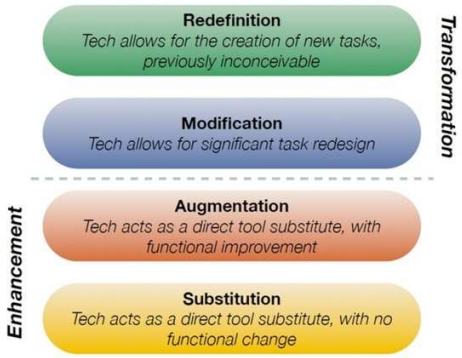
Additional Handouts for Sessions

Handout 1: Session 1 (morning)

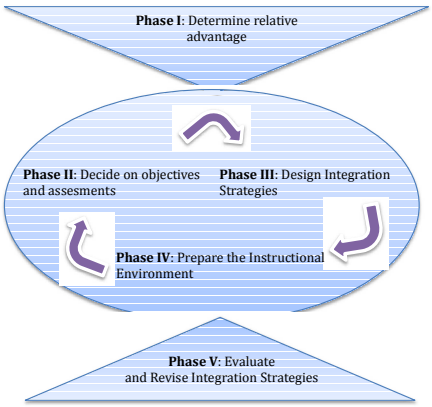
Instructions and schedule: The presenter/program coordinator should pass out this document to technology coaches and teachers before starting the large group PowerPoint presentation.

Document of the SAMR model and TIP model

SAMR model: Puentedura, R.R. (2009). SAMR: Framing the goals of transformation. Retrieved from [Web log post]. http://www.hippasus.com/rrpweblog/



TIP model: Roblyer, M.D. (2006). *Integrating educational technology into teaching (4th ed.)*. Upper Saddle River, NJ: Prentice Hall.



Handout 2: Session 1 (afternoon)

Instructions and schedule: Technology coaches meet in their small groups to discuss the morning presentation and brainstorm apps that can be used for meeting learning standards and core curricula in the teacher's classroom. The following document should be passed out to all teachers for this small group discussion.

Apps for Curriculum Maps Brainstorming – SAMR model and wheel: The Pedagogy Wheel by Allan Carrington is licensed under a Creative Commons Attribution 3.0 Unported License. Based on a work at http://tinyurl.com/bloomsblog

Handout 2: Session 1 (afternoon)

Instructions and schedule: Technology coaches should use the following handout of guided questions to discuss and reflect on connecting the literature and conceptual framework to practice and experiences of the technology coach and mentee's classroom environment.

Discussion Questions:

1. In what ways does the current research relate to your experiences in the classroom?
2. How do you interpret the SAMR model?
3. What are the advantages of using the TIP model for strategic planning with technology?
4. What aspects of technology support do you need right now?

Handout 3: Session 1 (afternoon), 2, & 3

Instructions and schedule: Technology coaches and teachers will each receive the following handout of the technology planning form document from the presenter/program coordinator to review aspects of technology alignment and curricular goals for the classroom. During Session 1, discuss how the TIP model and the technology planning form will impact your curriculum and instruction. During Session 2, complete phase 1-3 on the technology-planning document with the support and collaboration of your technology coach and colleagues. During Session 3, practice and reflect on strategic technology planning by completing phase 4 & 5 on the technology-planning document. Technology coaches will collect all the technology planning forms from the small group. The presenter/program coordinator and technology coaches will arrange a meeting to discuss the responses and determine additional professional development for teachers throughout the school year.

Document of the Technology Planning Form

Adapted from the TIP model (Roblyer, 2006)

Lesson Name and Grade Level: _____

Phase I: Advantage(s) of Technology

1. _____
2. _____

Phase II: Objectives and Assessments

1. Learning Objective(s) -

_____

2. Form of Assessment(s) -

_____

Phase III: Integration Strategy

1. Type of Technology - _____
2. Instructional Strategy - _____

Phase IV: Preparation

List of materials or resources needed to accomplish integration:

1._____

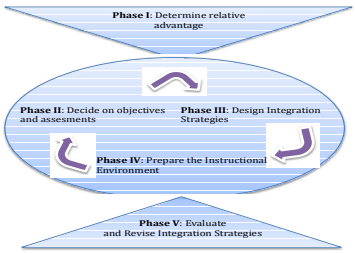
2._____

3._____

Phase V: Evaluation and Revision Strategy

1. Strengths - _____
2. Weaknesses - _____
3. Future Changes - _____

TIP Model: Roblyer, M.D. (2006). *Integrating educational technology into teaching (4th ed.)*. Upper Saddle River, NJ: Prentice Hall.



Appendix B: Observational Checklist & Guide

Classroom Observation 1

*Date & Time:*_____ *Grade Level:* _____

*Participant:*_____ *Class:*_____

Checklist:

SAMR Levels:

Evidence of …	Yes or No:	Notes:
Substitution		
Augmentation		
Modification		
Redefinition		

Impact of Mobile Learning:

Evidence of…	**Yes or No:**	**Notes:**
Academic Growth		
21st Century Skills		
Curriculum Design & Modification		
Engagement & Motivation		

Additional Notes & Personal Reflections/Behavior:

Appendix C: Interview Protocol with Sample Questions

Semi-structured Interview 1:

Date & Time: _____

Location: _____

Personal Information:

Participant Name: _____

Date of Hire:_____

Title:_____

Sample Questions: ***Guiding research is looking for strategies and support in participant descriptions of modifying curriculum using the SAMR model and the impact of 1:1 mobile learning at Thief River Falls School District.***

1. Tell me how you've modified your curriculum with 1:1 technology.

   (triangulate with observational and document data)

   a. Do you use the SAMR model as a framework for curricular design? Why or why not?
   b. How do you interpret the SAMR model?

2. Can you provide an example or experience that relates to technology *enhancing* teaching and learning in your classroom? ***(strategies)***

c. Does this represent substitution or augmented tasks?

d. Why did you choose this lesson/activity/etc.?

3. Can you provide an example or experience that relates to technology *transforming* teaching and learning in your classroom? ***(strategies)***

e. Does this represent modification or redefinition tasks?

f. Why did you choose this lesson/activity/etc.?

4. In what ways are you challenged to move up the ladder of the SAMR model in designing or modifying curriculum with technology? ***(Strategies and support)***

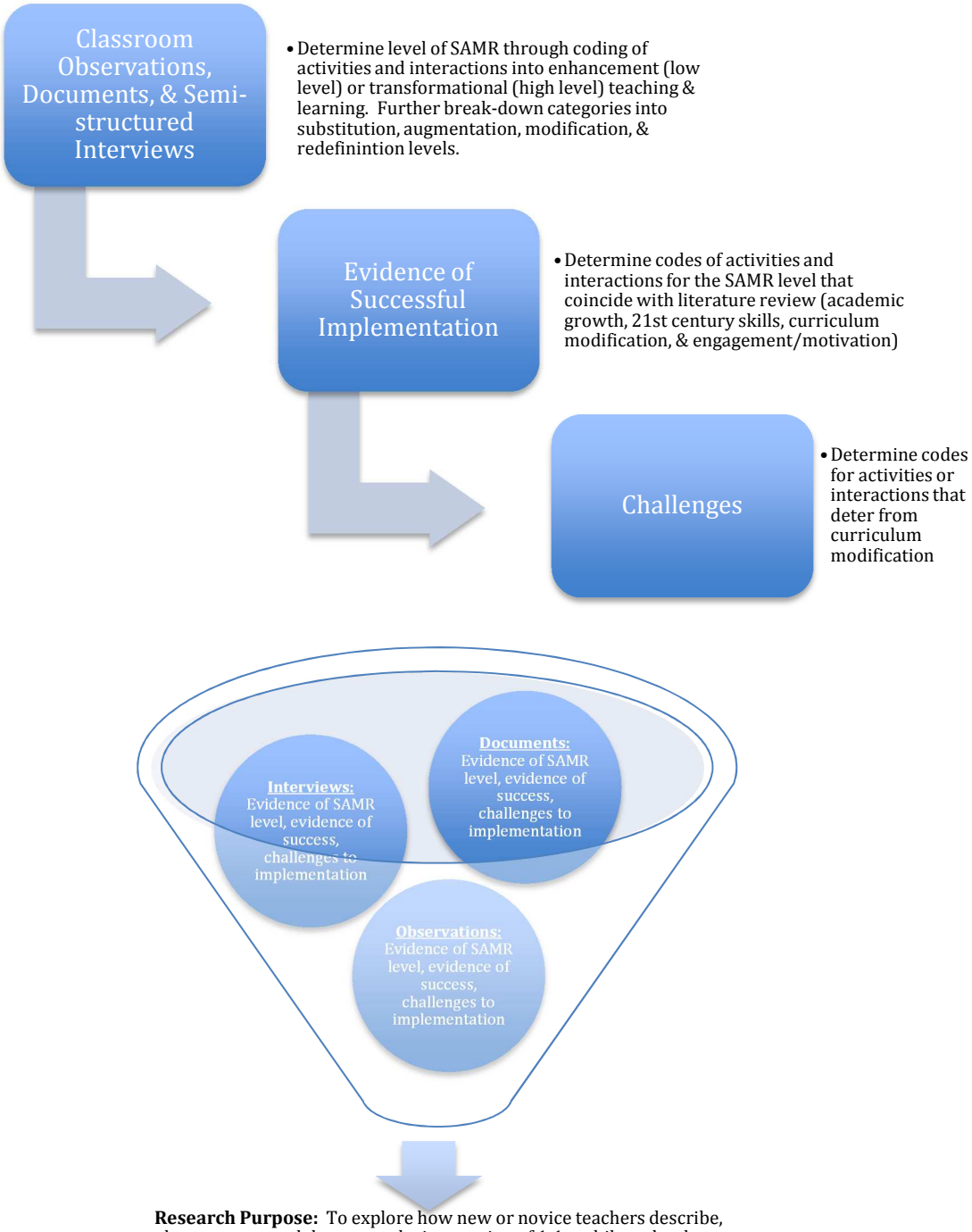
g. How has your role as a teacher changed?

h. How has the role of students changed?

i. How are students interacting with the technology and one another?

j. Does the technology support critical thinking or problem solving skills?

Appendix D: Data Analysis Model



Research Purpose: To explore how new or novice teachers describe, demonstrate, and document the integration of 1:1 mobile technology for teaching, learning, and curriculum modification and implementation in relation to the SAMR model.