Strategic Leadership in Technology Implementation: A Case Study on the Principal's Role in Classroom Technology

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AUTHORIZATION TO SUBMIT DISSERTATION

This dissertation of Greggory Russell, submitted for the degree of Doctor of Philosophy in Education with a major in Educational Leadership and titled "Strategic Leadership in Technology Implementation: A Case Study on the Principal's Role in Classroom Technology" has been reviewed in final form. Permission, as indicated by the signatures and dates given below, is now granted to submit final copies.

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I was taught early on as a schoolteacher that reflection is an integral part of the learning process. Reflection allows one to examine what they have learned and to embark on new learning. As I pause and reflect on this process, I realize this study would not have been possible without the help of several key individuals.

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DEDICATION

This paper is dedicated to my Lord and Savior Jesus Christ, whose sacrificial death on the cross atoned for my sins and appeased God's wrath. This simple biblical truth is what my life has been based on, and without the work of the Holy Spirit, I would not have been able to come to know the blessings of God's covenant laid out in the Holy Scriptures. Soli deo Gloria.

ABSTRACT

There is a high demand to incorporate technology into schools. Technology has infiltrated our society, and principals must learn to leverage technology to enhance learning while preparing students for a digital world. This case study examined principal leadership during a technology implementation in four public schools. The research was designed to investigate which specific actions principals take to promote technology in a school setting. McRel's change management process was used as a theoretical framework in which to view the leadership of the participants. Methodology for the study included qualitative interviews and observations. A quantitative survey was used to run a Principal Component Analysis. Findings indicate that principals who strategically create a vision, provide resources, develop strong lines of communication, and systematically manage the change process develop supportive cultures that promote innovation and student-centered learning. Factors that support technology included managing change and communicating to stakeholders. This study identified five leadership responsibilities which, when used in conjunction with McRel's second-order change process, enhanced a principal's effectiveness. Findings would indicate that strategic leadership, paired with a change management framework, can increase a principal's efficacy in implementing technology to promote a student-centered learning environment.

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Chapter I

Introduction

The school principal has a vast impact on the success of a school (Bouchama, 2012; Crum & Sherman, 2008; Forner, Bierlein-Palmer, & Reeves, 2012; James-Ward & Abuyen, 2015; Lemoine, Greer, McCormick, & Richardson, 2014; Marzano, Waters, & McNulty, 2005; Waters & Cameron, 2007). Research on educational leadership has shown the principal is second only to the classroom teacher when it comes to fostering student learning (Bouchama, 2012; Crum & Sherman, 2008; James-Ward & Abuyen, 2015). An effective principal can increase student achievement by one standard deviation (James-Ward & Abuyen, 2015; Marzano et al., 2005). Researchers such as Bouchama (2012), Crum and Sherman (2008), Forner et al. (2012), and Lemoine et al. (2014) assert the school principals must demonstrate instructional leadership qualities to make these improvements. However, this has not always been the case. For many decades, the principal was seen as a manager who administered the daily operations of the school and oversaw student discipline. In addition to these managerial skills, a school principal must now have instructional leadership qualities such as setting a vision, selecting and communicating instructional goals, monitoring student data, and leading teacher professional development (Ali, 2017; Bouchamma, 2012; Crum & Sherman, 2008; Davis & Leon, 2014; Forner et al., 2012; Fowler, 2014; James-Ward & Abuyen, 2015; Lemoine et al., 2014). To assist principals, the Mid-Continent Research for Educational Learning (McRel) has identified 21 leadership responsibilities that are correlated to improve student achievement. These leadership responsibilities provide principals with specific actions that can increase the effectiveness of a school (James-Ward & Abuyen, 2015; Marzano et al., 2005; Waters & Cameron, 2007). Leadership is a critical component in today's high-stakes accountability climate where schools must meet federal and state regulations (Crum & Sherman, 2008). Therefore, the principal's role has become increasingly

difficult and more complex (Davis & Leon, 2014; Crum & Sherman, 2008; Forner et al., 2012; Lemoine et al., 2014).

Further adding to this complexity is the requirement to increase the use of technology in schools. Technology has infused our society (Chua & Chua, 2017; Cojocaru & Cojocaru, 2014; Jones, Bunting, & de Vries, 2013; Sheppard & Brown, 2014). Twenty-first century digital tools such as the Internet and computers have become very common in American culture. Rideout and Katz (2016) report that 94% of families have Internet access through a home or cellular phone. This access has extended to schools as well. Internet availability in schools has increased to 96%, and over 97% of teachers have access to a computer in their classroom (Delgado, Wardlow, McKnight, & O'Malley, 2015). Sheppard and Brown (2012) claim digital media has "become a routine part of how school-age students live, socialize, play, work, and learn" (p. 84). Educators, researchers, and policy makers have promoted classroom technology as a way to support learning and improve student achievement (Anthony, 2012; Friedman & Heafner, 2007; Hadjithoma-Garska, 2011; Levin & Schrum, 2013; Maniger, 2006; Raman, Don, & Kasim, 2014). Computers are now common in schools, and the Internet is seen as an integral part of a student's learning environment (Chua & Chua, 2017; Delgado et al., 2015; Friedman & Heafner, 2007; Schrum & Glassett, 2006). Despite the influx of technology in schools, the classroom experience of students has not changed. The use of technology in the classroom is sporadic, and many students are required to learn through teacher-directed instructional practices. These methods require students to recall information and recite the material on a standardized assessment (Anthony, 2012; Delgado et al., 2015; Friedman & Heafner, 2007; Horn & Staker, 2015; Maniger, 2006; Schrum & Glassett, 2006; Sheppard & Brown, 2014). This form of teaching has urged educational reformers to use technology as a way to support student-centered learning (Bekele, 2010; Friedman & Heafner, 2007; Jones et al., 2013; Levin & Schrum, 2013; Maniger, 2006; Sheppard & Brown, 2014). Student-centered learning allows students to customize

their learning to enhance their skills, strengths, and interests (Christensen, Horn, & Johnson, 2011; Friedman & Heafner, 2007; Levin & Schrum, 2013; Maniger, 2006). Principals play a key role in helping foster this shift in instruction (Anthony, 2012; Hadjithoma-Garska, 2011; Levin & Schrum, 2013; Raman et al., 2014; Sheppard & Brown, 2014). This shift in instruction is enhanced when a vision is developed to define how technology will enrich the classroom experience. Likewise, principals need to provide professional development that not only teaches educators about the technology, but also demonstrates how to shift their pedagogical approaches to a more student-centered learning environment (Friedman & Heafner, 2007; Jones et al., 2013; Levin & Schrum, 2013; Maniger, 2006; Sheppard & Brown, 2014; Topper & Lancaster, 2013).

Statement of the Problem

Despite the best efforts of educators, the use of technology in schools remains inconsistent (Anthony, 2012; Delgado et al., 2015; Friedman & Heafner, 2007; Horn & Staker, 2015; Maniger, 2006; Schrum & Glassett, 2006; Sheppard & Brown, 2014). Means (2010) reports both teachers and students use technology more frequently outside of school than in class. Research claims less than 35% of teachers who received funding to enhance education through technology have integrated technology into their weekly instruction (Anthony, 2012). Degaldo et al. (2015) reports teachers typically use technology for administrative purposes rather than for classroom instruction. The research also suggests that many school districts have difficulty funding and providing equitable learning environments for students. School districts struggle to provide up-to-date technology in classrooms due to the rapid speed at which technology changes in the commercial market (Delgado et al., 2015; Levin & Schrum, 2013; Schrum & Glassett, 2006; Sheppard & Brown, 2014). Despite their best efforts, funding discrepancies lead to inequality in the classroom (Delgado et al., 2015; Schrum & Glassett, 2006; Sheppard & Brown, 2014).

To compound these problems, many of our school systems remain in a factory-based approach to learning. In order to meet the demands of a growing population, American schools developed an efficiency model based on the Industrial Revolution (Christensen et al., 2011; Enăchescu & Damasaru, 2013; Horn & Staker, 2015). This model led to a standardization of learning where teachers deliver "the same subjects, in the same way, and at the same pace" (Horn & Staker, 2015, p. 6). This model of instruction has become entrenched in our education system and has created a barrier to change to a more student-centered approach to learning. Therefore, school leaders must understand the context of the current educational environment and apply strategic leadership to increase pedagogy that will provide students with the skills they need to better prepare for a digital workforce (Christensen et al., 2011; Enăchescu & Damasaru, 2013; Horn & Staker, 2015; Sheppard & Brown, 2014; Wagner & Compton, 2012).

Theoretical Framework

To further understand the difficulties of leveraging technology to prepare students for a digital society, a theoretical framework from McRel (2007) will be used to frame this problem in the context of organizational change management. Change management is the foundation on which all improvement efforts are built (Weston & Bain, 2009). Without successful change management, the likelihood of a principal effectively harnessing technology to improve student outcomes is minute. In fact, change management is considered the primary distinguisher between a building manager, who runs the day- to-day operations of a school, and an instructional leader, who embraces complex problems with confidence, systematically guiding his or her staff toward instructional improvements (Goodwin, Cameron, & Hein, 2015; Fullan, 2001; Tomal, Schilling, & Trybus, 2013).

To better understand change management in a school setting, McRel has developed a change management theory based on the magnitude of change that is to appear within a school. McRel has also divided change management into four non-linear phases that are likely to occur during the change

process (Goodwin et al., 2015; Waters & Cameron, 2007). Waters and Cameron (2007) base their framework on two primary premises. First, a principal must understand the nature of change, and second, the principal must understand the implications of the change on those individuals who are affected by the change initiative. If a principal does not understand the ramifications that change can have on a teaching staff, their leadership effectiveness will be greatly diminished. Thus, Cameron and Waters (2007) have simplified change into two primary categories based on how stakeholders may perceive the change initiative. These two categories are first-order change and second-order change.

First-order change is seen as a natural progression toward one's ideals and beliefs. Goodwin et al. (2015) states, "If you view a change as a relatively straightforward step, it is likely first-order change" (p. 39). However, if a change initiative requires a drastic change in one's ideals and beliefs or requires one to gain a new mindset or skill, it is likely a second-order change. Second-order change may require new beliefs, new skills, and a new perspective in order to achieve the change initiative (Goodwin et al., 2015; Waters & Cameron, 2007).

Teaching in a student-centered learning environment requires new skills. It requires a teacher to shift their mindset and instructional practices. The teacher must learn to change their instructional practice from a traditional lecture style, in which information is delivered to students, to a constructivist learning environment, where students are encouraged to discover knowledge from multiple sources including their teacher, peers, community, and through experiences (Alijani, Kwun, & Yu, 2014; Deed et al., 2014; Liu et al., 2014). It also requires teachers and students to use technology to enhance these learning experiences. Technology provides vast amounts of information but also promotes collaborative thinking. Liu et al. (2014) states, "Studies have shown that mobile (technology) learning provided a distinct opportunity for collaboration among students and teachers while also supporting individual mean making" (p. 361).

Teaching and learning in the 21st century will require second order change. It is important that school principals understand how to lead this transformation using McRel's four phases of second-order change. The phases of second-order change include

- creating demand for the change,
- implementing change,
- managing personal transitions, and
- monitoring and evaluating the change

(Goodwin et al., 2015; Waters & Cameron, 2007). These four stages will be used throughout this study to provide a theoretical framework to guide further insights into the research questions.

Background to the Study

To better understand how principals can prepare students for a digital economy, it is important to recognize the context in which American schools currently exist. The American education system has been under constant change since its inception over 240 years ago. American schools have continually been influenced by the society in which they serve. As society has changed, so have American schools (Fife, 2016; Fowler, 2014; Rury, 2013; Webb, 2006). The most recent change occurred during the Industrial Revolution. As the Industrial Revolution took hold, American society required skilled laborers who could work in the many factories that mass-produced goods for commerce (Christensen et al., 2011; Enăchescu & Damasaru, 2013; Horn & Staker, 2015; Rury, 2013). Schools began to reflect the organization structure of a factory; the curriculum was divided into subjects and students were organized into classes based on age. This allowed schools to educate large masses of students and progress them through a public education system based on efficiency (Christensen et al., 2011; Enăchescu & Damasaru, 2013; Horn & Staker, 2015; Rury, 2013).

Later in the 20th Century, after the World Wars, America became a world power (Rury, 2013). After the launch of Sputnik in the late 1950's, American schools began to stress technology and

innovation to compete with the Soviet Union. Subjects such as science, engineering, and math took on more significance, and the development of the computer in the 1970's began to influence schools (Cojocaru & Cojocaru, 2014; Jones et al., 2013; Rury, 2013). It was not until the 1990's, when the Internet arrived, that technology advanced to where educators could begin to use it to expand student learning. The Internet provided a limitless amount of information to students, and it was during this time that educators realized the power of technology to increase student knowledge (Anthony, 2012; Delgado et al., 2015; Friedman & Haefner, 2007; Hadjithoma-Garska, 2011).

However, expanding student learning through technology requires more than the Internet; it also requires an effective school. Effective schools are led by effective leaders who have an impact on student achievement. This is accomplished when a principal becomes an instructional leader (Garza et al., 2014; Marzano et al., Tschannen-Moran & Gareis, 2014; Waters & Cameron, 2007). Instructional leadership is a rather new responsibility; traditionally principals have been in a managerial role. The traditional role of a principal required the administrator to handle school budgets, build public relations, manage employees, organize the school, and provide student discipline and oversight (Lemoine et al., 2014). However, in order to increase student achievement, principals must become transformational leaders who adopt new innovations and philosophies to guide schools in the improvement of teaching and learning (Liu et al., 2013; Goodwin, 2011; Marzano et al., 2005; Waters & Cameron, 2007).

To fully change teaching and learning to meet the needs of the 21st century, principals must utilize technology as a learning tool. This is an important aspect of principal leadership. Arokiasamy, Abdullah, and Ismail (2014) note, "In the age of information, principals must be able to integrate ICT into their daily practice and to provide consistent and positive leadership for technology use in the teaching-learning process" (p. 28). Effective technology leaders have a clear vision for how the technology will support teaching and learning in the school. Identifying a common purpose for

technology and learning helps teachers see how technology will support classroom instruction. This purpose also assists the teacher's ideals and beliefs about teaching and learning and promotes transformational leadership within the school (Arokiasamy et al., 2014; Davis & Leon, 2014, Liu, 2013; Means, 2012; Tropper & Lancaster, 2013).

Research Questions

In light of the complex demands of being a principal and the challenges of technology implementation in a factory-based model of schooling, very little research exists to help the building principal meet the demands of these challenges. While researchers like Anthony (2012), Christensen et al., (2011), Horn and Staker (2015), Sheppard and Brown (2012), and Topper and Lancaster (2013) suggest recommendations on how to address these problems, none of the literature provides what specific leadership responsibilities are needed to be successful in overcoming these difficulties. Therefore, the following questions were designed to deliver exploration and insights into these challenges.

1) What strategic leadership responsibilities do education leaders perform to promote a school improvement initiative?
2) What is the responsibility of the principal in implementing technology in a school?
3) Which of McRel's 21 Leadership Responsibilities are most influential on implementing innovative practices and technology in a school?

Description of Terms

Clear language is important to communicate ideas. Therefore, to avoid confusion, the following terms will be used to clearly understand the topic and research questions within this dissertation.

American Education System. Free public education structure for all American citizens (Fife, 2016).

American Revolution. An 18th century war between the British North American Colonies and Britain, which resulted in the formation of the United States of America (Rury, 2013).

Blended Learning. A formal education program in which a student learns in part through online learning with some element of student control (Horn & Staker, 2015).

Change Agent. A principal leadership responsibility that challenges the status quo and current practices of the school (Waters & Cameron, 2007).

Effective Leadership. An administrator who can determine the need for change, motivate staff, generate a vision for learning, and cause employees to change their practice (Alunay et al., 2012).

Factory Model of Schooling. A system of school that efficiently educates large numbers of students through a standardized way of teaching and testing (Horn & Staker, 2015).

First-Order Change. A change initiative that is seen as an extension of current practice and, therefore, does not require any new ideals & beliefs or skills (Waters & Cameron, 2007).

Flipped Classroom. An approach to learning in which students participate in online learning off-site from a traditional school (Horn & Staker, 2015).

Globalization. The mobilization of people and trading of goods around the world (Rury, 2013).

High Accountability. Federal government accountability systems imposed on schools that are designed to raise student achievement and improve teaching pedagogy in schools (Crum & Sherman, 2008).

Online Learning. An education system or approach that delivers instruction and content through the Internet (Horn & Staker, 2015).

Ideals & Beliefs. A principal leadership responsibility on professional beliefs about schools, teaching and learning, and the purpose of education (Waters & Cameron, 2007).

Immigration. The vast movement of Europeans into American Society during the 19th century (Rury, 2012).

Innovation. The use of technology to promote a culture of inquiry and learning in 21st century public schools (Wagner & Compton, 2012).

Second-Order Change. A break from past practice that may require new ideals & beliefs, skills, or philosophy (Waters & Cameron, 2007).

Student-Centered Learning Environment. A vision for teaching and learning that allows students to customize their learning to enhance their skills, strengths, and interests (Christensen, Horn, & Johnson, 2011).

Technology Integration. The integration of technology into classroom instruction in order to promote blended and personalized learning (Horn & Staker, 2015).

Significance of the Study

This study is significant because there is a need to develop strong leadership that promotes effective pedagogy with technology. The school principal has a profound impact on student achievement (Bouchama, 2012; Crum & Sherman, 2008; Goodwin, 2011; James-Ward & Abuyen 2015; Waters & Cameron, 2007). Marzano et al. (2005) explains that principals can increase student achievement by 22 percentile points. Waters and Cameron (2007) noted that principals can improve student achievement by over one standard deviation. This research highlights the importance of effective school leadership on student achievement. Thus, school principals must be successful if students are to receive the best possible education.

Instructional leadership is difficult and complex; however, it can be learned. Goodwin et al. (2015) wrote, “Research has proven that certain actions and behaviors have a positive effect on student achievement, and all principals can learn these actions and behaviors and how to implement them with efficacy” (p. 1). The implications of this study can provide principals with specific

leadership responsibilities that can guide their work. These specific leadership responsibilities can then be broken down into practical actions and behaviors that can be performed on a daily basis. This practical application can serve as a reflection tool, allowing a principal to reflect on their practice to ensure their work is effective in the day-to-day running of a school.

Lastly, the impact of this study can further inform the educational community. The complexity of education is well documented (Davis & Leon, 2014; Crum & Sherman, 2008; Forner et al., 2012; Lemoine et al., 2014; Tschannen-Moran & Gareis, 2014). This study can add to the existing knowledge to combat the many pressures and concerns educational leaders face. If principals are to be effective leaders, they need practical information that can guide their thinking and equip them for the responsibility of leading students and teachers in the 21st century.

Overview of Research Methods

The research methodology used in this study was based on an ethnographic case study design. According to Gerring (2004), case studies provide a way to understand a phenomenon or element within the social context of the participants. Creswell (2015) supports this description, stating that case studies describe a way to study a group to better understand a larger issue. Case studies also allow a researcher to understand how a participant, or unit, changes over time, and to determine how those changes can be applied to a broader audience (Gerring, 2004). Therefore, a case study was used to examine public school principals, their leadership, and how they directed technology implementations in their schools. The principals varied on several criteria:

- Elementary school
- Middle school
- High school
- Years of experience
- District enrollment

- Involved in a technology implementation in their school
- Focused on student-centered learning environment

In order to better understand the leadership responsibilities of these principals and to see how they used their leadership responsibilities to further their technology implementation, three primary methodologies were used. First, face-to-face, semi-structured interviews were performed. Marshall and Rossman (2016) claim interviews are a flexible methodology that can be used in a variety of studies. Furthermore, Creswell (2015) notes that interviews provide detailed information that may not be easily observed.

Next, school observations were conducted. Observation is a process that allows a researcher to glean first-hand data within the social context of a school (Creswell, 2015; Marshall & Rossman, 2016). Observations of the school principals and their teaching staff were used to gain further insights into how the principals led their staffs through second-order change and furthered their vision of teaching and learning with digital tools.

Finally, a web-based survey was used to determine underlying factors that may influence the principal's leadership. This data was triangulated with the interviews and the observations. Web-based survey questionnaires can provide a unique set of multi-media data to researchers and can be used in qualitative methodologies (Marshall & Rossman, 2016).

Chapter II

The Literature Review

Introduction

The demands of education have significantly increased over the past two decades (Bouchamma, 2012; Crum & Sherman, 2008; Forner et al., 2012; James-Ward & Abuyan 2015; Lemoine et al., 2014; Maniger 2006). This new accountability has created a demand for skilled leaders that can improve student achievement and meet the needs of a complex society (Bouchamma, 2012; Crum & Sherman, 2008; Davis & Leon, 2014; Forner et al., 2012; Lemoine et al., 2014). The complexities of society are vast and include reduced funding for education, deterioration of the traditional home, higher rates of poverty, and a more diverse student population (Davis & Leon, 2014; Forner et al., 2012; Lemoine et al., 2014). Included in this complexity is a growing consensus that students need to be prepared to meet the needs of a 21st-century digital economy where knowledgeable workers can collaborate, innovate, and persevere through difficult problems (Enăchescu & Damasaru, 2013; Friedman & Haefner, 2007; Jones et al., 2013; Levin & Schrum, 2013; Sheppard & Brown, 2014). This digital economy has required schools to invest heavily into technology, yet technology's use and effectiveness is inconsistent. Thus, principals must use strategic leadership to implement technology and ensure students meet the challenges of the 21st century (Anthony, 2012; Delgado et al., 2015; Friedman & Heafner, 2007; Goodwin, 2011; Hadjithoma-Garska, 2011; Horn & Staker, 2015; Maniger, 2006; Raman et al., 2014; Schrum & Glassett, 2006; Sheppard & Brown, 2014; Tropper & Lancaster, 2013).

The review of literature will focus on four distinct sections. The first section provides a historical context of the American education system. Section two covers how technology has evolved within the American education system. This leads into an analysis of the school principal's role in creating effective schools. The final segment describes the effect principals can have on implementing

technology into the schools and details how principals can successfully lead a technology implementation.

Theoretical Framework

The theoretical framework for this study is McRel's second-order change management process. McRel's change management process is based on a meta-analysis of school level leadership (Goodwin et al., 2015). This meta-analysis examined over 5,000 studies on principal leadership. From these 5,000 studies, 69 were selected based on their design, rigor, and reliability. From this work several conclusions were drawn.

First, principals have a profound impact on student achievement. For years there has been much debate about whether principals have an actual impact on the learning that takes place in a classroom (Goodwin et al., 2015; Marzano et al., 2005; Waters & Cameron, 2007). McRel's work has helped solidify the role of the administrator as an instructional leader.

Second, the research pinpointed 21 specific leadership responsibilities that can improve student learning. These leadership responsibilities quantify the areas in which principals should focus their time and energy to maximize their abilities (Goodwin et al., 2015; Marzano et al., 2005; Waters & Cameron, 2007).

Third, not all strong leaders had a positive effect on student achievement (Goodwin et al., 2015; Marzano et al., 2005; James-Ward & Abuyan, 2015; Waters & Cameron, 2007). This final result led to further research indicating that even when school leaders focus their leadership on the right responsibilities, it may not improve student learning. Student achievement increases only when principals understand the focus and magnitude of the change on stakeholders (Waters & Cameron, 2007). To assist a principal's understanding of the magnitude of change, McRel developed a framework to guide principals through a change initiative (see Figure 1). The McRel Change

Framework is a non-linear model designed to provide the school principal with guidance in how to systematically manage change (Waters & Cameron, 2007).

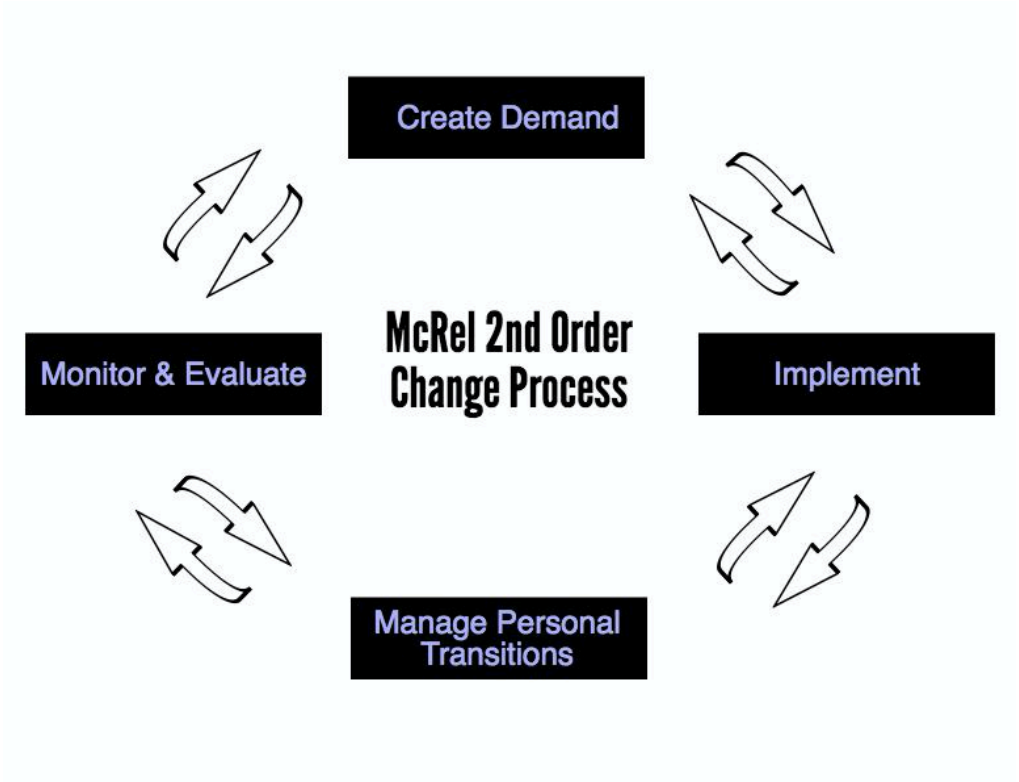

Figure 1. McRel's Second Order Change Process

The McRel change process has four phases: Create Demand, Implement, Manage Personal Transitions, and Monitor & Evaluate. Each of these phases are reoccurring and perpetual. The change process is often complex and ever-changing (Waters & Cameron, 2007). Therefore, successful change management requires a leader to have a deep understanding of both the change process and the organization in which they lead. This knowledge, combined with McRel's 21 leadership responsibilities, can help a principal strategically lead a school to maximize their school improvement initiatives (Waters & Cameron, 2007).

History of American Education

The earliest history of American education dates back to colonial America, which stretches from the 17th century to the American Revolution (Kober, 2007; Rury, 2013). During this period, education, culture and religion were intertwined. In the 17th century, school attendance was rare, and men were the primary students. They studied a curriculum of Latin, Greek, theology, grammar, spelling, and science (Rury, 2013). As the American Colonies' economies began to expand and creative thinking of the Enlightenment Period took hold in colonial society, the role of education became more important (Rury, 2013; Webb, 2006). Innovative thinkers like John Locke spread a philosophy that stated man had various inalienable rights given to him by God (Webb, 2006). These rights, which consisted of life, liberty, and the pursuit of happiness, emphasized the freedom of the individual. Freedom began to challenge societal norms and was the foundation of the American Revolution (Webb, 2006).

After the American Revolution, the newly formed United States was founded on democratic principles that granted citizens representation in their government (Rury, 2013). Revolutionary leaders such as Ben Franklin, James Madison, and Thomas Jefferson realized the new republic would need an educated populace to support its democratic foundation (Rury, 2013; Webb, 2006). Prominent advocates like Benjamin Rush began to call for all children to become well-versed in democratic ideals. These new societal requirements required America to form a public education system that would grow and expand into the 19th century.

As in the previous century, the needs of the society would drive the American education system (Kober, 2007; Rury, 2013). In the early 1800s, the United States was a rural country consisting of a widely-dispersed population located around small towns and farms. The United States economy was primarily agricultural, however, by the mid-1850s, manufacturing had grown from 5% of the economy

to over 50%. This incredible growth in manufacturing produced great wealth for the newly formed country and had a drastic effect on American schools (Rury, 2013).

Early in the century, American schools consisted primarily of one-room schoolhouses where student attendance varied by local growing season. It was during these early decades that school attendance grew, and by 1830 the United States was second only to Germany in school enrollment (Rury, 2013). Schools were run by the local community, which hired the teachers. The teachers were typically men studying for the clergy (Webb, 2006). The men earned minimal salaries and taught a curriculum that focused on reading and mathematics (Rury, 2013).

Later in the century, a great divide began to occur in the country. Immigration increased in America, and large cities began to take form primarily in the Northeast, where New York, Boston, Philadelphia, Chicago, Pittsburgh, and Cincinnati grew rapidly. Innovations such as the steam engine, electricity, and the modern factory supplied these cities economies (Rury, 2013; Webb, 2006). The rise of manufacturing brought employment, and a great migration occurred as families began to leave their small farming communities and live in urban areas. This massive rise in urban populations forced school reformers to devise a system that could teach large amounts of students in an efficient way (Christensen et al., 2011; Horn & Staker, 2015; Rury, 2013). Reformers also proposed a way to educate older students, and the rise of the first secondary schools began to take form, primarily for the wealthy.

By the end of the century, over half a million students attended high school. This increase in the student population forced many schools to become more efficient in how they taught students. Therefore, by the end of the 19th century, many schools resembled factories. These schools divided students into classrooms based on age while bells and schedules efficiently moved students through a general curriculum that is similar to what is seen today (Christensen et al., 2011; Horn & Staker, 2015; Kober, 2007; Rury 2013).

In the 20th century, the factory model of education would grow and expand (Christensen et al., 2011; Horn & Staker, 2015; Rury 2013). School reformers began to question the instructional practices of the day, which revolved around rote memorization and recitation (Horn & Staker, 2015; Rury, 2013). One of the first educational reformers of the 20th century was John Dewey. Dewey believed students could learn from experiences, and his beliefs would lead to a new approach in pedagogy. Other reformers like Francis Parker and Jane Addams would continue to reform schools as schools began to explore the idea of differentiation, or meeting the needs of individual students. Differentiation would lead to the modern high school where students would begin to choose various courses of study (Rury, 2013).

Students started to learn different skills from classes like home economics, shop, and auto mechanics, which allowed them to graduate and immediately enter the workforce (Christensen et al., 2011; Enăchescu & Damasaru, 2013; Horn & Staker; 2015; Rury, 2013). This practice continued into the latter half of the 20th century when schools began to be influenced by social change yet again (Christensen et al., 2015; Fowler, 2014; Kober, 2007; Rury, 2013). Rury (2013) states the battles of segregation and the rise of a youth culture, which was fueled by popular music and movies, began to influence society as a whole. Later globalization began with the launch of Sputnik, and the oil embargoes of the 1970's would further pressure American schools to compete in a world market (Rury, 2013). In 1983, the federal government released *A Nation at Risk*, which reported American schools were falling behind global competitors (Christensen et al., 2011; Fowler, 2014; Rury, 2013). This report moved the American education system into a standards-based accountability system. In 2002, the No Child Left Behind Act increased the accountability of schools, requiring schools to test students on standardized assessments in order to pass benchmarks to meet federal regulations (Crum & Sherman, 2008; Fowler, 2014). Recently, the government has approved new legislation called the

Every Student Succeeds Act, otherwise known as ESSA, which continues strong federal government oversight (Fennell, 2016).

When viewed through the theoretical lens of McRel's second-order change process, societal factors continue to create a demand for change on the American education system. Creating demand can be defined when a driving force propels a change initiative (Goodwin et al., 2015; Waters & Cameron, 2007). Factors such as high poverty, mobility, drug abuse, crime rates, and other societal concerns continue to affect our education system (Crum & Sherman, 2008; Lemoine et al., 2014). The American education system is under enormous pressure to deliver both economic and cultural results. To meet the needs of today's society, American schools must reduce unemployment, eliminate poverty, preserve a democratic electorate, and keep the United States competitive in the global market (Christensen et al., 2011; Enăchescu & Damasaru, 2013). Therefore, American schools must break from traditional teaching practices and move to a 21st century learning environment to promote the skills needed to be successful in the future economy (Enăchescu & Damasaru, 2013; Friedman & Haefner, 2007; Jones et al., 2013; Horn & Staker, 2015; Levin & Schrum, 2013; Sheppard & Brown, 2014).

Throughout the history of the American education system, society has created demand on public schools. Today, this demand is fueled by cultural and economic pressures to produce citizens that can uphold American ideals and compete in a global economy (Christensen et al., 2011; Horn & Staker, 2015; Sheppard & Brown, 2014; Rury, 2013). School principals must understand these factors to create demand in their schools. A school principal who understands change and leadership can use these outside forces to propel a change initiative within their school (Marzano et al., 2005; Waters & Cameron, 2007). Since schools are highly reflective of the community and society in which they serve, a school principal can challenge instructional practices that do not meet the needs of a digital society. In essence, a principal can provide a defense for why a school must incorporate a student-

centered learning environment and incorporate digital tools into their curriculum and instruction. This demand can be supported by several leadership responsibilities, such as challenging the teaching faculty's ideals and beliefs on the importance and purpose of the school. A principal can also create demand by providing intellectual stimulation and increasing the staff's knowledge on the most current instructional practices. Lastly, a school leader can create change by being a change agent and challenging the status quo (Goodwin et al., 2015; Marzano et al., 2005, Waters & Cameron, 2007).

Technology in the American Education System

The learning environment in American schools is highly influenced by the demands of modern society (Crum & Sherman, 2008; Lemoine et al., 2014; Schrum & Glassett, 2006). American schools face the strains of an ever-increasing digital world, which has prompted educators and policy makers to promote technology into American schools (Anthony, 2011; Enăchescu & Damasaru, 2013; Jones et al., 2013; Sheppard & Brown, 2014). American schooling has used technology since the 1870's. However, it was not until the 1980's, when Apple released the first personal computer, that technology was seen as a way to increase student achievement (Reed, 2007; Schrum & Glassett, 2006; Tropper & Lancaster, 2013). Technology became a subject in American schools and was added to an already crowded science curriculum. (Jones et al., 2011; Reed, 2007; Schrum & Glassett, 2006). In the 1990's, personal computers and the rise of the Internet provided an unlimited amount of information to students. Educators realized the potential for student learning, and school districts invested heavily into technology as a way to increase student achievement (Anthony, 2012; Delgado et al., 2015; Friedman & Haefner, 2007; Hadjithoma-Garska, 2011). In the early 2000's, technology increased in schools as more districts began to adopt 1:1 initiatives (Tropper & Lancaster, 2013). Today, access to technology in schools has continued to increase with a student to technology ratio of 1.7: 1. Internet access in schools has increased to 96%, and over 97% of teachers have access to a computer (Delgado et al., 2015). Ample access to technology has transformed classrooms (Christensen et al., 2011;

Delgado et al., 2015, Horn & Staker, 2015). Classes now feature a variety of instructional approaches from traditional face-to-face teaching to blended learning, flipped classrooms, and online learning (Christensen et al., 2011; Delgado et al., 2015; Horn & Staker, 2015).

To continue this shift in instructional practices, the second phase in McRel's change process can be used to understand how to implement technology into the classroom (Waters & Cameron, 2007; Goodwin et al., 2015). Technology is now ubiquitous, and its filtration into American schools is common. School principals must understand how to implement technology to leverage student learning (Aslan & Reiguluth, 2012; Delgado et al., 2015; Christensen et al., 2015; Horn & Staker, 2015). The implementation of new classroom practices is supported when principals optimize and demonstrate their knowledge of curriculum, instruction, and assessment (Goodwin et al., 2015; Waters & Cameron, 2007).

Optimizing is accomplished when a principal inspires teachers to teach in new and innovative ways (Goodwin et al., 2015; Waters & Cameron, 2007). This can be accomplished by developing a strong vision for innovation, building a collaborative culture that supports the implementation of new teaching and learning practices, and clearly communicating how the technology will support new pedagogy (Aslan & Reiguluth, 2012; Anthony, 2012; Delgado et al., 2015; Hadjithoma-Garsks, 2011).

Knowledge of curriculum, instruction, and assessment is achieved when principals become knowledgeable about current best practices (Waters & Cameron, 2007). Studies assert that technology can increase student engagement, promote deeper levels of thinking through project-based learning, and increase student's communication skills. Principals must use research to guide instruction in the classroom and to educate teachers on new teaching methods (Aslan & Reiguluth, 2012; Friedman & Haefner, 2007; Izadpanah & Alavi, 2016).

Despite the research, teaching pedagogy remains unchanged (Christensen et al., 2015; Delgado et al., 2015; Enăchescu & Damasaru, 2013; Schrum & Glassett, 2006). Classroom teachers often

require students to recall facts of information by assessing their memory on classroom exams. This style of teaching results in a misalignment between "what and how we teach students in schools and what and how they operate within society" (Aslan & Reiguluth, 2012, p. 19).

However, society has begun to force schools into a new era of teaching. The Internet brought an infinite amount of knowledge into schools, and teachers realized students would need to be able to decipher the information in order to use it effectively (Anthony, 2012; Delgado et al., 2015; Friedman & Heafner, 2007; Horn & Staker, 2015; Maniger, 2006; Schrum & Glassett, 2006; Sheppard & Brown, 2014). The Common Core standards enhanced these skills, and soon classroom instruction began to focus on a constructivist approach to learning which uses technology as a way to create a student-centered learning environment (Horn & Staker, 2015; Jones et al., 2011; Reed, 2007; Schrum & Glassett, 2006; Sheppard & Brown, 2014). This type of learning encourages students to make connections between new concepts and past experiences, evaluate information, and generate new knowledge. This form of teaching encourages the use of technology and increases its effectiveness (Christensen et al., 2011; Horn & Staker, 2015; Jones, 2011; Schrum & Glassett, 2006; Tropper & Lancaster, 2013). The use of constructivist teaching and technology allows educators to build 21st century skills in students. Twenty-first-century skills require students to research, analyze and synthesize information, collaborate with peers, communicate their findings, evaluate the work of others, and persevere through problems. These skills engage students in the learning process, increase their retention, and prepare them for a digital world (Christensen et al., 2011; Friedman & Heafner, 2007; Horn & Staker, 2011; Levin & Schrum, 2013; Maniger, 2006; Sheppard & Brown, 2014; Tropper & Lancaster, 2013). However, technology has not always been effective in preparing students for the future. Many challenges limit the success of technology in American schools (Delgado et al., 2015; Levin & Schrum, 2013; Schrum & Glassett, 2006; Sheppard & Brown, 2014).

Since the late 1990's, spending on education technology has significantly increased (Delgado et al., 2015; Goodwin, 2011; Horn & Staker, 2015). In the past few decades, the United States Government has spent over $100 billion on computers, and recent profits by education companies have topped $2.4 billion, which is a 6.4% increase in the last six years (Christensen et al., 2015; Delgado et al., 2015). Despite the increase, insufficient funding has been a major problem hampering technology implementation in schools (Jones et al., 2011; Sheppard & Brown, 2014; Schrum & Glassett, 2006; Tropper & Lancaster, 2013). Delgado et al., (2015) reports resources are the primary hindrance to technology implementation. A lack of resources often leads to inequality among schools. Funding also tends to be inconsistent with many school districts depending on private or federal funding to implement technology initiatives. However, Sheppard and Brown (2014) claim school districts should build funding into their operation budgets to see long-term effects. Lack of financing also has an impact on teacher professional development (Sheppard & Brown, 2014; Schrum & Glasset, 2006).

Professional development is one of the best indicators to successful technology implementation (Jones et al., 2011; Sheppard & Brown, 2014; Topper & Lancaster, 2013). Jones et al. (2011) indicates that professional development is critical to teachers who must teach a consistently changing curriculum designed to meet the needs of the 21st century. The most effective professional development is fostered through a professional learning environment. This learning environment promotes a collaborative culture where teachers can learn from their colleagues. This collective culture is seen as essential to the success of technology implementation (Anthony, 2011; Jones et al., 2011). Sheppard and Brown (2014) suggest teachers should take a lead role in supporting their colleagues. This role can take on a variety of forms, from formal professional development sessions to informal conversations about how best to effectively change lessons and pedagogy (Sheppard & Brown, 2014).

Despite the benefits of professional development, its implementation is often inconsistent and sporadic. Professional development is also costly, and many schools and districts tend to do training after school, during one-time workshops, and over the summer (Arokiasamy et al., 2014; Sheppard & Brown, 2014; Tropper & Lancaster, 2013). The focus of the professional development is also important. Typically, professional development focuses on how to use the technology rather than how to leverage the technology to improve student learning. This low level of use does not increase the teacher's pedagogical skill and knowledge. Therefore, professional development should focus on lesson enhancement and pedagogical change rather than just the intricacies of learning how to use the technology devices or software (Afshari et al., 2010; Arokiasamy et al., 2014; Flanagan & Jacobsen, 2003; Sheppard & Brown, 2014; Tropper & Lancaster, 2013).

The effectiveness of technology in schools continues to be mixed. Research affirms that technology can have a positive impact on American schools (Delgado et al., 2015; Friedman & Heafner, 2007; Maniger, 2006; Reed, 2007). A recent meta-analysis found students in blended learning classrooms score as well or better than traditional face-to-face classrooms on state assessments (Delgado et al., 2015). Further, flipped classrooms have shown growth with 71% of respondents displaying improved grades. In New York, flipped classrooms have shown an increase in the state math assessment and ACT scores (Delgado et al., 2015). Technology also increases student engagement, improves student decision-making, increases participation, changes teacher beliefs on learning, and improves teacher pedagogy (Friedman & Heafner, 2007; Maniger, 2006; Reed, 2007; Tropper & Lancaster, 2013).

However, other studies maintain student achievement results remain inconsistent (Anthony, 2012; Friedman & Heafner, 2007; Schrum & Glassett, 2006; Sheppard & Brown, 2014; Watson, 2001). Goodwin (2011) asserts findings from Maine's statewide program found little effect on student achievement. Another study in the state of Texas found that students who used technology

consistently in the daily classroom work did not perform better than their peers on state assessments. In fact, students who used less technology scored higher on their state exam (Kuyatt, Holland, & Jones, 2015). Kuyatt et al. (2015) indicates these results may be because of the fidelity in which the teachers did or did not implement the intended curriculum. Furthermore, other findings report no significant difference between face-to-face classrooms and online learning (Goodwin, 2011). Delgado et al. (2015) and Goodwin (2011) assert several factors can attribute to these results, such as faulty research and the short duration of the studies. School-level factors can also limit the effectiveness of the technology. Key factors such as inconsistent professional development, inadequate technology infrastructure, and misalignment between teaching pedagogy and student assessments can impede the value of technology in the classroom (Anthony, 2012; Friedman & Haefner, 2007; Kurt, 2013; Schrum & Glassett, 2006; Sheppard & Brown, 2014).

In spite of these mixed results, technology will continue to grow with the demands of our digital society. Therefore, school administrators, and in particular school principals, must learn to deal with the expectations of the 21st century. This includes using digital tools to enhance teacher effectiveness while increasing student achievement in a digital world (Enăchescu & Damasaru, 2013).

Effective School Leadership

Effective leaders can have an impact on student achievement. Waters and Cameron (2007) suggest effective school leaders can have a .25 effect size on student achievement, raising student achievement by one standard deviation. However, the role of a school principal as an instructional leader is a break from traditional practice. Tschannen-Moran and Gareis (2014) state, “The principal as an instructional leader must engage with teachers regularly, effectively, and with clear intent in order to exact change in their instructional practices” (p. 71). In order to change instructional practices, effective principals use strategic leadership responsibilities to develop a vision for teaching and learning. They also improve lines of communication between stakeholders, develop the teaching

staff's pedagogical skill, and manage change within the school. Furthermore, effective principals provide resources for the teaching staff and balance their managerial and instructional roles (Ali, 2017; Bouchamma, 2012; Liu, Ritzhaupt, & Cavanaugh, 2013; Means, 2010; Zang & Suan, 2014). When a principal successfully engages a school in these practices, he or she can have a large impact on student achievement. Marzano et al. (2005) notes an effective principal can raise student achievement by 22 percentile points.

Recent educational reforms spurred on by state and federal laws and globalization have shifted the role of the principal from an administrative manager to an instructional leader (Fowler, 2014; Garza et al., 2014; Lemoine et al., 2014; Tschannen-Moran & Garies, 2014). Historically, the role of the principal was to oversee the managerial aspects of the school. The original role of the principal was one based on practical duties such as building management, public relations, fundraising, managing discipline, and handling the school's finances (Ali, 2017; Karuanayake, 2012; Lemoine et al., 2014; Rousmaniere, 2007). However, in the 20th century, as administrators became more educated and pedagogical research began to develop, the role of the principal began to shift toward instructional leadership (Karuanayake, 2012; Rousmaniere, 2007). In the late 1980's, studies began to indicate that instructional leadership had a dramatic effect on schools. Pan, Nyeu, and Chen (2014) note, "Instructional leadership was portrayed as one differentiating aspect between high- and low-achieving schools" (p. 52). Eventually, federal laws such as the No Child Left Behind Act would require principals to increase student achievement scores. This has forced principals to embrace instructional leadership while maintaining their managerial duties in their daily work. Principals now must develop a vision for the school, set academic achievement goals, monitor student learning, demonstrate instructional leadership skills, provide professional development with an emphasis on improving pedagogy, and use data to drive instructional practices (Afshari et al., 2010; Lemoine et al., 2014; Pan et al., 2014; Tschannen-Moran et al., 2014). This tension between manager and instructional leader

puts great stress on the school principal and requires the principal to demonstrate flexibility in their leadership (Karuanayake, 2012). Lemoine et al. (2014) reports administrators engage in over 40 different types of daily tasks. Principals spend less than 10% of their time on classroom observations and professional development. However, it is this 10% that makes a difference between effective and ineffective principals (Lemoine et al., 2014). The literature supports several qualities that distinguish an effective principal from their ineffective counterparts.

First, effective principals set a vision for the school (Bouchamma, 2012; Crum & Sherman, 2008; Forner et al., 2012; Garza et al., 2014; Lemoine, 2014; Tschannen-Moran et al., 2014; Wu, 2017). A vision provides a clear direction for the staff and helps galvanize the work of the school toward student achievement. Effective school leaders establish goals and communicate those goals as part of the school's vision with stakeholders. Once the vision's goals have been clearly articulated, the school's staff can focus on teaching and learning. Effective principals should focus the work of their school on teaching and learning while sharing a belief that all students can learn and be successful (Bouchamma, 2012; Crum & Sherman, 2008; Forner et al., 2012; Garza et al., 2014; Lemoine, 2014; Tschannen-Moran et al., 2014).

In the context of McRel's second-order change process, a principal must create demand through a school vision. This vision drives the work of the school and also provides a purpose for the employees of the school. It is the school vision that allows teachers within the school to foresee a brighter future where the change initiative is seen as a way to provide a purpose for the work of the school (Goodwin et al., 2015; Varney, 2017; Wu, 2017). Garza et al. (2014) explains a school's purpose is key to developing the teaching staff. When a purpose is clearly articulated, a staff begins to change their past practices in order to meet the new expectation. This change in practice is characterized as transformational leadership (Garza et al., 2014; Tschannen-Moran et al., 2014). Transformational leadership is when a leader creates a brand that others can follow. Similar to brands

in marketing, people tend to gravitate toward a moral message or purpose. Effective school principals tie a moral purpose into their vision in order to capture and motivate their staffs to overcome the difficulties they may face (Garza et al., 2014; Tschannen-Moran et al., 2014). Fullan (2001) defines moral purpose as the evolution of people over a given time frame and in a given social context. This social context is supported by strong relationships within the school.

Effective principals communicate and build relationships with their teachers (Ali, 2017; Bouchamma, 2012; Crum & Sherman, 2008; Forner et al., 2012; Garza et al., 2014; Lemoine, 2014; Rosenbaum, More, & Steane, 2017; Tschannen-Moran et al., 2014; Wu, 2017). They form open lines of communication that ensure transparency and promote rapport (Garza et al., 2014; Lemoine et al., 2014; Liu et al., 2013; Zang & Suan, 2012). Effective principals communicate that they care for their staffs on a personal level and allow them to express their views openly (Lemoine et al., 2014). This openness promotes a feeling of partnership between the principal and the staff, increases morale, and improves teacher participation within the school (Lemoine et al., 2014). Open communication also allows an instructional leader to express their views, speak openly about school reform, encourage systematic change, promote positive working conditions, and provide feedback to their teaching staff (Garza et al., 2014; Lemoine et al., 2014; Bouchamma, 2012). This form of communication also builds trust with school employees. Trust can be defined as the willingness to make oneself vulnerable to another member of your institution (Tschannen-Moran et al., 2014). Garza et al. (2014) describes trust as the ingredient that binds the interrelated parts of a school together to form a cohesive group. Trust also helps school personnel support their principal. Principals are under constant scrutiny to see if their actions and message align with their moral purpose. When they do, a principal can be trusted and student achievement can flourish (Tschannen-Moran et al., 2014).

School leaders can build trust by managing personal transitions. Managing personal transitions is the third stage of McRel's second-order change process. Effective principals must understand how

the demand for change and the implementation of technology in pedagogy can be perceived. Stakeholders may view this change and implementation as both a positive and a negative (Goodwin et al., 2015; Rosenbaum et al., 2017; Waters & Cameron, 2007). Therefore, effective leaders adjust their leadership style to meet the demands of their staff. This is accomplished through the leadership responsibility of flexibility (Arokiasamy et al., 2014; Goodwin et al., 2015; Tomal et al., 2013; Waters & Cameron, 2007).

A leader can purposefully adjust their leadership style to fit the needs of a social context (Waters & Cameron, 2007). Flexibility can be accomplished through communication where a principal can be non-direct or direct, depending on the situation. This can be effective when communicating the vision of the technology and the desire to change instructional methods (Waters & Cameron, 2007).

Arokiasamy et al. (2014) explains flexibility in the context of transformational leadership and transactional leadership. A leader can inspire his or her staff to accomplish new tasks. This form of leadership is known as transformational leadership. This style of leader is characterized when a leader is proactive and inspires the teachers to accomplish goals that may be beyond their current abilities, while a transactional leader is a leader that is reactive, less creative, and conservative. The researchers note, “Though transformational and transactional leadership are often presented as being at opposing ends of a spectrum, a combination of select elements from both leadership styles may yield the best results” (Arokiasamy et al., 2014, p. 31). Therefore, flexibility is executed through the strategic analysis of the situation and applied at the correct time to yield the desired behavior.

Effective principals also manage resources. Successful principals focus their efforts on obtaining and utilizing resources to empower their teachers. Principals also utilize the teachers themselves as a resource. They understand how to motivate teachers to become change agents within their school (Liu, Ritzhaupt, & Cavanagh, 2012). This is most effective in the Implementation stage of

McRel's second-order change process. During the Implementation stage, principals use change agents as a way to optimize others (Anthony, 2012; Levin & Schrum, 2013; Waters & Cameron, 2007). Goodwin et al. (2015) calls these individuals opinion leaders, noting, "When opinion leaders support an improvement initiative, they can influence and encourage other staff members to adopt new research-based practices" (p. 55). Therefore, principals should use opinion leaders to build and shape their school's vision and culture and to create plans that will help others transition throughout the change initiative (Anthony, 2012; Bridges & Bridges, 2000; Goodwin et al., 2015; Levin & Schrum, 2013; Waters & Cameron, 2007).

Finally, effective principals have balance. They can strike a balance between student achievement and running an effective school that nurtures student growth (Ali, 2017; Zang & Suan, 2012). Zhang and Suan (2012) recommend that principals balance "quantity" with "quality" (p. 253). The "quantity" refers to student achievement scores, and the "quality" refers to educating the whole student, which promotes social and emotional growth (Zang & Suan, 2014). It is also important to have balance when managing change within a school (Waters & Cameron, 2007). The most effective principals balance the benefits of the change with the disruption it may cause within the school context. Zang and Suan (2014) recommend principals balance the magnitude of the change within their school structure.

The qualities of an effective principal do not come naturally. Principals must learn strategic leadership skills to foster these qualities (Ali, 2017; Jacob et al., 2014). In a meta-analysis that consisted of over 5,000 studies, Waters and Cameron (2007) developed 21 leadership responsibilities that have a positive impact on student achievement. The effect sizes of these leadership responsibilities are recorded in Table 1. These specific abilities provide principals detailed leadership skills that can improve their performance and guide them towards instructional leadership.

Table 1

McRel's 21 Leadership Responsibility Effect Size on Student Achievement [a]

Leadership Responsibility	Effect Size
1. Affirmation	.19
2. Change Agent	.25
3. Contingent Rewards	.24
4. Communication	.23
5. Culture	.25
6. Discipline	.27
7. Flexibility	.28
8. Focus	.24
9. Ideals/Beliefs	.22
10. Input	.25
11. Intellectual Stimulation	.24
12. Involvement in Curriculum, Instruction, and Assessment	.20
13. Knowledge of Curriculum, Instruction, and Assessment	.25
14. Monitoring/Evaluating	.27
15. Optimizer	.20
16. Order	.25
17. Outreach	.27
18. Relationships	.18
19. Resources	.25
20. Situational Awareness	.33
21. Visibility	.20

[a] Marzano et al., 2005, p.42-43

James-Ward & Abuyan (2015) state these leadership responsibilities can be used to engage schools in meaningful change that will enhance student success. McRel's 21 Leadership Responsibilities also take the abstraction out of instructional leadership and provide school leaders with a "well-defined" set of research-based practices to increase their effectiveness (Waters & Cameron, 2007, p. 3). If principals have successful qualities and specific leadership responsibilities to guide their instructional leadership, then profound effects on school culture and student achievement can occur (Goodwin et al., 2015; Marzano et al., 2005).

Goodwin et al. (2015) indicates that principals must use their leadership to build a strong culture. Principals must set high expectations for all students, have a clear academic vision with clear goals, and involve teachers in shared leadership. These attributes build a strong collective efficacy within a school. Goodwin et al. (2015) notes, "In schools with high levels of collective efficacy, teachers believe that, together, they can positively affect student achievement" (p. 77). The more adept a school is at developing efficacy, the more likely the school will impact student achievement in a positive manner (Goodwin et al., 2015; Marzano et al., 2005).

Effective Technology Leadership

There is also a strong link between educational leadership and the effective use of technology in schools. Principals can have a profound impact on the implementation of technology in the classroom (Afshari et al., 2010; Afshari et al., 2012; Chua & Chua, 2017; Raman et al., 2014; Seyal, 2012; Kara-Soteriu, 2009). However, this is not easily achieved. Principals face a daunting task to transform teaching and learning using digital tools. Today, American schools spend over $6 billion on educational technology (Anderson & Dexter, 2005). This figure does not include the popular E-rate fund, which is a government rebate program designed to promote technology in American schools. This dollar amount, along with the U. S. Government's E-Rate funding, indicates a strong commitment by the federal government to develop schools that implement 21st century tools. This expectation is

heightened by the growing demands of a digital society that assume principals have the skill and training to achieve this undertaking. In spite of these high expectations, principals have demonstrated the ability to effectively lead technology implementations that enhance teaching and learning (Afshari et al., 2010; Cojocaru & Cojocaru, 2014; Flanagan & Jacobsen, 2003; Seyal, 2012). Raman et al. (2014) confirms that school administrators can have a significant impact on the use of technology within their schools. This is accomplished through transformational leadership, developing competence in the use of technology, providing professional development for the teaching staff, creating a vision for technology in the school, and promoting blended learning within a student-centered learning environment (Aslan & Reigeluth, 2013; Chua & Chua, 2017; Means, 2012; Hilliard, 2015; Fassbender & Lucier, 2014).

Effective technology leaders promote technology in their schools through transformational leadership. This style of leadership is a catalyst to successful technology implementation. It is often considered the ideal leadership style to promote change within a school (Afshari et al., 2012; Afshari et al., 2010; Asan, 2015; Seyal, 2012; Sun, Chen, & Zhang, 2017). Transformational leaders can be characterized by several attributes, which include inspiring and motivating others and developing an awareness of any underlying factors that may hinder a change initiative. School leaders must be skilled in inspiring and motivating their teaching staff. This can be accomplished through creating demand for the change initiative, communicating one's ideals and beliefs about schooling, and setting a vision about how technology can enhance teaching and learning (Asan, 2015; Anderson & Dexter, 2005; Chua & Chua, 2017; Flanagan & Jacobsen, 2003; Waters and Cameron, 2007). Transformational principals also understand the nuances that may hinder a change initiative. Principals must understand problems, dissect them, and communicate to their stakeholders about how they will overcome the challenges of implementing technology into their schools. McRel describes this leadership responsibility as situational awareness. Situational awareness is when a principal is

fully aware of underlying obstacles that may prevent a school from moving forward on a change initiative. Situational awareness can be a key component in creating demand for the change and managing the individual's personal transitions to the change (Waters & Cameron, 2007; Yang 2015).

Furthermore, Transformational Leadership is more successful at implementing change when compared to other leadership styles (Arokiasamy et al., 2014; Hadjithoma-Garska, 2011; Sheppard & Brown, 2014; Sun et al., 2017). Change occurs when individuals within an organization engage with one another and boost each other's performance beyond their previous limits. Other leadership styles are not as successful at influencing new behaviors with technology. Leadership styles such as pacesetting, authoritative, transactional, or laissez-faire were not as successful at promoting change within a school (Asan, 2015; Afshari, 2010; Hadjithoma-Garska, 2011). These other leadership styles did not promote open lines of communication or shared leadership, which Sheppard and Brown (2012) recommend as a way to improve technology usage in the classrooms. Research suggests that effective leaders should consider their leadership style when implementing technology to grow their teacher's capacity (Asan, 2015; Sheppard & Brown, 2014; Yang, 2015). Transformational principals also use teacher leaders to leverage change within the organization. Teacher leaders can be used to influence a change initiative (Waters & Cameron, 2007; Seebaum, Sussman, Davis, & Gutierrez, 2016; Sun et al., 2017). During the McRel second-order change process, principals can use teacher leaders to create change and to help implement technology within their schools. This can be accomplished through mastery experiences and vicarious experiences. Mastery experiences are formed when teachers have a successful experience implementing technology into their classroom. These early successes can propel individuals through the implementation stage as they continually build on these small wins (Waters & Cameron, 2007; Seebaum et al., 2016). Similarly, vicarious experiences boost teacher effectiveness when they get an opportunity to witness a colleague being successful with technology. Waters and Cameron (2007) note, "Efficacy is strengthened when individuals and groups have the opportunity to

observe successful individuals in situations with similar circumstances" (p. 52). Principals can establish vicarious experiences by promoting walk-throughs where teachers can watch and observe other teachers teaching with technology. These observations can improve the teacher's efficacy and beliefs that they can achieve similar results (Goodwin et al., 2015; Seebaum et al., 2016).

Furthermore, an effective technology leader promotes the value of technology in the school through demonstrating competence in its use (Afshari et al., 2010; Arokiasamy et al., 2014; Chua & Chua, 2017; Flanagan & Jacobsen, 2003; Kara-Soteriou, 2009; Seyal, 2012). This includes gaining a thorough understanding of the capabilities of the technology. Principals typically use computers or other digital tools for word processing or email. Seyal (2012) indicates that this low level of use often encapsulates a principal's knowledge. Therefore, principals are encouraged to gain further training to improve their skill and to increase their daily use of technology. Being competent in the use of technology can improve the principal's performance and decision-making on how to implement digital tools into the school (Afshari et al., 2010; Afshari et al., 2012; Kara-Soteriou, 2009; Seyal, 2012). Technology training should expand beyond simply learning the tools and applications of the software. Rather, effective school leaders must also learn how to integrate technology into the curriculum. Kara-Soteriou (2009) notes that principals who received coaching in technology integration were more successful at incorporating the digital tools into the school's curriculum. This training should also be made available to the teaching staff. Teachers should become well versed in how to incorporate computers, tablets, the Internet, and other digital tools into their curriculum. During these teacher trainings, it is recommended that digital leaders attend the sessions alongside their teaching staffs. This attendance promotes community within the school and demonstrates the importance of the technology initiative (Afshari et al., 2010; Chua & Chua, 2017; Flanagan & Jacobsen, 2003; Hsu, 2016; Kara-Soteriou, 2009).

However, technology training is sparse (Afshari et al., 2010; Arokiasamy et al., 2014; Chua & Chua, 2017; Flanagan & Jacobsen, 2003; Kara-Soteriou, 2009; Kurt, 2013; Seyal, 2012; Young, 2016). Training is typically difficult to implement due to a lack of time. Seyal (2012) indicates that only 28% of the principals studied provided consistent release time to learn technology, and over 50% are "unwilling" to give time over to learn this skill (p. 38). The researcher noted, "If the teachers do not receive release time to practice software for inclusion in their instruction, their ability to integrate computer technology across the curriculum will be underutilized and will affect their effectiveness" (Seyal, 2012, p. 38). When training is provided the focus is often scattered or unclear. The majority of the trainings focus on how to use the technology and little time is spent on how to incorporate the technology into the curriculum (Seyal, 2012; Kurt, 2013; Young, 2016).

An effective technology leader also sets a vision for the use of technology in the school (Asan, 2015; Afshari et al., 2010; Chua & Chua, 2017; Davis & Leon, 2014; Raman et al., 2014; Topper & Lancaster, 2013; Wu, 2017). This vision should be clear and communicated to all stakeholders including students, teachers, parents, district office leaders, and the community (Hillard, 2015; Raman et al., 2014; Topper & Lancaster, 2013). A clearly communicated vision is an indicator of success and should guide the school's path. Without a clear path, schools may appear confused on how technology fits within the school's purpose. The vision determines the direction of the school and provides the teaching staff with a clear objective on which to base their work. A consistent vision should also describe how technology will support and enhance the pedagogical practices within the school and match the principal's ideals and beliefs on teaching and learning (Arokiasamy et al., 2014; Liu et al., 2013; Means, 2012; Yang, 2015). Liu et al. (2013) supports this notion, stating:

> Leaders of successful innovation tend to be tuned into the core values of their organization, and facilitate change as a way to realize a core value more fully. Further, in organizations where change facilitation is especially effective, leaders model the innovation, participation in the innovation, and take explicit steps to enable the innovation to occur (p. 577).

A strong vision should rally individuals within the school to see problems as a temporary barrier. The visions should provide hope on which to unite individuals around a common cause. A hopeful vision reminds the staff that there is a reason for their work and that they are impacting and affecting student lives. This hope can reduce stress, re-energize teachers, and re-culture a school (Fullan, 1998; Wu, 2017). Lastly, a vision should support a strategic plan. A strategic plan should aid a school in changing its instructional practices and move classrooms to promote deeper levels of thinking where students can investigate phenomena, do research, generate hypotheses, and apply their findings to real-world settings, all while using technology to aid their learning (Friedman & Heafner, 2007; Maniger, 2006; Sheppard & Brown, 2014; Topper & Lancaster 2013).

To facilitate these instructional practices, the literature recommends developing a student-centered learning environment that is supported by blended learning (Deed et al., 2014; Christensen et al, 2011; Fassenbender & Lucier, 2014; Watson, 2001). A student-centered learning environment is an environment where students engage in real-life learning activities that allow them to personalize their learning to suit their strengths and interests (Christensen et al., 2011; Easel, 2017; Horn & Staker, 2015; Maniger, 2006; Sheppard & Brown, 2014; Watson, 2001). Friedman & Heafner (2007) report positive gains from this style of learning. Their qualitative data showed 93% of the students enjoyed student-centered learning when compared to listening to a lecture. The researchers felt this was significant given that engagement is a precursor to student learning. Bekele (2010) supports this, noting that motivation and achievement were positively correlated. Engagement also affects motivation which improves the acquisition of higher order thinking skills. Student engagement also decreases student behavioral problems in the classroom. Classrooms that engaged students in a student-centered learning environment displayed no obvious behavior problems (Bekele 2010; Friedman & Heafner, 2007).

Blended learning consists of students learning in part through online resources that allow student's control over when, where, and how they learn (Horn & Staker, 2015). This ubiquitous approach to learning supports 21st century-learning skills and prepares students for post-secondary education (Chang et al., 2014; Fassebender & Lucier, 2014; Friedman & Heafner, 2007). Hillard (2015) affirms that 85% of colleges and universities are using some form of blended learning. Blended learning is also successful in K-12 education. Ninety-four percent of teachers and principals believe blended learning had a positive impact on student's success (Alijani et al.; 2014). Furthermore, blended learning, when appropriately applied with classroom instruction, can increase student achievement (Bottage, 2014). This approach to schooling also stimulates personalized learning and enables students to develop multiple learning paths to access the curriculum (Horn & Staker, 2015; Liu et al., 2014). Personalized learning has shown to improve student creativity, self-esteem, and familiarity with mobile technology (Alijani et al., 2014; Liu et al., 2014; Peterson & Horn, 2016). However, this learning environment has been underutilized in today's schools. Sheppard & Brown (2014) state, "The potential of technology as a support for learning has not been realized because the focus has been on using technology for teaching, without taking into account the needs of the learner" (p. 85).

Furthermore, principals should help teachers develop inquiry-based pedagogy (Friedman & Heafner, 2007). This style of teaching helps students interpret content and improve their thinking skills (Friedman & Heafner, 2007; Sheppard & Brown, 2014). Critical thinking skills enable students to be successful in the 21st century. The National Research Council's Committee on learning and the North Central Regional Educators Laboratory affirm this belief, stating public schools need to foster skills of the 21st century that include digital literacy, inventive thinking, effective communication, and high productivity (Sheppard & Brown, 2014).

However, this style of teaching is not an easy undertaking. There are numerous barriers that limit student-centered learning. Barriers such as a lack of access to technology and the absence of time to implement new instructional strategies into the curriculum play important factors into the success of student-centered learning (Hsu, 2016; Young, 2016; Wang et al., 2014). Another key factor that limits student-centered learning is a teacher's lack of knowledge. Teachers feared creating student-centered learning environments because they were worried their lack of knowledge would be exposed in front of their students. This fear limits the teacher's ability to learn and use technology in the classroom (Hsu, 2016). Wang et al. (2014) noted, "They (the teachers) worried about being seen as teachers who don't know what they are doing in front of their students, especially when they were testing out new technologies in the classroom" (p. 652). Experienced teachers may also feel like novices when implementing new instructional strategies with technology (Sheppard & Brown, 2014). To support teachers through this transition, principals need to understand the second-order change that is occurring within each individual (Goodwin et al., 2015; Seebaum et al., 2016; Waters & Cameron, 2007). If teachers view student centered or blended learning as a loss of their autonomy, then the technology initiative may falter. It is recommended that principals reflect while managing personal changes and maintain a situational awareness of the underlying feelings within the school. This will help a principal to leverage their leadership where the most support is needed (Goodwin et al., 2015). If teachers are feeling a sense of loss during the change initiative, principals should listen to the individuals who may challenge the proposed change. Fullan (1998) notes, "Reforms often misfire because we fail to learn from those who disagree with us" (p. 3). An effective technology leader understands how to manage the opposition's personal transitions. This can be accomplished through setting up meetings to discuss the concerns or mobilizing individuals to attack the concern. Managing personal transitions can lead to great learning not only for the individuals moving through the

transition, but also for the school principal. Personal transitions during turbulent times can lead to new insights and ways to solve problems (Fullan, 1998; Waters & Cameron, 2007).

Summary of the Literature Review

The 21st century has forced many demands upon American schools. The effects of diversity, poverty, and governmental referendum have placed great strains on schools and school leaders (Bouchamma, 2012; Crum & Sherman, 2008; Forner et al., 2012; James-Ward & Abuyan, 2015; Lemoine et al., 2014; Maniger, 2006). To further compound these demands, our society has universally adopted technology as a way to conduct business, communicate, entertain, socialize, and learn (Bottage, 2014; Enaschue & Damasaru, 2013; Sheppard & Brown, 2014; Liu et al., 2014). School leaders must now successfully manage their schools and improve student achievement while meeting the demands placed upon them. Therefore, strategic leadership is required to create and lead schools in today's climate (Anthony, 2012; Chua & Chua, 2017; Delgado et al., 2015; Garza et al., 2014; Horn & Staker, 2015; Goodwin et al., 2015; Waters & Cameron, 2007).

To equip school principals, the Mid-Content Research for Education and Learning (McRel) has developed a change management framework to guide the work of school leaders. This framework provides insights into simplifying the complexities of change initiatives while providing principals a theoretical framework on which to base their leadership decisions (Waters & Cameron, 2007). This framework also provides a lens through which to view the current literature.

Throughout the history of American education, schools have been under society's influence. Society has continually required schools to meet its demands (Rury, 2013; Webb 2006). The rise of the personal computer and mobile technology has prompted schools to shift their instructional practices to meet these demands (Anthony, 2011; Jones et al., 2013; Sheppard & Brown, 2014). Schools are now using technology more often to promote blended and personalized learning. This shift in instruction requires unique leadership capabilities. School principals must be equipped both to

lead their schools instructionally and technologically (Christensen et al., 2011; Delagdo et al., 2015; Horn & Staker, 2015).

The current gap in the professional literature does not address this style of leadership. It is clear that effective technology implementation requires strategic leadership and thorough knowledge of a change framework (Goodwin et al., 2015; Waters & Cameron, 2007). Principals must use their guidance to promote the kind of school that values authentic learning to foster the kind of students that will be productive citizens in the 21st century (Delgado et al., 2015; Enăchescu & Damasaru, 2013; Jones et al., 2013; Tropper & Lancaster, 2013; Watson, 2001).

Chapter III

Design and Methodology

Chapter III describes the researcher's design and methodology of the study. This chapter will highlight a) the design and methodology, b) the research questions, c) the participants, d) the data-collection methods, e) the analytical methods, and f) the limitations of the study. The purpose of sound methodology is twofold. First, the methodology adds validity and logic to a research proposal. Second, the methodology should provide enough flexibility to allow the researcher to obtain and interpret data in a flexible manner in order to better understand the subject (Marshall & Rossman, 2016).

The methodology that was selected for this study was a qualitative case study. A case study is a form of ethnographic research that focuses on a particular activity involving individuals (Creswell, 2015). Ethnographic research has a long tradition in qualitative research and, in particular, the field of education (Creswell, 2015; Gerring, 2004; Houghton, Murphy, Shaw, & Casey, 2015; Johnston, 2013; McGloin, 2008). In recent decades, case studies have become increasingly popular. Johnston (2013) notes, "The decade leading up to the 21st century produced an increased use of diversification of case study tools and an elaboration of the method" (p. 24). However, due to their popularity, case studies can be misconstrued. McGloin (2008) notes that case studies can lose their purpose and meaning when certain criteria are not within the methodology. Thus, a case study should investigate phenomena in the context of a real-life setting and provide an in-depth analysis of a particular group or individual and how they evolve over a given time period. These findings can then be generalized to a larger population to better understand the case and ultimately change future practice (Bachor, 2002; Gerring, 2004; Houghton et al., 2015; Johnston, 2013; McGloin, 2008).

In order to fully understand phenomena or events, the researcher chose the McRel second-order change process to better comprehend how principals lead change within the social context of a school. The McRel change process provides four clear phases (Create Demand, Implementation, Manage

Personal Transitions, and Monitor & Evaluate) as a way to view the leadership responsibilities of the principals within this study (Waters & Cameron, 2007). The researcher chose this framework as a foundation on which to view the development of principal leadership and technology implementation within the context of a school. Therefore, the flexibility of a case study provided the necessary characteristic on which to view school leadership from the perspective of a change initiative (Gerring, 2004; Johnston, 2013).

Besides flexibility, Creswell (2015) notes other characteristics of case studies. First, a case or unit is often studied in several steps that form a coherent sequence. Second, a case or unit often focuses on a small group of individuals to better understand experiences or activities of merit. Lastly, the case or unit is best studied through extensive data collection, which allows the research to gain an in-depth analysis of a particular individual (Creswell, 2015; Gerring, 2004). Johnston (2013) furthers this thought, noting that case studies allow an individual to reveal himself/herself in an intimate way, thus allowing the researcher to better understand their subject. It is for this reason that a case study was selected to answer the research questions.

Research Questions

American schools are under great pressure from society to prepare a well-educated citizenry to compete in a global digital market (Horn & Staker, 2015; Sheppard & Brown, 2014; Rury, 2013). Schools need to break from the traditional model of schooling that was formed during the Industrial Revolution. This form of teaching and learning standardizes the curriculum and expects all students to learn the material at the same time, using the same instructional strategies. This traditional educational practice undermines the uniqueness of each student and does not typically promote deep thinking and innovation. School principals need to understand the current context in which schools operate and the demands of the future work force. They must shift classroom instruction to promote the skills of a 21st century worker (Anthony, 2012; Christensen et al., 2011; Delgado et al., 2015; Horn & Staker, 2015;

Topper & Lancaster, 2013). Therefore, the following questions were designed to better understand how school principals can conduct this work.

1) What strategic leadership responsibilities do education leaders perform to promote a school improvement initiative?
2) What is the responsibility of the principal in planning and implementing technology into a school?
3) Which of McRel's 21 Leadership Responsibilities are most influential on implementing innovative practices and technology in a school?

The focus of this study is to examine the leadership of school principals as it pertains to implementing technology into schools. Four school principals were selected as the primary participants of the research. Creswell (2015) and Gerring (2004) assert case studies allow an extensive examination of a particular individual. Thus, a small number of principals was selected to gain a greater understanding of their leadership practices. To assist in understanding leadership in the context of change, McRel's second-order change process was used as a theoretical framework to view the leadership practices of the participants. This framework supported the researcher in identifying how the participants led their schools and in which phase of change the principals executed their leadership duties.

Pilot Study

The researcher began the process by conducting a pilot study to gauge the appropriateness of the proposed methodology. A pilot study is the preliminary examination of the procedures, methods, and instruments to be used in a larger study (Marshall & Rossman, 2016; Prichard & Whiting, 2012; Secomb & Smith, 2011). Pilot studies allow a researcher to test data collection instruments, refine analytical approaches, and adjust methodology tactics prior to embarking on the large case study (Marshall & Rossman, 2016; Prichard & Whiting, 2012; Secomb & Smith, 2011).

All forms of research can have unknown obstacles that can hamper a research study. Therefore, conducting preliminary interviews and observations allowed the researcher to investigate complications prior to launching into the full study.

The researcher developed a preliminary principal observation tool (see appendix D) and a preliminary principal interview protocol (see appendix F). Likewise, a preliminary classroom observation tool was developed (see appendix E), as was a preliminary semi-structured teacher interview protocol (see appendix G). These instruments were used in the pilot study to assess their validity.

Once the preliminary data collection tools were developed, the researcher contacted a former principal colleague who was involved in a technology implementation. An email was sent to the prospective principal inquiring about performing a pilot study at his school (see appendix M). After permission was obtained, the researcher set up a mutual time to conduct both a principal and a teacher interview using the preliminary interview protocols. During the interviews, the researcher tested a recording app on the iPad to test record the interviews. This allowed the researcher to experiment with storing the interviews on a secure cloud network. The interview files were named and uploaded onto the researcher's Google Drive account where they were stored.

An observation was also conducted of the principal during a staff meeting to test the principal observation protocol (see appendix D). The researcher took notes during the observation and later developed the notes into themes to determine if any of the themes tied to McRel's 21 Leadership Responsibilities. A similar process was used to test the classroom observation protocol (see appendix E). The researcher scheduled a 45-60 minute classroom observation and recorded the results on the classroom observation protocol. This observation was used to assess the classroom observation protocol as well as to determine the level of learning in the classrooms and how technology was

supporting the instruction. These notes were then used to triangulate the data with the principal and teacher interviews.

Once the pilot study was conducted, the researcher conferred with several colleagues about the pros and cons of the pilot study. This process enriched the researcher's knowledge and led to several refinements in the final data collection methods.

Participants

The participants of the study were selected based on purposeful sampling. Purposeful sampling is when a researcher selects a group of participants that can best inform a given research topic. This form of sampling provides a researcher the ability to select individuals that specifically relate to a given topic of study (Creswell, 2015). Further sampling strategies were selected to develop a more uniform sample for the study. The researcher chose Homogeneous Sampling to further investigate school leaders. Homogeneous Sampling involves the specific selection of individuals based on a particular trait or characteristic (Creswell, 2015). The characteristic that was examined was principal leadership during a technology implementation in a k-12 school. Thus, k-12 school principals currently involved in a technology implementation were selected.

To attract participants for this study, the researcher began initial conversations with educators throughout the local community. These conversations included discussions with educators from the local school district, the Idaho State Department of Education, and Northwest Nazarene University. The intent of these conversations was to inquire about schools and school leaders who might currently be involved in a school-wide technology implementation and who were leveraging technology to develop a student-centered learning environment. The following questions were used to guide the researcher in these initial conversations.

1) Are you aware of any current school districts or principals that are leveraging technology to develop a student-centered learning environment into their school?

2) Who might I contact at the said school or district to request more information?
3) Are you aware of the school's vision for teaching and learning?

Once these initial informal discussions were made, a list of 11 potential participants was generated by the researcher. Next, the researcher obtained and examined each school's demographics. This information was obtained from the Idaho State Department of Education. The information that was examined included the school's student demographics, free and reduced lunch population, special education percentage, the percentage of English as second language learners, and student achievement scores. The researcher then narrowed the list to include schools that were diverse in nature. The goals were to identify schools from both urban and rural settings that were incorporating technology to support a student-centered learning environment. The researcher paid close attention to the school's demographics and socioeconomic statuses to ensure a broad range of schools were included in the study. Furthermore, the researcher also considered the sex of the school leader to ensure a variety of both male and female leaders. Based on the aforementioned criteria, a list of six school leaders, 5 males and 1 female, were selected. The researcher began with an initial phone call to the principals to learn more about their school and how their technology implementation supported their academic visions (see Appendix J). These phone calls consisted of two parts: the researcher introduced himself and the purpose of the proposed research. The researcher then inquired about the school and the technology implementation that was taking place. If the conversation was positive and the school appeared to be a possible site to conduct the study, the researcher asked to visit the school. If that was not possible, the initial inquiry was done on the phone. If the researcher did conduct a visit, the researcher spoke with the principal in more depth and conducted a walk-through in the classrooms to get a first-hand look at the instruction and environment of the school, and also how technology was being implemented to support student learning. Likewise, the researcher asked questions about the school culture and the school's instructional vision to determine if the school had a student-centered

learning environment. Finally, the researcher thanked the principal for their time and ended the phone call or school visit. After these inquiry phone calls or school visits were conducted, the researcher narrowed the list of potential candidates based on four areas. The four areas included:

- A vision for teaching and learning that promoted individualized learning
- Student voice and choice in selecting how student's express their learning
- Student agency and ownership for their learning
- A systematic approach to incorporating technology into the curriculum to support the student's voice and choice in their learning

These areas are foundational elements of a student-centered learning environment. Student-centered learning is an environment that promotes learning based on a student's interests and strengths. Students engage in learning experiences that promote student independence. In this form of learning, students have more input into how they learn, where they learn, and what tools they can use to express their learning. Furthermore, reflection of progress is highly utilized so the student can see whether they are making academic progress. A teacher's role is often shifted from being the sole provider of information to more of an instructional mentor. A teacher will set the learning objectives for the student and then conference with the students to set instructional goals and help guide the students toward the learning. If the student needs direct instruction they will receive it. However, if a student needs independent research or practice, the teacher will help facilitate this. Lastly, teachers often meet with students to help check on their academic progress (Christensen et al., 2011; Easel, 2017; Horn & Staker, 2015; Maniger, 2006; Sheppard & Brown, 2014; Watson, 2001). This form of learning differs from the traditional form of learning that requires students to learn the same curriculum, at the same time, and at the same pace (Christensen et al., 2011; Horn & Staker, 2015). The researcher used this information to distinguish six schools from their traditional counterparts.

Next, the school districts were contacted. Creswell (2015) advises that researchers gain permission from various levels of leadership in order to conduct research in a given site. Therefore, school district superintendents, assistant superintendents, and district directors were contacted in the spring of 2017 by phone and by email to inquire about the district's process to conduct research within the school district (see appendix J). A phone call or email was placed to inquire about setting up an initial meeting with the leader to discuss the research proposal and to develop a positive relationship with the district's leaders. If the researcher had not heard from a given district leader within a two-week time frame, a second courtesy phone call or email was placed informing the superintendent about the purposed research and asking if a second letter or email could be sent. The researcher then inquired a second time if it would be possible to meet and discuss the research proposal.

Once a meeting was scheduled, the researcher introduced himself and explained the research proposal in detail to the superintendent (see Appendix Q). The researcher also inquired about the school district itself and the district's academic vision regarding technology. Questions were also asked about the schools that were leveraging technology to promote deep thinking, problem solving, and student efficacy. After receiving input from the district leader, the researcher asked the superintendent to give permission to conduct research within the said school district (see Appendix A). Once permission was obtained from the district superintendent, an informed consent form and a research proposal were sent to the school principals (see Appendix B & Appendix Q). These letters informed prospective principals of the purpose and background of the study, the procedures that would take place, the time frame of the proposed study, and the possible risks involved. If the researcher had not heard from a given principal within a two-week time frame, a courtesy phone call or email was placed informing the principal of the study and asking if a second letter or email could be sent.

Based on the researcher's initial investigation and the feedback from the district leader, four school principals were selected based on their academic vision and how they have promoted

technology to support student learning. The principals were selected based on several criteria. First, the participants had to have a minimum of three years' experience as an administrator. The demands of school leadership are great (Anthony, 2012; Hadjithoma-Garska, 2011; Levin & Schrum, 2013; Schrum & Glassett, 2006; Sheppard & Brown, 2014). Thus, experienced principals were selected for this study to avoid principals who may be overwhelmed with the initial demands of the job. Second, the researcher sought principals who had a student-centered focus toward teaching and learning. The researcher chose principals who had a clear vision for teaching and learning and who leveraged this vision to change classroom instruction within their schools. The researcher looked for principals who had a vision that promoted deep thinking, problem solving, and student efficacy within their school. Next, the participants were selected from a diverse set of schools in order to provide a rich variety of data. Case studies are strengthened when a variety of data is collected from different sources. This diversity allows a researcher to fully understand the phenomena of school leadership in various settings, which would permit the research to expand the findings to a variety of school situations (Gerring 2004; McGloin, 2008). Lastly, the researcher desired to obtain both male and female school leaders. However, based on the above criteria 4 male principals were selected for the study.

Two elementary school principals and two secondary school principals were selected for this study. The first elementary principal, Mr. Newman, was in his sixth year as an administrator. He works in a rural school district in southwestern Idaho. His school was in their third year of a technology implementation.

The second elementary school principal, Mr. Young, had fourteen years of administration experience. He was in his eighth year as an elementary principal and his sixth at his current school. Their school was in their second year of implementing technology into their curriculum.

The next participant, Mr. Mitchell, was a principal of a suburban middle school. He had 14 years of administration experience and had been the leader of his school for six years. His school had

slowly been purchasing and adopting technology as a way to increase student engagement while providing students with 21st century learning tools.

Lastly, Mr. McKnight was a principal of a large suburban high school in southwestern Idaho. His high school had recently adopted a 1:1 technology imitative and were entering their second full year of implementation. Mr. McKnight was in his tenth year as a school principal; he spent two years at the elementary level and eight at his current school.

Data Collection Methods

The data collection methods of this study are designed to examine the specific leadership responsibilities that principals exhibit while leading technology within a school. Creswell (2015) states, "In addition, when case study writers research a group, they may be more interested in describing the activities of the group then identifying share patterns that develop as a group interacts over time" (p. 469). Principal leadership was examined in this study to determine which activities principals could perform to enhance pedagogy with digital tools. To further define principal activities, McRel's 21 Leadership Responsibilities were selected. These leadership responsibilities can effectively guide the leadership of a principal (Goodwin et al., 2016; Marzano et al., 2005; Waters & Cameron, 2007). However, Waters and Cameron (2007) noted that principals could still be ineffective leaders despite performing these 21 leadership responsibilities. This ineffectiveness was due to a misalignment between their leadership practices and the magnitude of change needed to propel the school through a change initiative. To guide principals and their leadership practices through the complexity of a change initiative, McRel developed a change process that corresponded with the 21 leadership responsibilities. This provided school leaders with a cohesive connection between leadership and change management. To further investigate this connection to the research questions, several qualitative data collection methods were applied.

First, the researcher employed school observations. Observations were used to answer research questions: 1) What strategic leadership responsibilities do educational leaders perform to promote a school improvement initiative? and 3) Which of McRel's 21 Leadership Responsibilities are most influential on implementing innovative practices and technology in a school? Observations are a process to gather data firsthand by observing subjects in their natural context (Creswell, 2015). Several prolonged observations of school principals were performed in order to better understand how principals act in the complex setting of a school (Marshall & Rossman, 2016). These observations were conducted using an observation protocol (see Appendix D). The observation protocol notes the name of the participant, date, time, and location of the observation. To further assist the researcher, a list of McRel's 21 leadership responsibilities was added to the observation protocol. This document was divided into two sections that allowed the researcher to note descriptive actions and reflective notes. The descriptive actions were specific actions that the school principal performed during their daily routines and interactions with their teaching staffs. The goal was to observe the principal's leadership in their natural context of a school setting. The reflective notes' section of the protocol allowed the researcher to reflect on the principal's leadership as it pertained to McRel's 21 leadership responsibilities and the theoretical framework, McRel's second-order change process.

The observation protocol also provided concrete data that informed research questions one and three. Based on the researcher's experience as a former school principal, many principals, both successful and unsuccessful, have a difficult time articulating what they do strategically to lead their schools. Creswell (2015) explains observations are effective for individuals who "have difficulty verbalizing their ideas" (p. 211). Therefore, multiple observations of principals in various settings, such as staff meetings, professional learning committee meetings, professional development, classroom walkthroughs, and personal interactions, provided insights into the daily governance of schools during a technology implementation.

Other observations took place to examine the effectiveness of the technology in teaching and learning. To obtain these classroom observations, two classroom teachers from each school were purposefully selected through a snowball sampling technique. The researcher asked the school principal to recommend two classrooms that demonstrated a student-centered learning environment supported by technology. The purpose of these classroom observations was to gain insights into the use and effectiveness of the technology implementation at the classroom level. The researcher first approached each of these teachers through an informal meeting. Introductions were made and the purpose of his study was explained to the teachers. The researcher then provided an overview of the research proposal and explained the purpose of the classroom observation and how it pertained to the research proposal. Finally, the researcher asked the teachers if they would review the proposal (see Appendix Q) and sign the informed consent (see Appendix B). A week later, a follow-up email was sent letting the teachers know the researcher wanted to observe the classroom and obtain the informed consent (see Appendix I). Once an informed consent form was obtained, the classroom observations were scheduled with the classroom teacher and the classroom observations were conducted. These observations determined whether the school had been successful at leveraging technology to promote deeper levels of learning within the classroom. Therefore, classroom observations were conducted to examine lesson objectives, classroom assignments, and student work. An observation walk-through protocol was used to determine the students' level of learning based on Benjamin Bloom's taxonomy (see Appendix E). Bloom's taxonomy helps determine the level of thinking students are required to do on the assignments. The purpose of this section of the walk-through protocol was to determine if the technology had been used to help the students analyze, evaluate, and create new information.

Likewise, interviews were conducted with the principals and members of their teaching staffs. These interviews helped provide further insights into research questions one and three. Creswell (2015) and Mikéné, Gaizauskaité, and Valaviciené (2013) explain how an interview allows participants

to voice their thoughts and experiences without distractions. They also enable the researcher to gather in-depth information from participants, such as inner feelings and how certain events affected individuals within a social context (Mikéné et al., 2013). The purpose of these interviews was to gather more information about the leadership responsibilities of the principals and to note how they themselves and their teaching staffs view their leadership qualities.

To conduct the principal interviews, the researcher began by administering the School Technology Needs Assessment, otherwise known as the STNA, to each principal. The survey results were printed and the researcher looked for commonalities among the principal participants. The information gathered from these initial surveys helped guide the researcher's questions for the principal interview protocol (see Appendix F). The researcher performed one-on-one interviews based on a prescribed principal interview protocol. Interviews with the teaching staff were conducted from a teacher interview protocol (see Appendix G). This interview focused on the teacher's perspective of the technology initiative and how they viewed their principal's leadership during the technology implementation. All interviews were transcribed and coded to identify various patterns that would point to one or more of McRel's 21 leadership responsibilities. A mixed analysis was used to triangulate the data with the data obtained during the school observations. Triangulation of the data provided better reliability and validity to the research (Marshall & Rossman, 2016).

Research question two was answered using the qualitative data and the STNA survey. The STNA is an online survey designed to inform planning and assessment of a technology initiative (Corn, 2007). The STNA was created to assist educators in planning and assessing technology projects. It consists of 87 Likert Scale questions subdivided into four categories and was designed to obtain the perceptions of teachers to inform school leaders in the planning for technology (Corn, 2007). The survey was performed electronically through a software program obtained from the Friday Institute out of North Carolina State University. This software allowed the researcher to create an

individual survey for each participating site. Prior to administering the STNA, an email was sent to each teacher from the school principal informing them of the STNA and how the results would benefit the research process (see appendix N). If the researcher had not received the survey from the teachers within a week, a second follow-up survey was sent (see appendix O). The results of the survey were stored in the software and then downloaded onto an Excel spreadsheet and saved in the researcher's hard drive on a password-secured computer.

Analytical Methods

In case studies, the researcher engages in an analysis of the data collected through data collection methods (Creswell, 2015; Vallis & Tierney, 2000). A quasi-qualitative strategy was used to begin the data analysis. This approach is used when predetermined categories have been selected to analyze the data (Chenail, 2012; Marshall & Rossman, 2016). The categories of the data investigation centered on McRel's 21 leadership responsibilities. Thus, the analytical goal of this study was to examine each principal's leadership as a case and then perform a cross-analysis of the data to determine themes that would fit within the predetermined categories (Creswell, 2015; Houghton et al., 2015, Vallis & Tierney, 2000). Cross-case analysis promotes analytical thinking by examining similarities and differences. The object of this cross-case analysis was to find similar leadership responsibilities among the four participants (Houghton et al., 2015). Khan and VanWynsberghe (2008) report, "Engaging in cross-case analysis extends the investigator's expertise beyond the single case. It provokes the researcher's imagination, prompts new questions, reveals new dimensions, produces alternatives, generates models, and constructs ideals and utopias" (para. 2). The data analysis for this study began simultaneously with the data collection methods. This collection method included analyzing the data through a constant comparative method. This process involves member checking to clarify data and to generate further meaning from the data (Synder, 2012).

A structure for the data analysis was based on the work of Houghton et al. (2015), which recommended taking the raw data through four strategic steps that include a) comprehending the data into codes b) synthesizing the codes to form patterns c) theorizing the patterns into summary categories and d) contextualizing the categories into a coherent explanation of the phenomena. Houghton's et al. (2015) structure was used to determine which of McRel's 21 leadership responsibilities had a positive effect on their school's technology implementation.

Comprehending the data was conducted through coding. Chenail (2012) notes that coding provides a perspective on the phenomena that was observed by creating a meaning to the abstract. Raw data often has an abstract or general meaning with little relevance to any specific topic. It is not until the researcher provides a code that the abstract obtains meaning to the researcher (Chenail, 2012). Coding was performed differently for each form of data.

For principal interviews and observations, coding was performed by comparing the observed data with McRel's 21 leadership responsibilities. The raw observational data and interview data was transferred into codes that fit within the 21 leadership responsibilities (see Appendix H). For example, one of the principals engaged with a group of teachers in a discussion on why technology could improve student learning. This descriptive episode was then coded under the leadership category of *ideals & beliefs* and *communication* and a tally was placed for each of those responsibilities onto the data-recording sheet (see Appendix H). During an interview, if a principal mentioned the importance of professional development, the comment was coded as *resources* and a tally would be placed on the data-recording sheet (see Appendix H). These codes were then counted to determine which of McRel's leadership responsibilities were the most common (Chenail, 2015; Houghton et al., 2015; Marshall & Rossman, 2016; Vallis & Tierney, 2000).

For teacher interviews and observations, coding was performed by broad coding. Houghton et al. (2015) describes broad coding as generating scheme from observable or oral data. Codes were generated based on the content or ideas from interviews and observations. For example, if a teacher spoke about the importance of having principal support in the building, a broad code of *principal support* was used.

Once all the data was coded, the process of developing patterns began. The codes were counted using tallies. Codes with the highest frequency counts were grouped. The researcher then looked for other groups of codes that shared similar information. If two groups were similar they were formed into a pattern. For example, if a code *vision for learning* had 13 tallies and another code *ideals & beliefs about teaching* had 10 tallies, the two were combined into a pattern *ideals & beliefs with a vision for teaching and learning* with a total tally count of 23.

The researcher then used the most common patterns with the largest frequencies and synthesized them into themes or memos. Houghton (2015) remarks that memos can be summaries that "lay the foundation for further development" (p. 5). These memos, which ranged from a few sentences to several paragraphs, were often summaries of the raw data that was observed or collected. Once the patterns were synthesized into memos, the data was triangulated with the principal- and teacher-interview data and with the McRel's change management process. Triangulation involves using more than one source of data to collaborate the findings. This analytical process also enhances the validity of the data and significantly strengthens the study (Cresswell, 2015; Marshall & Rossman, 2016; Snyder, 2012; Vallis & Tierney, 2000).

The teacher STNA survey data was analyzed using IBM SPSS version 24. The researcher inputted the data and ran several statistical tests. A descriptive statistics analysis was conducted to determine the mean and standard deviation (Field, 2013). The researcher then ran an exploratory factor analysis to determine if there were any underlying factors that would provide insights into

the principal's leadership (Field, 2013; Pholmann, 2004). The researcher selected the top responses from the survey. All questions that had 70% or more of the respondents agree or strongly agree were inputted into SPSS, and a Principal Component Analysis was conducted. The Principal Component Analysis combined the variables into factors (Field, 2013; Kim & Kim, 2012; Pholmann, 2004). The factors were used to answer the research questions.

The final analytical method involved theory development. Theory development requires building a clear and logical interpretation of the data (Houghton et al., 2015). However, theory development does not necessarily require one to develop a theory in the traditional sense. Rather, Houghton (2015) urges the researcher to construct a more integrated understanding of the data by examining it to better understand the events or experiences that were observed in the observations and interviews. The researcher then examined the data to interpret the participant's experience of leading a school through a technology initiative.

Theory development resulted in the final step of cross-case analysis. Cross-case analysis empowers the researcher to understand the participant experiences and extend those experiences to a broader audience (Houghton, 2015; Khan & VanWynsberghe, 2008; Vallis & Tierney, 2000). Cross-case analysis brings several benefits which include a) creating rich holistic experiences from the study, b) identifying similarities and differences among cases, c) and generalizing findings to impact the practice of a broader audience (Khan & VanWynsberghe, 2008; Vallis & Tierney, 2000). The researcher began by examining the holistic experiences of each principal. This process is supported by Vallis & Teirney (2000), who recommend creating rich holistic experiences through an initial single case analysis. This form of analysis includes developing chains of events that can be deciphered from the data. The researcher used the patterns from the previous steps to perform a cross-case examination. This was accomplished through pattern matching or charting similar patterns into larger themes (Vallis & Teirney, 2000). Each of the four principal's cases was

compared with each other to determine which themes they had in common. Vallis & Tierney (2000) note cross-case analysis can be assisted by using a model; therefore, a second analysis was performed to determine if those themes matched McRel's 21 Leadership Responsibilities and answered the three research questions. Khan & VanWynsberghe (2008) affirm this practice stating,

> In case-oriented research, commonalities across multiple instances of phenomenon may contribute to conditional generalizations. The researcher can thus demonstrate that the outcomes in the cases selected are in fact enough alike to be treated as instances of the same thing. The central question of interest to the case-oriented researcher is in what ways the cases are alike (p 3).

Cross-case analysis led to several commonalities that helped inform the research questions and led to the case report. The final case report was supported by the recommendations of Bachor (2002), which state that case reports should clearly articulate how the evidence collected in the case study supports the final findings. This can be accomplished through developing visual graphics and ratios (Bachor, 2002). The researcher first developed several visual graphics including pictorial representations, charts, and graphs of the common themes. The visual representations were supported by ratios and percentages. Ratios and percentages can improve the comprehension of the themes by expressing how frequently a theme occurred (Bachor, 2002). For example, if the researcher noted that *communication of vision* occurred numerous times throughout the observations and interviews, these occurrences were transferred to number ratios or percentages to communicate the frequency of such occurrences.

Finally, the case report was assessed for validity through member checking. Member checking is a process that involves assessing the accuracy and credibility of the findings by taking the findings back to the participants to assess the accuracy of the report (Bachor, 2002; Creswell, 2015; Marshall & Rossman, 2016; Vallis & Tierney, 2016). The researcher sent the final case

report to the individual participants through email to inform them of the findings of the case and to ensure accuracy (see appendix K).

Limitations

Limitations are a natural research process (Rossman & Marshall, 2016). Therefore, the limitations of this study will focus on the research design and methodology, the sample size, time, and the researcher's inter-rater reliability as a former school principal.

Qualitative data has recently seen a resurgence as a research methodology (Creswell, 2015; Gerring, 2004; Snyder, 2012). Despite this increased popularity, qualitative methodology does have its drawbacks. The qualitative researcher examines words and images. However, quantitative research provides statistical data based on mathematical analysis. This method of research offers the researcher the ability to examine trends or explanations (Creswell, 2015). A quantitative methodology may provide different insights into the findings.

Sampling size is another limitation to consider. Marshall and Rossman (2016) report that sampling size may undermine the credibility and transferability of a study. The researcher must understand the variety of variables that affect a population sample and consider those variables as they develop their sampling size. This includes the size of the sample, the time spent with the sample, and the role the researcher plays within the social context of the sample (Marshall & Rossman, 2016). Creswell (2015) notes, the larger the sample the less likely the results will be "different from the general population" (p. 145). Therefore, it is probable that a larger sampling size may produce more robust results that could be used to generalize the findings of this study.

The last limitation of this study is the bias of the researcher's inter-rater reliability. Bias involves the researcher's passions, assumptions, ideals and beliefs, and past experiences. These characteristics can be a great asset to a researcher. However, they also may be detrimental if the researcher is not aware of how they affect the role of the researcher, their analysis, and how they

report the findings (Creswell, 2015; Marshall & Rossman, 2016). Consequently, the researcher's time as a former principal should be taken into consideration in this study.

The researcher had spent six years in administration as a vice principal and principal at two separate elementary schools in southwestern Idaho. During that timeframe, the researcher used the McRel Balanced Leadership Framework to guide his daily work within each school. This framework helped propel both schools to great success academically and also helped generate high teacher efficacy and satisfaction within the school climate. Thus, it is possible the researcher's favorable view of the framework, its leadership responsibilities, and its change process, requires an awareness of an interpersonal connection with the content and the participants of the study. While the researcher's prior experience was a great advantage, it could also hinder the reporting of the findings due to unintentional bias.

Summary of Design and Methodology

Chapter 3 highlighted the study's design and methodology. A quantitative case study was selected to investigate the leadership responsibilities of principals during a technology implementation in a k-12 public school. Four public school principals were selected using purposeful sampling to investigate the research questions. Data was collected through observations, semi-structured interviews, and an online survey. This information was analyzed through a quasi-qualitative strategy that included a statistical test ran through IBM's SPSS version 24. The corresponding information was used to run a cross-case analysis of the participant's leadership responsibilities. Theory development was used to interpret the cross-case analysis and to generalize the findings. Limitations of the study included the research methodology, sample size, and the researcher's prior experience as a school principal (Bachor, 2002; Creswell, 2015; Marshall & Rossman, 2016; Khan & VanWynsberghe, 2008).

Chapter IV

Findings

The purpose of chapter IV is to review the outcomes of the research conducted within this study. To add context to these findings, a brief introduction is included to review the purpose of the study, the research questions, the theoretical framework, and the methodology conducted. Case vignettes of the participants and insights into their schools were included in this chapter to better understand the research subjects. The core of this chapter includes a presentation of the data that was obtained through both qualitative and quantitative methods. The chapter concludes with an identification of the major themes obtained from the data analysis.

Introduction: Context of the Study

The role of the school principal has evolved over time. In previous decades, the role of the principal was seen as a manager who only oversaw the day-to-day operations of a school. Their duties often consisted of hiring teachers, managing school finances, and maintaining student discipline. However, these assumptions are now changing. A school principal must be seen as an instructional leader who sets an educational vision, communicates instructional goals, and monitors student achievement (Bouchamma, 2012; Crum & Sherman, 2008; Davis & Leon, 2014; Forner et al., 2012; Fowler, 2014; James-Ward & Abuyen, 2015; Lemoine et al., 2014). In a similar fashion, principals are now tasked with preparing students for the 21st century. Due to the ever-increasing infiltration of technology in our society, school leaders are being asked to integrate technology into their school's curriculum (Cojocaru & Cojocaru, 2014; Jones et al., 2013; Sheppard & Brown, 2014). This brings many challenges, including providing the appropriate resources, such as mobile laptops or tablets, professional development for the teachers, and shifting the instructional vision of the classroom (Afshari et al., 2010; Afshari et al., 2012; Asan, 2015; Chua & Chua, 2017; Davies & Leon, 2014; Flanagan & Jacobsen, 2003; Topper & Lancaster, 2013; Wu, 2017).

For decades the traditional classroom has focused on teacher-directed lessons where all students, despite their instructional needs, receive the same lesson. However, not all students have the same instructional need, nor do they learn with the same instructional strategies. Thus, a more student-centered approach to learning is required. In this approach, students have independence in what they learn, how they learn, and how they express their learning. Principals must foster this shift of instruction to maximize the learning of all students (Christensen et al., 2011; Friedman & Heafner, 2007; Levin & Schrum, 2013; Maniger, 2006).

To explore the role of a principal in implementing technology into the curriculum, three research questions were used to guide this study.

1) What strategic leadership responsibilities do education leaders perform to promote a school improvement initiative?
2) What is the responsibility of the principal in implementing technology in a school?
3) Which of McRel's 21 Leadership Responsibilities are most influential on implementing innovative practices and technology in a school?

To further add to the research, McRel's Change Management process was used as a theoretical framework in which to view the leadership of the participants of this study. Change management is considered a foundation on which all improvement efforts are built (Goodwin et al., 2015; Fullan, 2001; Tomal et al., 2012; Weston & Bain, 2009). McRel's Change Management Framework views change through four distinct stages a) Create Demand b) Implement c) Manage Personal Transitions and d) Monitor and Evaluate (Waters & Cameron, 2007).

Since the nature of this study was based on the evolving leadership of school principals, a mixed methodology case study was used. Case studies allow researchers to investigate phenomena in a real-life social context. This form of research uncovered the experiences of individuals to better

understand the intimate and often complicated details of school leadership (Creswell, 2015; Gerring, 2004; Johnston, 2013).

Participants

The participants of this study were selected based on purposeful sampling. This form of sampling selected participants based on several criteria.

- A vision for teaching and learning that promoted individualized learning
- Student voice and choice in selecting how student's express their learning
- Student agency and ownership for their learning
- A systematic approach to incorporating technology into the curriculum to support the student's voice and choice in their learning

Based on these criteria, four principals were selected to participate in this study. The participants ranged from a variety of schools, districts, and backgrounds. The following case vignettes are included to further aid the context of the research study.

Case Vignettes

Mr. McKnight. Mr. McKnight was a tall man in his mid 40's. He had been a principal at his school for eight years. He began his educational career in a rather untraditional manner. Mr. McKnight grew up highly devoted to his church and took a mission trip to a large urban area after graduating from high school. While serving his mission, he was exposed to the difficulties of poverty. He often encountered broken families and men who struggled to find employment. During this time, he realized he wanted to help people, particularly men who had struggled to obtain an education, so he thought a career in human services would suit him best. He finished college and earned a degree in educational psychology and adult basic education. His first job was in a prison helping inmates earn their GED's through an online program. This was his first exposure to teaching. Upon moving back to his hometown, he was asked to coach at a local high school and subsequently was hired as a reading

teacher. He did that for two years, until he was asked to become a school counselor. He spent five years in that role, and during that time, he returned to school and earned a graduate degree in educational leadership. He eventually was hired as an elementary principal and had a successful stint leading a traditionally underperforming school. This school quickly became one of the top achieving schools within his district. After this success, he was promoted to be the principal of a large suburban high school. His school was entering their second full year of a technology implementation and served over 1,500 students. His school had a free and reduced lunch population of 70%. His student demographics include 70% white, 23% Hispanic or Latino, and 7% classified as other. For the first several years of his leadership, Mr. McKnight primarily focused on building a strong culture that promoted collaboration. Later, as he became more informed about innovative instruction, he began to shift the focus of his school from a traditional approach of teaching and learning to a more student-centered approach. His school had several innovative features.

First, there are three tracks for all incoming freshman to choose from in order to meet their high school graduation requirements. The students can choose between a traditional track, a STEM track, and a personalized learning track. The first track is a traditional track, which mirrors many of the high schools throughout the United States. Students attend traditional classes in the main subject areas. The class periods reflect a traditional length and bell structure. The second track is a STEM track. This track focuses on using Science, Technology, Engineering, and Math to meet the requirements for graduation. Students have their own wing of the school and a flexible schedule with no bells. They attend classes based on their learning needs, and teachers meet with the students often to monitor their academic progress. Students learn primarily through project-based learning and internships outside of school. The third track is a personalized learning track. This track uses a computer based learning management system that details all the educational requirements a student needs to graduate. Students in this track choose the pace and time in which they learn. It allows

students to learn at their own speed. Students are allowed to accelerate through the curriculum and take duel-credit college courses to earn credits toward an associates or bachelor's degree while still in high school.

Besides these unique paths to graduation, Mr. McKight has also secured 1:1 technology for each student in the school. Currently, his school is the only high school within his district to have this level of technology. Many of the school's courses, whether on the traditional, STEM, or personalized track, have a blended learning component.

Lastly, Mr. McKnight also promotes an annual exhibition of innovative thinking. This event is called "Shark Tank," named after a popular television show. This contest is a competition where students submit innovative projects to a jury. The jury determines the winners, and students can earn a $1000 scholarship. Besides developing a project, the finalist is required to pitch their product to a panel. The panel comprises local community and business leaders, school district administrators, and parents. The winning project is announced later in the year during a school-wide assembly.

Mr. Mitchell. Mr. Mitchell knew he wanted to work with kids from a young age. In his teenage years, he had many opportunities to work with children in a variety of teaching and coaching capacities. He enjoyed these interactions and he knew he wanted to become a teacher. He earned a teaching degree and taught for several years. Later he explored another occupation, but soon realized teaching was his favorite profession. He taught for 13 years prior to earning his master's degree in educational leadership. He then became a school administrator, and his first job was as an assistant principal in the same school where he now serves as principal. He has worked a total of 26 years in education, and he enjoys being a positive role model for students.

Mr. Mitchell's school is a rather large middle school in a suburban community outside of a metropolitan area. His school had obtained technology for several years and served about 900 students in grades 6th, 7th, and 8th. His school had a free and reduced lunch population of 20%. His student

demographics include 88% White, 6% Hispanic, and 6% classified as other. His school has many similarities to many other middle schools. This is mostly due to a strictly adhered-to schedule that is imposed by his school district. All of the middle schools in his district have to be on the same schedule and teach the same curriculum. However, compared to many of the schools within his district, Mr. Mitchell's does have more access to technology. His school has 12 laptop carts, interactive whiteboards, document cameras, and a recording studio were students record daily service announcements that are broadcast each morning around the school. His school is characterized by a warm, welcoming culture where teachers interact and work collaboratively on lessons, assessments, and some project-based learning activities.

Mr. Young. Mr. Young has been an educator for 25 years. He grew up around education as both his mother and father were middle school teachers. He was exposed to teaching from an early age, and he noticed how his parents became role models for their students. He also enjoyed how teaching impacted his family. Since his parents work schedules matched his school schedule, their family was able to spend a lot of quality time together. This is something he wanted for his own family, and so teaching seemed like a natural fit. He earned his teaching certificate and began his career as a sixth grade teacher. After eight years in the classroom, he moved to an instructional coaching position, and during that time he earned a master's degree in educational leadership. His first school administration position was overseeing a sixth-grade-only school. He eventually moved to the middle school level and was an assistant principal for several years. He then became the head principal at an elementary school and has served in that role for the past eight years.

Mr. Young's school is a suburban elementary school that serves about 600 students with a free and reduced lunch population of 44%. His school was entering their second full year of a technology implementation. Their demographics include 75% white, 20% Hispanic or Latino, and 5% were classified as other. Mr. Young's school has experienced some drastic changes over the last few years.

His school was granted innovation status by his district, which allowed them to access funds to become a STEM school. After exploring that idea for a year, he and his staff decided they would shift their focus from STEM to project-based learning. There school now teaches through interactive projects. To further this work, his school has partnered with a local university to provide continual professional development around project-based learning. After the projects are completed, his school puts on several public exhibition nights. Parents and community members are invited to view the student's projects. Students interact and present their work to large crowds of over 1,400 spectators.

Besides their focus on project-based learning, Mr. Young's school has 1:1 iPads for every student. His teachers use a variety of digital tools to teach their content, and students often use the iPads to personalize their learning. Mr. Young's school also focused on a book study based on Carol Dweck's Growth Mindset (Carol Dweck, 2008). His entire staff was involved in learning about a growth mindset and had incorporated her research into their curriculum.

Mr. Newman. Mr. Newman was the principal and superintendent of a rural elementary school located in a small farming community. He grew up in the community where he now serves as principal and superintendent. However, he did not immediately see teaching as his career. He attended college only after being pressured by several high school friends to attend because they needed a roommate. While his friends ended up withdrawing from school, Mr. Newman enjoyed college and finished out the year. However, he eventually felt called to the ministry and transferred to another college, where he majored in Behavioral Science. He worked as a youth minster for four years and eventually went back to school to earn his teaching degree. He worked in the day and attended classes at night and on the weekends. After graduation, he got his first teaching job teaching middle school science. However, he was also asked to be a reading intervention teacher. His students showed academic growth in both classes, and his love for teaching was born. Due to his success in the classroom, one of his administrators encouraged him to consider being a school principal. During that time, he felt

frustrated with the current leadership and believed he should do something about it. He obtained his administration degree and began to look for leadership positions. There were very few openings around his local community, so his mother encouraged him to apply in his hometown. He interviewed and was hired as an elementary principal in 2007. Several years later his superintendent retired and he again was encouraged to take the job. He was hired and now works as a principal and superintendent.

His school was entering their third full year of a technology implementation and served about 300 students. One hundred percent of the students receive free and reduced lunch. His school's demographics include 70% Hispanic or Latino, 20% white, and 10% classified as other. Mr. Newman's school has gone through many changes. Prior to his leadership, his school and district had traditionally underperformed academically. He spent the first several years focusing his school on quality teaching practices, including identifying and teaching to standards, assessing students, and using data to drive instructional practices. His school began their innovative journey several years ago when he applied for a grant through his local state department of education. The grant awarded his school 1:1 iPads and free professional development. This prompted him to research mastery- and competency-based education. His school now focuses on mastery-based education where each student receives personalized instruction that focuses on their academic needs. The students work independently on digital curriculum and are supported by the classroom teacher through one-on-one coaching sessions, mini-lessons and, when needed, whole group instruction. Students are also encouraged to select instructional goals and reflect on their learning. Teachers spend the majority of their time working individually with students or in small groups. When students master a standard, they advance through the curriculum and move to their next standard. The school has no bells or schedules. Teachers and students can choose when they want to teach and learn their subjects. Outside of a lunch period, the schedule of the school day is determined by the teachers. Students have flexible seating in their classrooms, which allows students to choose where they want to work. This

encourages a collaborative work environment with other students. Peers often provide tutoring and feedback to one-another. Lately, the school has been focusing on project-based learning to help encourage real-life learning experiences.

Presentation of Data

Case studies were used to investigate the phenomena of principal leadership. These cases allowed the researcher to collect data from a variety of settings, including semi-structured interviews, principal observations, teacher interviews, classroom observations, and an online survey. Raw data was collected and analyzed in four steps a) comprehending data into codes, b) synthesize codes to form patterns, c) theorize patterns into summary categories or themes, and d) contextualize the themes into a coherent explanation (Houghton et al., 2015).

Principal Interviews

The researcher began by analyzing the semi-structured principal interviews (see Table 2).

Table 2

Common Leadership Codes from Principal Interviews

Leadership Responsibility Code	Frequency of Codes
Ideal/Beliefs	82
Focus	58
Resources	29
Culture	19
Change Agent	17
Outreach	15
Knowledge of Curriculum, Instruction, & Assessment	12

Principal interviews were coded using a quasi-qualitative strategy. This strategy uses predetermined categories to analyze data (Chenail, 2012; Marshall & Rossman, 2016). Therefore,

McRel's 21 Leadership Responsibilities was used to code the principal interviews. The research then combined like codes to form general patterns from the interviews. Figure 2 illustrates the major patterns from the principal interviews.

Figure 2. Patterns illustration – principal interviews

Several of the codes naturally combined to form patterns. For example, *Ideals and Beliefs* and *Focus*, which requires principals to create clear goals and expectations based on their ideals and beliefs, were highly connected (Waters & Cameron, 2007). *Culture* and *Change Agent* were combined because many of the principals developed their school culture by changing the status quo of their school. *Knowledge of Curriculum, Instruction, and Assessment*, also known as *Knowledge of C.I.A.*, was added to *Resources* because the technology hardware and professional development closely

aligned to the school's curriculum. While the code *Outreach* only had 15 occurrences, it was left as a theme. This was because *Outreach* spoke to the importance of the principal's communication within the school and to stakeholders. This was a common idea amongst the interviews and it was often used in conjunction with the other codes. The new principal interview patterns can be seen in Table 3, along with their combined code frequencies.

Table 3

Principal Patterns from Interviews

Previous Codes	Pattern Name	Pattern Frequency
Ideals/Beliefs & Focus	Vision	140
Resources & Knowledge of C.I.A.	Resources	41
Culture & Change Agent	Change Agent	36
Outreach	Communication	15

Memos were recorded for each pattern (Houghton et al., 2015). These written memos helped develop a clear understanding of the patterns and helped the researcher summarize the findings. The following pattern descriptions are based on these summary notes.

Vision formed the first pattern with the highest code count. This pattern combined two main concepts. The first was the principal's personal thoughts on why their schools exist. They often spoke about the purpose and vision of their schools. They all desired for their students to have knowledge and learn content, but they also wanted students to have skills that would help them later in life. These abilities included perseverance, collaboration, reflection, and communication skills. The second main idea was centered on the school's focus or vision. All the principals had a unique focus that went beyond the acquisition of knowledge. Mr. McKnight articulated this when he reflected on the purpose

of his school moving from a traditional high school that teaches students content to a high school that teaches students life skills such as perseverance and self-reflection. He shared,

> I think one of the visions we have is that we want to go away from being the liberal arts old-school content kind of high school to a skills-based high school. It's mostly the metacognitive skills that we're really focused on.

Other principals had developed similar visions for their schools. All four principals spoke about breaking free from the traditional practice of gaining knowledge to the more contemporary thought of applying knowledge. They wanted their students to not only learn information, but to use that knowledge in a meaningful way. Mr. Mitchell stated,

> I think real-world learning goes back to what we mention in our faculty meetings, and that is challenging our students in those deeper level thinking skills. Not just knowledge and understanding, but the application and the analyzing. We want students to be able to explain their thinking, because when they're able to explain their thinking, they can transfer that knowledge to any situation. I would say that's probably the biggest thing that will help our students develop real-world knowledge.

Mr. Young furthered this connection to real-world knowledge when he spoke about how his school had developed a project-based learning focus. His school was in their second year of project-based learning. His ideals and beliefs around project-based learning were to involve his students in meaningful learning experiences. The projects in his school focused on solving a community problem. He felt if students could connect their learning to their community, then they would feel some intrinsic value and motivation. He noted,

> The beauty of project-based learning is that it really creates for the students that essential question that oftentimes is empathy-driven and community-minded. It adds purpose to the learning, and as students work to solve real-world problems they see the value of their education.

Mr. Newman felt learning often takes place outside of the classroom. He mentioned a recent learning experience where he decided to take his whole school outside to observe and learn from a solar eclipse. His teachers taught lessons outside and the students brought their iPads to take pictures and record video. Later, they had to research the science behind the solar eclipse and present their

learning in a project that was later shared in a public presentation. “I wish we could have spent the whole day outside!” he said. “We had teachers teach lessons about the world around us. It was a day of science. We do things like that quite often.”

Resources and Knowledge of C.I.A. was the second pattern. Resources such as technology and professional development were an integral part of each school’s curriculum and instruction. Technology often allowed each principal to implement their vision of their school. However, each principal felt technology was only a tool to access the curriculum and was not a substitute for classroom instruction. Mr. Newman stated, “You can’t do it without technology, but it’s not about technology!” His school used technology to develop a unique approach to teaching that was centered on mastery-based learning. Rather than promote students by time, meaning students progress through lessons based on the teachers’ pre-determined time frame, his school promoted students based on what they learned. He stated, “Our uniqueness is the ability for our kids to focus on mastery versus seat time for credit or moving from grade to grade.” Thus, in a fifth grade classroom, you could have some students learning 4th grade material while others were learning 7th grade material. Students often worked independently or in small groups on a digital curriculum. The curriculum would notify the students and the teacher if they mastered the material. If they had not, the teacher would be notified, and the student would be pulled for a mini-lesson on the content. Students often reflected on their learning and had to articulate whether they understood the material or not. This promoted student ownership of their learning. Mr. Newman noted,

> The student has control of their learning and it could be on a device or it could be in a textbook. It could be a variety of things that the student has control of. It could be project-based material or a challenge-based activity. They have control of that and they could do that at home or they could do it here at school. No matter where they are, they can do their work, but the focus is about mastery.

Mastery learning was also common at Mr. McKnight’s school. His school had just undertaken a new mastery-based software called Summit Learning. This software places all the curriculum a

student needs to master inside a digital learning platform. Students can learn both in the classroom and online and then show mastery of the content through a variety of assessment options. A personalized timeline is created for each student. They can then track their progress to determine if they are on pace to master the curriculum. If so, the student can advance to other classes and earn credit for college. If a student falls behind, a teacher can meet with the student to provide additional instruction. This form of digital learning allows students to pick their own pace of learning, which he feels increases student productivity. "The teachers felt that they were getting much more work flow from the students," he said. This is also a major challenge since many students are not accustomed to monitoring their own learning. This style of learning requires a new mindset where students must learn failure is a part of the learning cycle. He noted, "We worked a lot, and continue to work a lot, on having that kind of mindset, a growth mindset."

Besides digital curriculum, another resource that was apparent in each school was professional development. Professional training was often considered the key attribute that allowed the teachers to effectively use the technology. While each principal spoke about its importance, each principal had a slightly different approach to implementing professional development within their school. Mr. Mitchell relied heavily on his local school district to provide his staff professional development. His teachers often attend trainings hosted by their district. He always felt supported by his district noting, "Our district has been very good the last few years supporting us with training." The teachers learned how to use a variety of hardware and software. Once his teachers felt comfortable with the technology, Mr. Mitchell expressed how critical it was to allow them to experiment with their new skills. He stated, "Once the training is in place it's a matter of making sure they understand they have our support to experiment…we're not going to be critical if things fall flat on their face."

Mr. Young used a different approach for his professional development. He relied heavily on a partnership with a local university. His school had worked closely with an innovation center that

specialized in providing professional development in project-based learning. He chose about a dozen teachers to form a vanguard team. This team of teachers attended monthly trainings. The vanguard group was then specifically assigned to another staff member to train. This work was supported by the work of an instructional coach. He explained, "Having a strong instructional coach has been probably one of the greatest blessings and helped us roll out this work."

Mr. Newman chose a similar approach and applied for a grant through his state department of education. This grant provided some financial resources that allowed him to hire a part-time digital coach. This coach attended special trainings and now supports the work of the school by helping her colleagues with technology and digital curriculum.

Mr. McKnight chose a different approach to professional development. He chose to send his teachers to other schools so they could learn from the experiences of others. He called these "vision" trips. He felt these trips helped create demand for a new style of teaching. He mentioned teachers that attend these trips helped "sell it" to other teachers. These trips also fostered conversations that promoted their growth. He added, "I feel fortunate…I would have never had conversations with different people about different things if I wasn't able to go and do and see…that's been huge!"

The third pattern that came forth from the principal interviews was Change Agent. Change Agent tied closely to the principal's ability to lead and build culture within their schools. Each school had a unique culture that mirrored the principal's ideals and beliefs. One characteristic that was common amongst all the schools was a growth mindset that focused on how an individual psychologically views success (Dweck, 2008). Dweck (2008) views failure as a key component to future success. Her research indicates that individuals who use failure as part of a learning cycle often reach higher levels of achievement (Dweck, 2008). This idea was a part of Mr. Mitchell's view of a successful student. He noted, "…growth mindset is a huge part of student success—it's not just the achievement, it's the growth." Likewise, Mr. Newman also defined student success through a growth

mindset. He believed a growth mindset promoted more “ownership” and “engagement,” which ultimately led to “significant academic growth” amongst his students. Yet, mindset went beyond students. Mr. Young felt it was critical for teachers and parents as well. Growth mindset was a professional development focus for his school. He even went as far as having his Parent Teacher Association join a book club. Each month his PTA read about a growth mindset. His ultimate goal was to encourage parents to promote this mentality with their students at home.

Besides mindsets, another common culture characteristic was strong relationships. Each school was characterized by having a warm and caring environment that promoted relationships with students, teachers, and parents. Mr. Mitchell was very cognizant of building a strong culture in his school. He stated, “Culture and climate is a fickle thing. I don’t know if it’s true in other businesses, but in education it’s something we have to always pay attention to. Otherwise, it just goes down in the dumps really quick.” He and his administrative staff promoted relationships by doing an appreciation project. Each staff member in his school was secretly assigned to another staff member. They sent notes of encouragement, praised each other for their work, and sent small treats of appreciation. His goal in this project was to make his school a healthy work environment where each staff member felt welcomed and encouraged. He believed this would ultimately lead to a more productive work environment that would equip teachers to improve their classroom instruction. He noted, “I think when the adults are happy they perform better.”

This performance included meeting consistently in collaborative teams that viewed student achievement data and developed academic interventions for students. All four of the principals promoted similar practices. Their teachers routinely met to review student achievement data and plan lessons together. This form of work breaks from the traditional practice of teaching in isolation. Mr. McKnight spoke about his teachers’ uniqueness, stating, “I know, especially on the staff side of things,

they know they're different than most traditional high schools. They're not working in isolation or being left alone to do whatever they want…we really do work collaboratively."

Mr. Newman also encouraged his teachers to work together. Prior to his arrival, working in isolation was common. He stated, "There was no trust in the building. No trust in the district and teaching in isolation. I mean, it was just all the things you come up with that are the worst practices that were happening!" Today, his teachers not only plan together, but they also learn from one another. He often had his teachers teach each other new technology or share their lessons during their professional development time, which occurred during a shortened school day once a week. These afternoons were set aside for professional development and collaboration.

This was similar to Mr. Young's school. His teachers met once a month to learn about technology and learn new applications on their tablets so they could incorporate them into their lessons. They would also share their progress on their projects and gain new ideas from one another. His school even began to partner with another elementary school in his district to help foster project-based learning. He believed if his teachers helped another school then their project-based teaching skills would improve.

The final pattern from the principal interviews was communication. Each leader had developed strong lines of communication within their school and to their parents. Communication within the school focused on sharing the ideals and beliefs of the principal through the school vision. It also included taking input from the teachers to help shape the vision. In each school, teachers provided input to their principal on a variety of topics. This was done primarily through a leadership team, school surveys, and informal meetings.

Mr. Newman relied on his teachers input when they were piloting their digital curriculum. "I'm constantly listening and looking and trying to connect with the latest things," he stated. "I really try to just kind of get the feedback from my staff and give them feedback on certain things."

Mr. Mitchell had similar thoughts, but he also believed listening needed to include actions. He stated, “I think a large part of it is letting them be heard and making sure they know that they are heard. I’m going to act on what they’re telling me. They have a say in how things go. A large say.” He explained he rarely had to make a “command decision.” Rather, he allowed his teacher leaders to make decisions. He would occasionally make decisions but he preferred to guide their decisions based on their input.

Teacher input was also important to Mr. McKnight, particularly when his teachers need assistance. He reminisced on how difficult his first year was implementing technology into their curriculum. The technology often malfunctioned due to technical errors, and he did his best to listen to their concerns. He felt taking their input helped them overcome their initial difficulties, and this ultimately allowed him to lead them more effectively. He mentioned, “When they know that there is someone there to help, even if it’s just a process, I think people allow you to shepherd them even more if you have that.”

Mr. Young took his teacher’s input from his leadership team. They met monthly and would provide him with updates on how their projects were going. He also would provide assistance if they needed help with their technology. However, his primary focus centered on communication. He developed a plan that required students to inform their parents about what they had learned in their projects. During parent-teacher conferences, students used a digital learning platform to communicate their instructional goals and progress. This was similar to the student’s exhibition nights. On those nights, students presented their projects to hundreds of community members. Mr. Young believed those nights engaged his students, teachers, and parents. He noted, ultimately this type of learning makes their school “more collaborative with our parents.”

Principal Observations

Each principal was observed in their school. The purpose of these observations was to view the leadership of each principal in the context of a school setting. These observations allowed the researcher to view each principal's leadership through a different viewpoint. Qualitative research recommends observing a case through multiple perspectives (Creswell, 2015; Marshall & Rossman, 2016; Khan & VanWynsberghe, 2008; Vallis & Tierney, 2000). Thus, the principals were observed leading in a variety of settings that included staff meetings, professional development meetings, and their normal daily duties. The researcher observed each principal using a principal observation protocol (see Appendix D). The observations were then recorded and coded to McRel's 21 Leadership Responsibilities. Table 4 outlines the main codes collected during the principal observations.

Table 4

Common Leadership Codes from Principal Observations

Observed Leadership Code	Frequency of Codes
Culture/Relationships	21
Input/Communication	12
Ideals/Beliefs	9
Change Agent	5
Focus	5

Once the codes were collected, they were synthesized into patterns (see Figure 3). For example, the researcher combined *Culture/Relationships* with *Change Agent* because of the connection between culture and leading change.

Focus was placed with *Ideals/Beliefs* because of the connection between the principal's ideals and beliefs and the focus of the school. Lastly, *Input/Communication* was left as its own pattern

because it stood as an independent pattern. The researcher again used memos to summarize and articulate the findings (Houghton et al., 2015). These summary notes aided the researcher in reporting the findings.

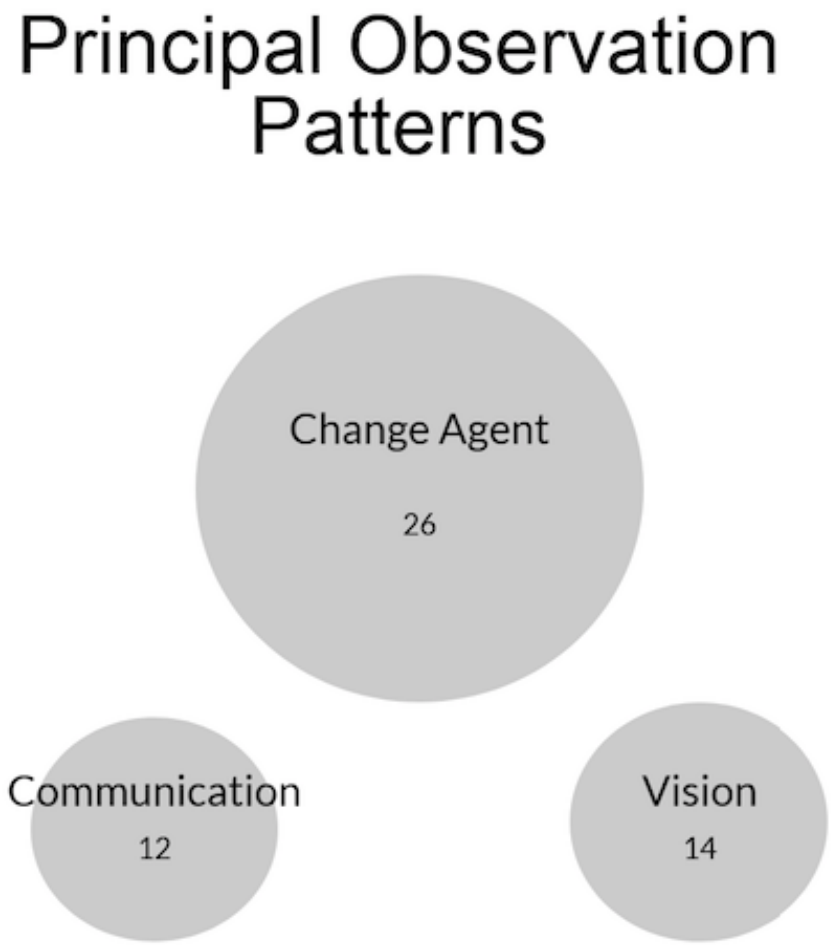

Figure 3. Patterns illustration – principal observations

Change Agent had the highest code count amongst all the principals. This was the most observed pattern during the principal observations because it reflected the principal's leadership on the school's culture. *Ideals/Beliefs* was typically communicated by the principal to teachers during staff meetings. This was evident as the principals challenged their staffs to meet instructional goals, and how the principal affirmed practices occurring in the school that met the current vision.

Communication was highly evident throughout the observations. Each principal had clear lines of communication that allowed for teacher input on a variety of topics. All four of the participants received input from their staffs. Table 5 illustrates the patterns developed from the observation codes. The following descriptions highlight the patterns that were displayed in the various observations.

Mr. Newman's observation occurred after school during a professional development meeting. The professional development took place in the school's library. Teachers sat in groups at several tables while Mr. Newman stood at the front and opened the meeting.

Table 5

Principal Patterns from Observations

Previous Codes	Pattern Name	Pattern Frequency
Culture/Relationships & Change Agent	Change Agent	26
Ideal/Beliefs & Focus	Vision	14
Input/Communication	Communication	12

The culture of the school was collaborative. Teachers worked closely together as they reviewed their student's data. Change Agent was evident in the collaborative nature of the school. This was a drastic change from the past when teachers worked in isolation. Toward the end of the meeting, he communicated his ideals and beliefs that all students, no matter their academic deficiencies, could end the school year at grade level. He challenged his staff to set individual goals with students and reiterated that he would provide any tools necessary to help the students achieve those goals.

Mr. Young was observed during a leadership meeting with his teachers. The meeting took place after school in a small meeting room. The teachers sat around a rectangular table while Mr. Young passed out an agenda.

He started the meeting with an overall introduction that communicated the purpose of the meeting. Several topics were discussed as he sought input from his staff on teacher evaluations, grading practices, and how PTA funds should be appropriated in the building. The teachers provided input as he wrote down their suggestions. His ideals and beliefs were evident as one teacher began to voice her frustrations with a recent change in the school schedule. Mr. Young thanked the teacher for sharing her thoughts and articulated the importance of having a growth mindset as she struggled with the new change. He also openly communicated his feelings about a new grading practice his district had mandated. He stated how "messy" the new practice was, but reiterated the importance of having the assessment data and encouraged his staff to not give up. Lastly, he closed the meeting with a practice called "Shout-Out!" This activity required each teacher to say a positive or affirming word about a fellow colleague. The teachers each took a turn and thanked another teacher or staff member for their work.

Likewise, Mr. Mitchell was observed during a leadership meeting. This meeting took place early in the morning before classes began. Several teachers and administrators sat around a table in the school's library. The culture of the school was collaborative in nature. Several teachers exchanged jokes, and laughter was evident amongst the team. The teachers were discussing several items on the agenda that included a school fundraiser, grading practices, and parent-teacher conferences.

Communication was evident throughout the meeting as the team provided input on what they felt was the most effective way to generate revenue for the school. Mr. Mitchell noted the suggestions. Later, the conversation moved to grading practices. Several departments in the school were frustrated because students were allowed to retake multiple exams to raise their test scores. The teachers argued that the students were wasting their time because they did not appear to study for their exam re-takes. Mr. Mitchell's ideals and beliefs were evident when he reiterated the importance of exam retakes, but he also conceded that multiple retakes without effort would be a waste of time. Change Agent was

apparent when Mr. Mitchell reinforced the importance of changing the parent's views on the school's grading policies. He discussed how important it was that parents know about the grading practices in the school and how grades should reflect the knowledge obtained in a class.

Mr. McKnight's observation took place during a back-to-school staff meeting. Eighty teachers sat around twenty tables in the school library. Teachers were handed a white T-shirt with the word "Family" written on them. The T-shirts evidenced Change Agent and Ideals and Beliefs. Mr. McKnight had worked diligently over the past several years to build a school culture that reflected a family atmosphere where individuals look out for the well-being of others. Later, this culture was displayed when each new staff member was introduced by a veteran teacher from the school. The veteran teacher stood up and shared details about the new teacher such as where they went to school and why they wanted to become a teacher. After each introduction, the whole staff clapped in unison, symbolizing they welcomed the new member into the "family." A short documentary film was then shown of the 1960's Civil Rights' movement. A question was posed to challenge the staff's assumptions on student achievement. This was followed by a discussion. Mr. McKnight wrapped up the activity by stating that great individuals, whether they are civil rights' leaders or classroom teachers, never give up when tasks are difficult. The activity was concluded when individual teachers stood up and shared a success story about a student who had overcome great challenges. After each story, the faculty clapped in unison, commemorating the family's work and celebrating the student's success.

Teacher Interviews

Teacher interviews were conducted in each school to determine how the principal's leadership had impacted the teaching staff and their use of technology in the classroom. The participants for these interviews were selected through a snowball sampling technique. This technique uses participants to refer other participants for the research study (Creswell, 2015). The researcher asked

the school principals to recommend two teachers from each of their schools who had implemented a student-centered learning environment. Based on these recommendations, the researcher set up individual interviews with each teacher. The interviews lasted between 30 and 60 minutes and were recorded using a digital application on an iPad. The interviews were then transcribed and checked for accuracy. Once transcribed, the interviews were coded. Codes for the teacher interviews were conducted using broad coding, which uses the general ideas of interviews to generate codes (Houghton et al., 2015). Table 6 features the codes that were collected in the teacher interviews.

To generate patterns, the codes were synthesized into similar groups. These patterns were based on comparable ideas. For example, *Ideals/Beliefs of Principals* was integrated with *Ideals/Beliefs of Teachers*, *Principal Vision*, *Ideal Role of Principal*, and *Growth Mindset* to form an overall pattern called *Vision*. The researcher then combined similar codes into like patterns. Table 7 features the patterns that were formed from the teacher interview codes, and Figure 4 illustrates the overall patterns.

Vision was the most frequent pattern in the teacher interviews. This pattern was illustrated in Mr. Newman's school. His teachers Mrs. Thomas and Mrs. Campbell noted that having a "clear vision" is essential to leading a school. They mentioned without having a clear path, teachers can become confused on what the expectation is of the school. In their building, the vision of mastery learning for students had been clearly articulated. This was done through developing clear learning expectations for students. They spoke often about how they encourage individualized instruction and promote student ownership of their learning.

However, this looked differently depending on the different grade levels. Mrs. Campbell taught first grade; thus, more time was spent on learning foundational reading skills as a whole class. This equated to less-personalized learning time, although she did place students in digital curriculum to practice their individual reading skills several times a week. Mrs. Thomas taught 5th grade and

spent a great deal of time on personalized learning and mastery of skills. She mentioned she "rarely" teaches lessons as a whole class; rather the students are allowed to work individually on assignments or in small groups.

Table 6

Common Codes from Teacher Interviews

Teacher Interview Code	Frequency of Codes
Ideals/Beliefs of Principal	172
Culture & Relationships	60
School Resources	55
Growth Mindset	37
Student Voice & Choice	31
Ideals/Beliefs of Teacher	26
Change Agent (Principal Role)	25
Flexibility	23
Inconsistent use of Technology	12
Ideal Role of Principal	11
Principal Vision	9
Trial & Error	8
Passive Principal	7

Change Agent was also a common pattern amongst all of the teachers. This was closely tied to the principal's vision, but it also varied in a distinct way. The primary focus of the Change Agent pattern was how the principals changed the teaching and learning of their schools. The teachers all

spoke openly about how their principals had changed their school's instructional practices, mindsets, and culture. In Mr. McKnight's school, his teachers spoke specifically about how his vision had changed the culture of their high school. They had previously been a traditional, comprehensive high school, but two years ago, they shifted their focus to personalized learning.

Table 7

Teacher Patterns from Teacher Interviews

Previous Codes	Pattern Name	Pattern Frequency
Ideals/Beliefs of Principal, Ideals/Beliefs of Teacher, Principal Vision, Ideal Role of Principal, Growth Mindset	Vision	255
Change Agent (Principal Role) & Culture/Relationships	Change Agent	85
Voice/Choice & Flexibility & Trial/Error	Flexibility	62
Resources	Resources	55
Inconsistent Use & Principal Message	Lack of Assertion	19

Mrs. Jenson, a Foreign Language teacher, mentioned how personalized learning helped change her classroom instruction. She stated, "It's more than just the teacher holds all the information and transfers it to the students. We get the opportunity to teach them how to learn and how to find resources." She also spoke about how her principal would not allow their school to become obsolete. She mentioned her principal continually pushed the school to learn more about personalized learning and to stay on the forefront of innovative instruction. Therefore, reading about innovation and personalized learning was paramount for her.

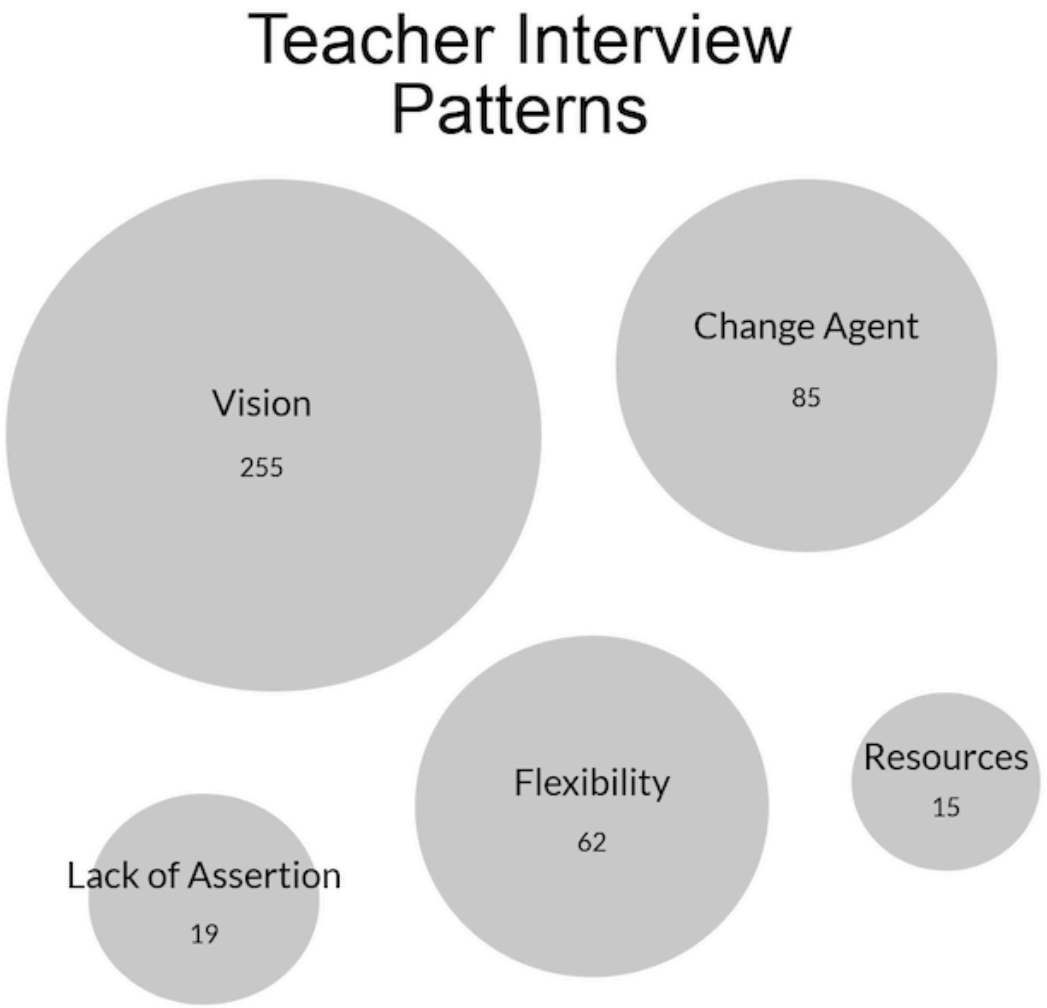

Figure 4. Patterns illustration – teacher interviews

Mr. Eric had similar thoughts. He was a science teacher in the newly formed STEM Academy. This was a school within a school that allowed all 9th graders to learn content through the integration of Science, Technology, Engineering, and Mathematics.

He spoke often about how important it was to have a leader who promoted personalized learning: “He (Mr. McKnight) is so supportive of us. He’s believed so strongly and he’s so supportive of us that he’s always there for us.” This support has allowed Mr. Eric to change the way he teaches

from a stand-and-deliver approach to a more personalized, student-centered learning environment. He stated,

> I did everything everybody told me to do, which was set up front and lecture with my PowerPoint. I just really felt like that was wrong. That wasn't how education should be so I decided to change.

This change led to project-based learning with a STEM focus. Mr. McKnight supported this change and helped him restructure the room and provided him with more resources to develop a school within a school. The principal's support was essential to moving the work forward. Mr. Eric explained, "He's never come in and told me 'You're wrong!' even if he thought so. He never told me that, he guided me, which is what I needed."

Flexibility was the third pattern. This pattern focused on the principal's ability to communicate the vision of the school, but to also allow for individualization on how the vision is implemented in the classroom. All the teachers spoke about how a principal should guide, nudge, and encourage teachers toward the vision without being rigid. In Mr. Young's school, this was done by allowing flexibility with the daily schedule. Rather than demand a rigid schedule of tasks, Mr. Young fostered growth targets. Mrs. Anderson, a fourth grade teacher, noted, "He's very flexible with timeframes. We know that this needs to be done by a specific time, but he understands things come up." Another way principals can be flexible is by being patient with staff who may have difficulty learning technology. Mrs. Reed, a second grade teacher, described how Mr. Young allowed teachers to learn at their own pace. She stated, "You know, he's not at our door going, 'What lessons have you done this week with technology?'" Principals also encouraged their staff's growth by building on previous successes. Mrs. Reed explained her principal built on these initial successes with gentle recommendations. She explained, "Just little pushes instead of saying 'Hey, there's a toolbox. There are ten (apps) in there. I want you to do all of them!' You know, just kind of ease in the staff." Flexibility also tied in closely with the pattern of Resources. Many of the principals were flexible with how they utilized resources.

Resources was the fourth pattern from the teacher interviews. It focused on providing access to technology devices and professional development for the teaching staff. Mr. Davidson, a seventh grade social studies teacher at Mr. Mitchell's school, explained any time he needs technology he's got access. He mentioned, "Any time I want a laptop cart I pretty much get one. Any time I want to get iPads, I could get those too." This access to technology has allowed his students to use web resources, take online quizzes, and to collaborate digitally. Mrs. Garrison, an English teacher, used the technology in a similar fashion. She applied the resources within the school to promote digital collaboration. Her students could work digitally on assignments and edit in real-time. This provided the students with immediate feedback. Mrs. Garrison could also provide feedback on assignments through a digital-learning platform. This promoted the idea of revision, which is a major skill in her class. She stated, "I want them to know it's okay for them to revise their work and resubmit it." Furthermore, she explained how the resource of technology had helped her students become more organized. Students now save their work on a digital cloud service. This has greatly eliminated lost work, and students no longer have an excuse for incomplete assignments.

Another prominent resource was professional development. The teachers felt professional development was a significant factor in their growth. This looked differently in each school. The teachers in Mr. Newman's school believed the professional development they received from online resources like webinars promoted their growth. In Mr. McKnight's school, seeing other teachers be successful with personalized learning encouraged their progress. This was similar to Mr. Young's school, whose staff visited a school in another state that specialized in project-based learning. Their visit prompted a professional development session where a group of teachers trained the whole staff on project-based learning.

The final pattern discussed in the teacher interviews was Lack of Assertion. This pattern incorporated how a lack of assertion from the principal and a lack of communication from the school

district can have an adverse impact on the use of technology. One teacher noted how they felt their principal should have been more insistent on his vision. The teacher said, "Sometimes the leadership is not there. Sometimes he just wants to keep a hands-off approach, which is not necessarily leading." This hands-off approach led to inconsistent technology use in the school. Another teacher in the school noted, "Some teachers use it all the time, while other teachers haven't used it at all." Despite a message about how teachers were to collaborate and teach the same content, she explained the inconsistent use of technology hurts this collaborative work. She stated,

> I'm doing something on the computer, while another teacher is doing pen and paper. Then we are comparing the results of our work. We're really not looking at the same product because only half of the students had the same resource, while the other half had to use whatever they walked into class with.

Besides inconsistent use of technology, a lack of clarity also led to a lower level of technology use. Rather than using technology to promote deeper thinking, such as synthesizing and evaluating information, one teacher admitted she sees her colleagues use technology to type papers or do simple research on the Internet.

The teachers also mentioned other obstacles that can hinder a school's growth. One was a lack of communication between the school district and the principal. One teacher noted, "The district is in such transition, they don't know what they're doing when it comes to technology." This lack of communication forced the teacher to learn several digital platforms. This frustrated her because the district changed direction from using one platform to another. Another concern came from sharing resources. The teacher found it hard to plan her lessons if the technology was taken away. She would plan lessons only to have the devices taken at the end of the day. She stated, "It (the technology) is just really inconsistent. I just have to be flexible and be thankful for when I have them."

Teacher Observations

Teacher observations were performed in each school. The purpose of these observations was to view how the teachers implemented technology into their classrooms. The teachers who

participated in the interviews were selected for the classroom observation. The researcher set up a mutually convenient time to conduct the observations with each teacher. The observations ranged from 30 to 90 minutes and covered a variety of subjects including language arts, mathematics, social studies, and science. The researcher used a classroom observation protocol to take notes and to determine the level of rigor in the classroom (see Appendix E). Descriptive and reflective notes were used to describe what the researcher witnessed as well as to reflect on the observable phenomena. The observations were then coded using broad coding. Broad coding uses the general ideas that were observed to generate codes (Houghton et al., 2015).

Table 8

Common Codes from Teacher Observations

Teacher Observation Code	Frequency of Codes
Student Engagement/Voice & Choice	13
Classroom Expectations (Behavior)	9
Deep Learning (Rigor)	7
Feedback	5
Student Self-Reflection	2
Growth Mindset	2

Due to the large variety of codes observed during the teacher observations, the researcher combined like codes. For example, *Student Engagement* was combined with the code *Voice & Choice,* because both codes reflected how students engaged in their class work. Table 8 reflects the like codes that were observed during the teacher observations.

To form patterns, the researcher looked for codes that could be combined. The codes *Feedback* and *Student Self-Reflection* were combined because the teacher's feedback often required the students

to self-reflect on their learning. *Student Engagement* was combined with *Voice & Choice* because both codes reflected the student's autonomy in how they expressed their learning. Classroom management and routines were apparent in all of the classrooms, and a code was developed called *Student Expectations*. The pattern *Deep Learning* illustrated the level of rigor that took place in the classrooms. The final code, *Growth Mindset,* only had two codes, and therefore the researcher did not consider it a pattern and it was excluded from the data. Thus, four patterns were developed from the teacher observations. Table 9 lists the common patterns and Figure 5 illustrates the teacher observation patterns and their frequencies.

Table 9

Teacher Patterns from Teacher Interviews

Previous Codes	Pattern Name	Pattern Frequency
Student Engagement/ Voice & Choice	Voice & Choice	13
Classroom Expectations (Behavior)	Student Expectations	9
Deep Learning (Rigor)	Deep Learning	7
Self-Reflection (Student)	Self-Reflection	7

The number one pattern observed in the teacher interviews was Voice & Choice. This pattern was characterized by allowing students choice in how they displayed their learning on their assignments. For example, in Mr. Eric's STEM Academy room, he allowed students to build a Mars lander out of cardboard, toothpicks, tape, newspaper, and string.

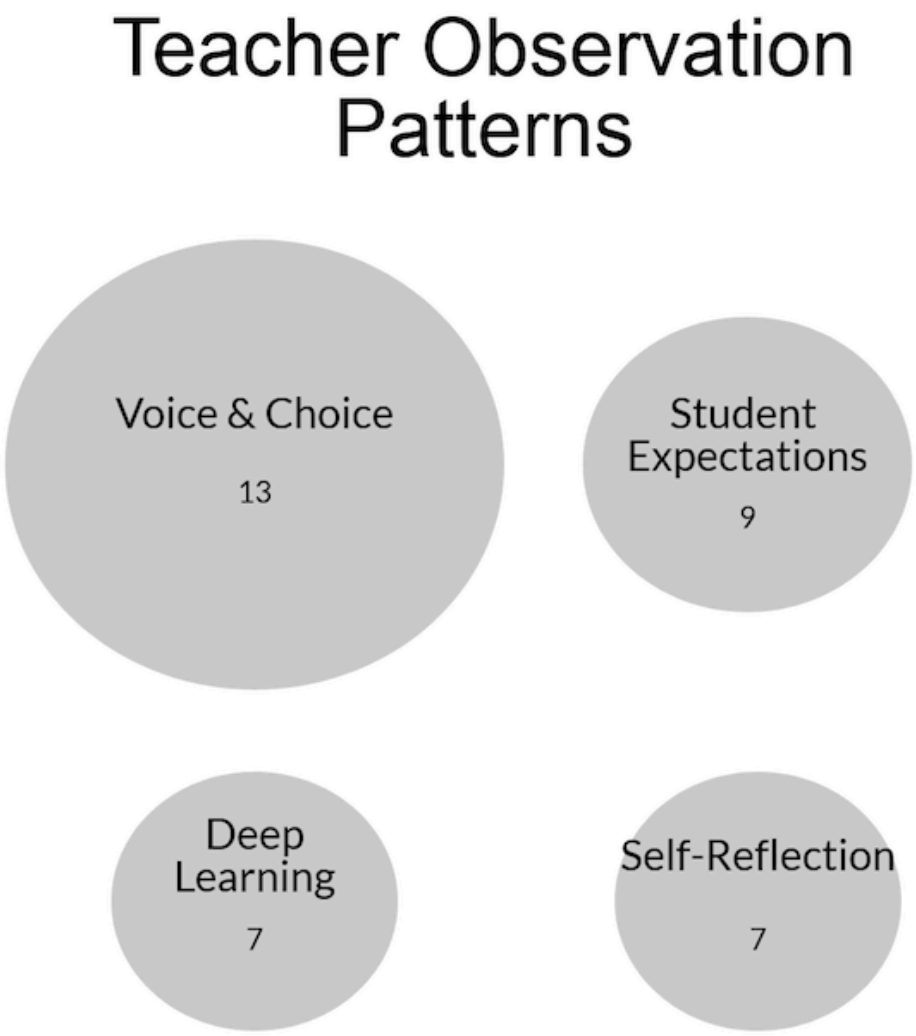

Figure 5. Patterns illustration – teacher observation

The idea behind this lesson was to allow students to engineer a container that could prevent an egg from cracking. The egg was placed at a predetermined height of eight feet and then dropped to the floor. Students worked in teams and developed prototypes landers that were then tested. Once tested, the students could make adjustments to their landers. Finally, the whole class did a final test, and the winners received a small token of recognition. Another example occurred, in Mrs. Thomas's 5th grade classroom. Groups of students were working together on several different assignments, including a science project. Each student could choose how to present their project. Some students used digital-

presentation software to develop an online presentation. Still others recorded themselves with their devices for a newscast. This newscast was later shared to inform their classmates about what they had studied.

Student Expectations was the next most frequently observed pattern. This was demonstrated by the teacher's ability to have classroom management. Since many of the classrooms offered more student independence, it was important for teachers to have clear behavior guidelines. For example, in Mrs. Reed's second grade classroom, she modeled her classroom expectations. Students were working on a graphic organizer, and she had the students transfer information from the graphic organizer onto a digital learning platform. She pulled out a wireless keyboard and demonstrated how students were to grab their keyboard from a box, walk back to their work-stations, and take turns typing. She then modeled how the students were to return the keyboard when they were finished. Once her expectations were clear, she allowed the students to work. In Mrs. Campbell's 1st grade classroom, she had trained the students using verbal cues. For example, when she needed to speak to the class as a whole she said, "Apples up!" and each student stopped working immediately. The students closed their device and folder their hands. This signaled to the teacher they were ready to listen.

The third pattern, Deep Learning, reflected the rigor that took place in the classroom. The researcher did not observe deep rigor in every lesson. Some lessons were recall-oriented or had students summarize information from the text. However, some lessons did reflect deep levels of learning, as was demonstrated in Mrs. Jenson's Spanish class. She was working with a class of English Language Learners who were in their 1st year of learning English. The goal of her lesson was to build the student's vocabulary by having them use adjectives to describe objects in academic subjects. The students had to read a social-studies text in English. The teacher continually elicited deep thinking by asking the students to answer questions that forced the students to identify the adjective and then apply the adjective in the correct context. This was done through using the

adjective in a sentence and explaining how the adjective affected the noun of the sentence. Thus, students had to identify the correct answer, apply the knowledge to the correct context, and then justify their thinking. If students had difficulty with the task, the teacher would switch to Spanish to provide assistance. To finish the lesson, the students had to create a presentation in a digital platform about what they had learned.

The final pattern observed was Self-Reflection. This was evidenced through the student's metacognition or their ability to self-reflect on whether they had learned the content. It also focused on a student's ability to self-monitor their progress towards academic goals. For example, Mrs. Thomas asked questions like "What is your goal by the end of the week?" or "What does the data on your quizzes say about your learning?". These questions forced students to reflect on their goals and academic progress. The researcher also noted in several classrooms where student mastery of content was evidenced through a digital curriculum. These curriculums enabled students to identify what skills they had mastered, what skills they were working on, and what skills they still needed to learn. This timely feedback allowed the students to reflect and set learning goals. Later, the teachers would conference with the students about their goals while they reviewed the data.

STNA Survey - Teachers

To further investigate the principal's role in implementing technology, an online digital survey called the School Technology Needs Assessment was provided to each study site. The STNA survey is designed to collect teacher and principal perceptions about implementing technology (Corn, 2007). The survey consists of 87 Likert scale questions in four subset areas.

- Supportive Environment for Technology Use
- Professional Development
- Teaching and Learning
- Impact of Technology

The survey was sent electronically to 185 teachers. To encourage response rates, the researcher met with the school principal prior to administering the survey. The principal was informed about the survey and was asked to email the link to each teacher. An email link was sent from the principal to each teacher to encourage their participation. A week later, a follow-up email reminded the school staff to complete the survey. The researcher received 74 responses with 9 incomplete surveys. The incomplete surveys were eliminated from the data pool, leaving 65 responses. Each principal participant was also sent a survey. Table 10 summarizes the STNA response rates.

Table 10

STNA Survey Responses

Participants	Surveys Sent	Completed Surveys	Completion %
Classroom Teachers	185	65	35%
School Principals	4	4	100%

Participant responses were recorded on a five-point Likert scale (5: Strongly Agree, 4: Agree, 3: Neither Agree nor Disagree, 2: Disagree, 1: Strongly Disagree). The response "Do Not Know" was not given a score and therefore was not included in the data set. The researcher then examined each question to determine the percentage of strongly agree and agree for each question within the four subsets. Questions that scored 70% or higher were highlighted for each subset within the survey (see Table 11).

Ten questions in the first subset had 70% or more of the respondents agree or strongly agree that principals provided the appropriate environment to support a technology adoption. Eight of the ten questions reflected how administrators provided access to technology and promoted communication and collaboration with technology among the staff. Ninety percent of the teacher respondents indicated their principals supported the necessary change through school-level policies,

and 81% of the teacher respondents believed the principal considered curriculum when selecting technology software to use in the school.

Table 11

STNA Teacher Subset Percentage Agree & Strongly Agree 70% or Higher

Subset	Question Number	% Agree or Strongly Agree
I-Supportive Environment		
	4	90%
	15	91%
	16	73%
	17	94%
	18	94%
	19	70%
	20	91%
	21	85%
	27	87%
	30	81%
II-Professional Development		
	35	72%
	38	73%
III-Teaching & Learning		
	63	78%
	65	79%
	73	70%
	74	73%
IV-Impact on Technology		
	80	70%

The third subset, Teaching and Learning, had four questions that had 70% or higher of the teacher respondents agree or strongly agree that technology impacted the classroom instruction. Two of the questions centered on teacher productivity. For example, 73% of the teachers believed technology increased their professional productivity. Also, 79% of the respondents felt technology had improved their communication and collaboration with other educators. The other two questions in the subset dealt with student use of technology. These questions asked whether students used online resources in their classrooms and whether the students were using technology that is used by

professional researchers. The teacher responses indicated that 70% agree or strongly agree that students used online resources, and 73% of the teachers believed their students were using the same digital tools that professional researchers use in the field.

The final subset, Impact of Technology, had one question that received 70% or higher agreement. This question asked whether technology had an impact on the teacher's classroom instruction. The responses indicated that 70% of the teachers agreed or strongly agreed that their teaching practices now emphasized technology to support student learning.

The researcher also examined questions that had a lower percentage of respondents agree or strongly agree. To determine this, all questions that had 35% or less of the respondents agree or strongly agree were examined. Table 12 highlights the questions that had 35% or fewer in agreement within the four subset areas.

The first subset area, Supportive Environment, had five questions that had 35% or fewer of the respondents agree or strongly agree. Those questions primarily focused on financial resources and how funds were being distributed to support the technology implementation. Eighteen percent of the teachers believed there was insufficient money to replace outdated technology in the schools, while only 34% of the teacher respondents believed outside sources such as grants were being sought to continue funding the technology implementation.

The second subset, Professional Development, had two questions that had fewer than 35% of the respondents agree or strongly agree. Both of these questions centered on how data was used to track the effectiveness of professional development. The teachers' responses indicated 28% agreed or strongly agreed that data was used to track professional developments' impact on classroom practices, and 33% of the teachers agree or strongly agreed that data was used to track professional developments' impact on student learning.

Table 12

STNA Teacher Subset Percentage Agree & Strongly Agree 35% or Lower

Subset	Question Number	% Agree or Strongly Agree
I-Supportive Environment	9	30%
	11	27%
	12	18%
	13	34%
	14	34%
II-Professional Development	54	28%
	55	33%
III-Teaching & Learning	56	19%
	66	34%
	67	22%
	70	21%
	75	31%
IV-Impact on Technology	80	28%

The third subset, Teaching and Learning, also had five questions that had fewer than 35% of the teacher respondents agree or strongly agree that technology had an effect on their teaching practices. Each of these questions varied from how teachers wrote lesson plans to how technology promoted real-world learning. Their responses indicated that 22% agree or strongly agree that they use technology to promote research or action research projects. Likewise, 31% of the respondents agree or strongly agree that they use projects to model the real-world application of technology.

The final subset had one question where 35% or fewer of the teacher respondents agree or strongly agree that technology had an impact on them or their students. The teachers indicated that only 28% of them agree or strongly agree that technology had helped their students become more socially aware.

STNA Survey – Principals

Each of the school principals also participated in the STNA survey. The researcher examined each subset of the survey to find questions that had a high and low percentage of participants agree or strongly agree on the survey questions. However, due to fewer participants, the researcher highlighted questions that had 100% of the principals agree or strongly agree and 25% or fewer of the respondents agree or strongly agree. Table 13 demonstrates the number of questions that had 100% of the principals agree or strongly agree in each of the four subset areas.

Table 13

STNA Principal Responses 100% Agree & Strongly Agree

Subset	Number of Questions (100% Agree or Strongly Agree)
I-Supportive Environment	13
II-Professional Development	2
III-Teaching and Learning	7
IV- Impact of Technology	4

The first subset, Supportive Environment, had 13 questions where all four principals agreed or strongly agreed. These questions primarily focused on the teacher's access to resources and how the principal had helped provided the appropriate environment to support the technology implementation. This subset also highlighted the principals' vision. All of the principals believed they had developed a clear vision through a collaborative process and 100% agreed or strongly agreed that they supported the change required to implement said vision.

Professional Development had two questions where all four principals unanimously agreed or strongly agreed. The principals believed their school's professional development used technology to

support a student-centered learning environment. All four principals also agreed or strongly agreed that professional development was ongoing and occurred over the course of a school year, rather than during a one-time workshop.

The third subset, Teaching and Learning, had seven questions where all four of the principals agreed or strongly agreed. Six of the seven questions focused on the students' use of technology in the school and how students used technology to communicate, collaborate, solve problems, and use higher order thinking skills. All the principals agreed or strongly agreed that their students used technology to create new ideas, analyze and synthesize information, and solve complex problems.

Impact of Teaching was the final subset. Four questions had 100% of the principals agree or strongly agree. The principals believed technology had impacted the teachers and students' ability to use technology to become more student-centered and emphasize project-based learning.

There were few questions where the respondents had 25% or less agree or strongly agree. One question that had 25% or fewer of the principals in agreement was whether they had effectively communicated the school's vision to their community. Another question focused on how the principals themselves used technology in professional development. Only 25% of the principals believed technology had helped their students become more collaborative.

Exploratory Factor Analysis – Teacher STNA Survey

To further investigate the survey findings, the researcher performed an exploratory factor analysis. An exploratory factor analysis provides insights into the underlying structure of a collection of correlated variables. This process involved three steps a) selecting the variables to measure b) determining the number of factors, and c) interpreting the results (Field, 2013; Pholmann, 2004).

The researcher selected seventeen questions or variables from the teacher STNA survey data to perform a Principal Component Analysis, also known as a PCA. A PCA is designed to transform correlated variables into smaller independent components called factors (Field, 2013; Kim & Kim,

2012; Pholmann, 2004; Sharp, 1997). To determine reliability and validity of the variables, the researcher performed Chronbach's alph as a measure of internally consistency. An internal consistency rating of 0.84 ($\alpha = 0.84$) was recorded, indicating the variables met the 0.70 ($\alpha > 0.70$) criteria for the assessment (Field, 2013).

To determine the adequacy of the sample variables, a Kaiser-Meyer-Olkin measure (KMO) and Bartlett's test of Sphericity were completed. The KMO assessment adequacy score of 0.638 indicated the variables were above the 0.60 recommendation (Field, 2013; Hutcheson & Sofroniou, 1999). Bartlett's test of Sphericity was completed to determine if the correlations within the correlation matrix were above 0.30 (see Appendix T). Bartlett's test indicated significance ($p < 0.01$) and concluded the correlations within the matrix are apparent and significantly different from zero (Field, 2013).

Components were determined based on Eigenvalues and a Scree plot (Field, 2013; Pholmann, 2004; Sharp, 1997; Sing, Pandey, Nagar, & Dutt, 2010). Output indicated six components had loadings above the Eigenvalue of 1.0 and accounted for 69.61% of the variance within the correlation matrix (see Table 14). Field (2013) and Pholmann (2004) recommend limiting factors further through a visual scree plot to identify the most significant factors. Therefore, a Scree plot was used to measure the reliability of the Eigenvalues. The Scree plot indicated two components, component 1 and component 2, had significant Eigenvalues when compared to the other factors (see Figure 6). This data supported the Eigenvalues and thus two factors or components were selected. The first two components had an Eigenvalue of 4.920 and 1.923 respectively. Both components accounted for 40.25% of the variance within the correlation matrix. This percentage indicates these two factors significantly narrowed the data into two smaller subsets (Field, 2013; Pholmann, 2004; Sharp et al., 2010).

Table 14

PCA Eigenvalues & Percent of Variance

Factor	Eigenvalue	% of Variance
1	4.920	28.94
2	1.923	11.31
3	1.496	8.79
4	1.248	7.33
5	1.195	7.02
6	1.053	6.19
7	0.875	5.14
8	0.825	4.85
9	0.699	4.11
10	0.585	3.44
11	0.551	3.24
12	0.438	2.57
13	0.355	2.08
14	0.310	1.82
15	0.258	1.51
16	0.154	0.90
17	0.115	0.67

A Direct Oblimin rotation was used to see if the factors correlated with one another. The components indicated a correlation of 0.07 and thus were not statistically significant (Field, 2013; Sing et al., 2010). Therefore, two components were selected as significant but separate factors.

Component 1 had the strongest Eigenvalue and visually was significant based on the Scree plot. This factor focused on change management and how principals manage the change to support technology within the school. The second component focused on communication. It indicated school leaders communicate and collaborate with stakeholders about the school's achievement, programs, and technology focus.

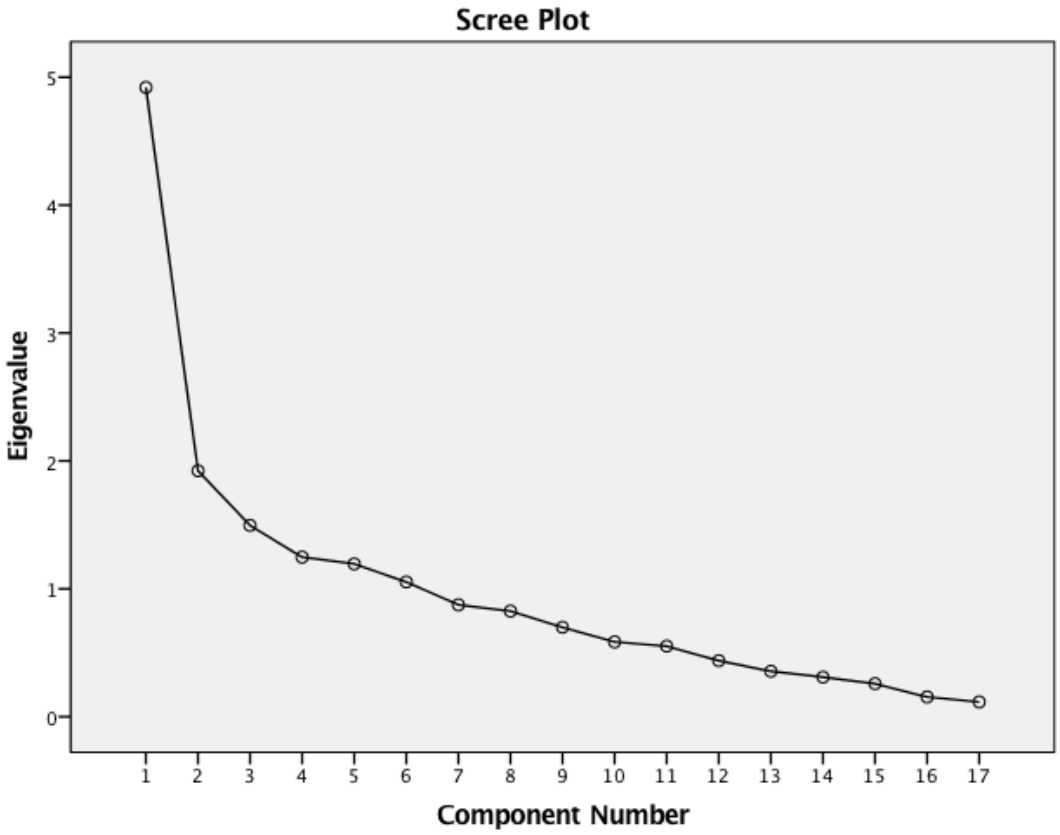

Figure 6. Scree plot of components

Themes

To determine the final themes and answer the research questions, the researcher examined all the data. The findings from the principal interviews and observations, teacher interviews and

observations, and the STNA survey results were synthesized into several major themes. Figure 7 illustrates the major themes from the research data.

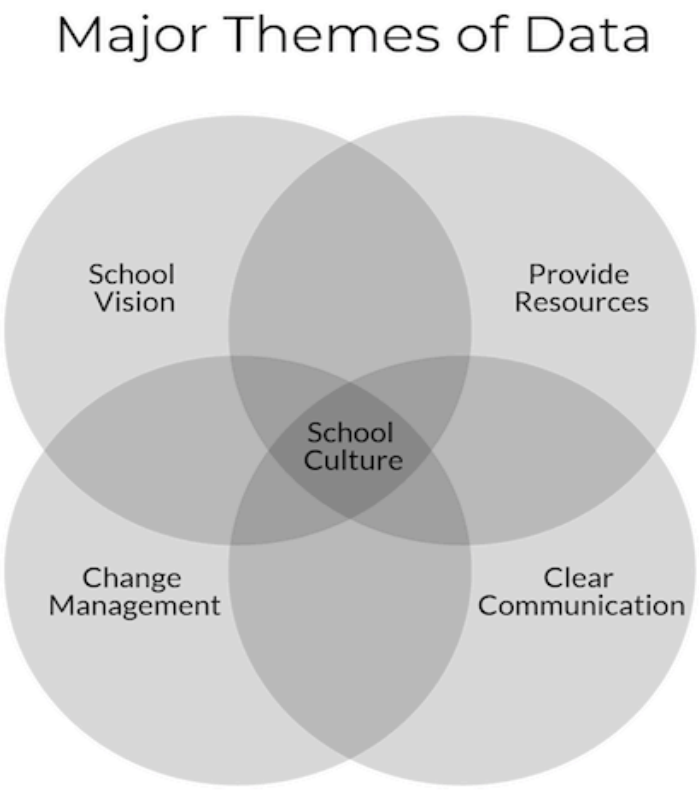

Figure 7. Major themes

School Vision

The first major theme, School Vision, was a common pattern observed in the principal interviews, principal observations, teacher interviews, teacher STNA survey, and principal STNA survey data. The theme is highly connected to the principal's ideals and beliefs about education and the purpose of schooling. This was a common pattern amongst the data and occurred 436 times in interviews and observations. This pattern was also apparent in both STNA surveys. Subset I-Supportive Environment had the highest amount of questions where participants agreed or strongly agreed. This subset included the principal's vision for the technology and how the principal had

developed the school's vision. It also included how the principal articulated and communicated the vision to the school's stakeholders.

Provide Resources

The second major theme, Provide Resources, was a common pattern that occurred 96 times. This theme was apparent in both the principal and teacher interviews and the principal and teacher observations. Likewise, it was apparent is subsection one of the STNA Surveys. Subset I-Supportive Environment, focused on the principal's ability to provide resources to the school to foster an innovative change. The theme signifies the principal's ability to fund and locate technology. Furthermore, it also depicts the principal's ability to leverage professional development to foster a change in classroom instruction.

Change Management

Change Management had 147 patterns. It occurred frequently in both the interviews and observations. The theme was highly connected to the STNA survey in subset III-Teaching and Learning. This subset focused on the impact technology had on classroom instruction. This reflects the change that each school was making in their classroom instructional practices as they moved to a more student-centered learning environment. The primary summarization of the theme focused on how the principals became the driving force for change within their building and how they managed that change to promote innovative practices within their schools.

Clear Communication

The fourth theme incorporates the importance of communication. Clear Communication had 27 patterns in the data and was a key theme in the principal and teacher interviews. It was also apparent in the principal observations that each principal was purposeful about how they communicated. The theme has two main components: input and clarity. Input focuses on the principal's ability to structure and receive communication from the teaching staff. This includes the

physical ways the principal elicits input from their staff, whether through meetings, leadership teams, professional development, surveys, or other means. The second, clarity, reflects how the principal articulates their thoughts and expectations to their school.

School Culture

There were no specific patterns that tied directly to school culture. However, indirectly each pattern was connected to the school culture and thus was impossible to separate the data from the culture of the school in which it was obtained. School culture was apparent in the principal interviews. This was triangulated with the teacher interviews and ultimately supported again in the school observations. Therefore, reliability from the triangulation and logic to include culture with the four other themes was made. This connection will be explained further in chapter 5.

Summary of Findings

Chapter IV illustrated the participants and the major findings of the data. The four participants in this study range from a variety of backgrounds. Participants included elementary, middle, and high school leaders from rural and suburban settings. A case study was developed to investigate the leadership of four school principals during a technology implementation. A mixed methodology was used to gather a more holistic view of principal leadership including semi-structured principal and teacher interviews, principal and teacher observations, and survey data (Creswell, 2015; Gerring, 2004; Johnston, 2013). Data was collected and coded using a quasi-qualitative strategy for the principal data and broad coding for the teacher data (Chenail, 2012; Houghton et al., 2015; Marshall & Rossman, 2016). Survey data was collected from 65 teachers and 4 school principals. A Principal Component Analysis was conducted on the teacher survey data to determine underlying factors in the survey data. Findings indicate two factors were statistically significant (Field, 2013; Pholmann, 2004; Sing et al., 2010). All forms of data were then synthesized to form general patterns. Patterns were then used in a cross-case analysis to form major themes (Creswell, 2015; Houghton et al., 2015; Khan &

VanWynsberghe, 2008). Findings indicate five major themes: Vision, Resources, Change Agent, Communication, and Culture. These themes are supported and connected to an overall school culture that fosters innovation in teaching and learning.

Chapter V

Discussion and Conclusion

Chapter V features the discussion and conclusion of the findings. This chapter will open with a brief introduction to add perspective to the overall study, followed by a short recap of the findings to better understand the research questions. The bulk of this chapter is comprised of a discussion of the three research questions, the literature, and the theoretical framework. A conclusion provides a holistic review of the findings, recommendations for further research, and discussion of how the findings of this study can impact future practice.

Introduction

The current demands of society have redefined the role of the school principal. In the past, school leaders were required to fulfill managerial duties. However, today's principals have additional responsibilities that include instructional leadership and incorporating technology into the curriculum. These demands have greatly increased the complexity of the job (Ali, 2017; Bouchamma, 2012; Crum & Sherman, 2008; Chua & Chua, 2017; Davis & Leon, 2014; Marzano et al., 2005; Waters & Cameron, 2007). To better understand the current demands facing school principals, three research questions were used to guide this study.

1) What strategic leadership responsibilities do education leaders perform to promote a school improvement initiative?
2) What is the responsibility of the principal in implementing technology in a school?
3) Which of McRel's 21 Leadership Responsibilities are most influential on implementing innovative practices and technology in a school?

This investigation also incorporated a theoretical framework by which to view the leadership of

school principals. McRel's Change Management process was used to better understand how principals lead change in the context of a technology implementation.

Due to the many variables that influence school leaders, a mixed methodology case study was used to investigate the experiences of school leaders. A case study provides researchers multiple avenues in which to explore social phenomena (Creswell, 2015; Gerring, 2004; Johnston, 2013; McGloin, 2008). Therefore, the researcher chose semi-structured interviews, observations, and an on-line digital survey to better understand the subjects.

Summary of Findings

Data from the interviews, observations, and surveys were synthesized and triangulated for validity (Creswell, 2015; Houghton et al., 2015; Khan & VanWynsberghe, 2008; Vallis & Tierney, 2000). Findings indicated five major themes: School Vision, Provide Resources, Clear Communication, Change Management, and School Culture (See Figure 8).

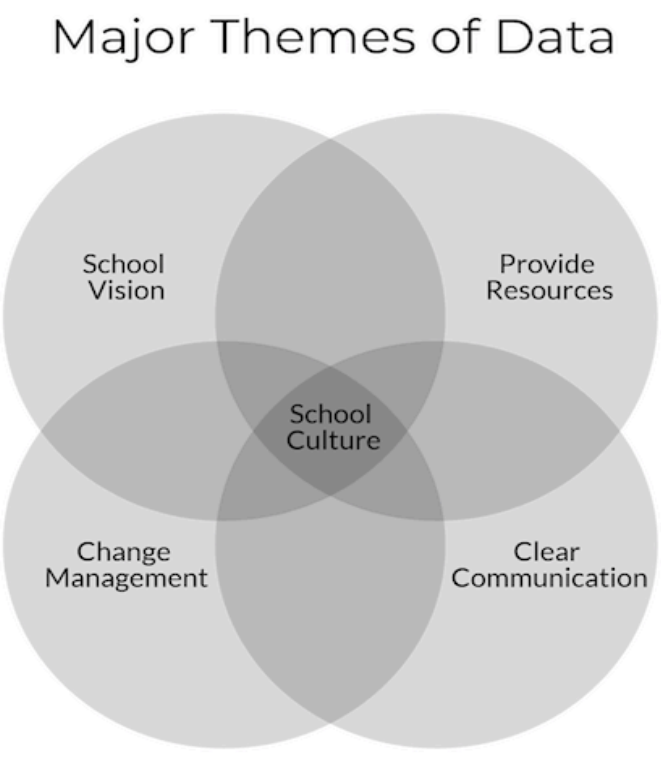

Figure 8. Major Themes

These themes were supported by a quantitative analysis of the teacher surveys collected from each school. A Principal Component Analysis indicated two components with significant Eigenvalues. These values were checked against a visual Scree Plot to determine their significance (Field, 2013; Pholmann, 2004; Sing et al., 2010). A Direct Oblimin rotation indicated the two components were not correlated, and thus, two distinct factors were determined (Field, 2013; Pholmann, 2004; Sing et al., 2010). The first factor indicated a principal's support is necessary to foster a technology implementation. The second factor illustrated that principals communicate with stakeholders about how technology supports the instruction with in the school.

Research Question #1

The first research question guiding this study asked: What strategic leadership responsibilities do education leaders perform to promote a school improvement initiative? The data from the observations, interviews, and surveys signified principals perform five basic leadership responsibilities to lead a school improvement initiative (see figure 9).

- School Vision
- Change Management
- Clear Communication
- Provide Resources
- School Culture

The data indicated the catalyst for this work begins with the first theme: School Vision. The data from the interviews and observations clearly identified school vision as the number one theme. This theme's underlying foundation is tied to a principal's ideals and beliefs. Waters and Cameron (2007) discuss ideals and beliefs to be when a principal communicates and operates from deeply-held attitudes about schooling. These are ideologies about the purpose of education and how school impacts students. Ideals and beliefs foster a principal's vision for their school. A school vision guides

the school's work and provides the staff and students direction (Ali, 2017; Garza et al., 2014; Ng, 2016; Tschannen-Moran et al., 2014; Sun et al., 2017). One principal stated his vision was focused on student thinking. He noted, "Challenging students in those deeper level thinking skills is important and not just the knowledge and understanding, but the application and analyzing too. That is what we are asking of every one of our teacher teams to do with students". The school vision is also tied closely to the school's culture. Ali (2017) claims culture is "a system of behaviors composed of beliefs, values, and ideas" (p. 408). He suggests school culture is closely connected to a leader's ideals and beliefs. Furthermore, the literature suggests the two are closely tied to a principal's self-efficacy (Sun et al., 2017).

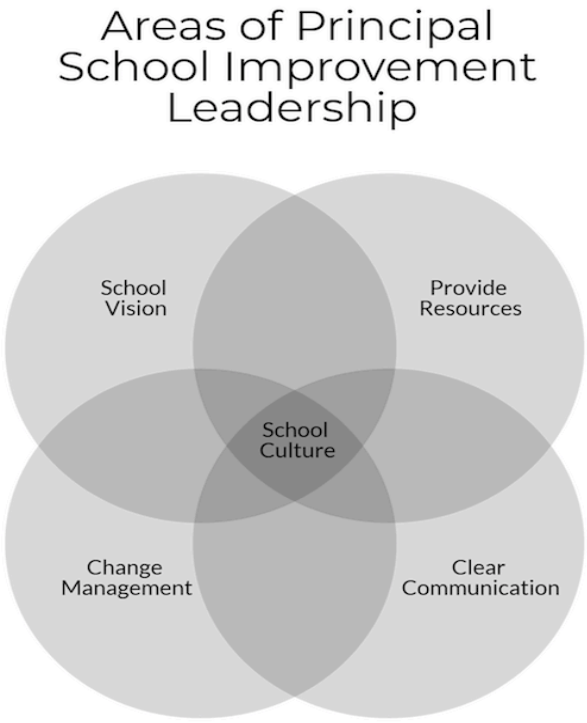

Figure 9. Areas of principal school improvement leadership

Sun et al. (2017) indicates self-efficacy is the most influential characteristic a principal can have to lead a school improvement initiative. However, the literature also notes a self-efficacious leader with a clear school vision may fail to lead a school improvement initiative. This is because principals need

to understand how to manage change within the school (Seabaum et al., 2016; Waters & Cameron, 2007; Varney, 2017).

Change Management was the second main theme. There is little in the literature that clearly discusses how to manage change. Much of the current literature focuses on transformational leadership, principal efficacy, and principal relationships with teachers (Ali, 2017; Bouchamma, 2012; Crum & Sherman, 2008; Forner et al., 2012; Garza et al., 2014; Lemoine, 2014; Tschannen-Moran et al., 2014; Sun et al., 2017; Wu, 2017). While all of these skills are important, principals need to combine these attributes to manage change. This improves a principal's success in leading a school improvement initiative. One of the primary findings in Waters and Cameron's (2007) meta-analysis was that not all "strong leaders" improve student achievement (p. 9). This is because principals fail to have an understanding of how change works in the context of a school. McRel's Change Management framework defines four areas in which principals must manage change: Create Demand, Implement, Manage Personal Transitions, and Monitor and Evaluate (see Figure 1).

Change Management ties closely with the third theme, Clear Communication. One of the primary findings from the teacher interviews suggested if principals do not clearly communicate their school vision, then the school improvement initiative will be sporadic and less effective. Mrs. Reed, a second grade teacher, noted the importance of promoting a school vision. She stated, "I think it comes from a really clear vision that your principal backs up. When you have a principal who is behind you and supporting you and communicating 'This is where we're headed.' I think that makes a big difference." A teacher in another school stated,

> They're the boss! They have the final say. I think that if they are all in then they can get the staff to be all in too. If they are not and they're kind of half doing it, then it's going to trickle down to the staff.

The literature supports this thought, indicating a lack of communication and direction can lead to a poor implementation (Goodwin et al., 2015; Marzano et al., 2005; Waters & Cameron, 2007; Seebaum et al., 2016).

The themes of Change Management and Clear Communication were also supported by the PCA factor analysis. The PCA specified two factors that support a technology implementation. The first factor had an Eigenvalue of 4.920 and accounted for 28.94% of the variance. The second factor had an Eigenvalue of 1.923 and accounted for 11.31% of the variance. Together the two factors accounted for 40.25% of the variance within the data. This percentage of variance suggests the survey data was broken into two main subsets or factors. These factors signify principals have two primary responsibilities to implement technology. The first responsibility suggests principals manage the change within the school to promote a technology initiative. This finding supports the main theme of Change Management. It indicates that principals should be mindful of how they manage change to promote a school improvement initiative. The second responsibility illustrated how principals clearly communicate with stakeholders about the school's curriculum. Principals need to clearly articulate the instructional purpose of the school and how technology is supporting that focus. Again, this factor supports the main theme of Clear Communication (see Figure 8). Therefore, the findings of the PCA backed the main themes of Change Management and Clear Communication.

The fourth theme was Provide Resources. The data from the principal and teacher interviews suggest principals provide resources to help foster the improvement initiative. The STNA survey data supports this idea. The data from the first subset, Supportive Environment, had the highest amount of respondents agree & strongly agree (see Table 11). This implied that principals need to provide resources to their teachers to implement the improvement initiative. Providing resources includes physical items like computers, but it also includes professional development (Afshari et al., 2010; Chua & Chua, 2017; Kara-Soteriou, 2009; Seyal, 2012). It is important for principals to understand

how to provide resources in the McRel Change Management framework. During the implementation phase, providing resources is important because it can be used to propel the change initiative. Leaders can also use resources to create demand for the change. For example, Mr. McKnight, a principal of a large suburban high school, used several vision trips to other innovative schools to help create demand for his change initiative. After his staff returned from their trip they "sold" the idea to their colleagues. This helped spread the vision throughout the school. Mr. Young, an elementary principal, used the technology devices themselves as a way to drive change. He purposefully placed devices in the hands of several teacher leaders who were willing to learn the technology, and once they became comfortable, they taught their colleagues. He stated, "They became more and more comfortable and saw their colleagues as a source of information. That really is how we generated demand." The principals also used sources such as grants and partnerships with local universities as other forms of resources to move the school improvement initiative forward.

The last theme, School Culture, was the final component to a school improvement initiative. School culture and leadership are connected (Ali, 2017; Marzano et al., 2005; Sun et al., 2017; Waters & Cameron, 2007). The literature recommends that principals build school culture by developing relationships with teachers, communicating a clear vision, and by connecting the school's vision to their personal morals (Garza et al., 2014; Lemoine et al., 2014; Liu et al., 2013; Ng, 2016; Zang & Suan, 2012; Sun et al., 2017). Findings from the interviews, observations, and survey data would affirm the literature. Yet, the literature does not expand upon how change management impacts a school's culture. Ng (2016) states principals should "have the courage to break new ground" and approach new paths (p. 109). This suggests principals should evoke change to further a school's culture. This is supported in the PCA factor analysis and by the quantitative data which identified change management as a primary theme. Thus, this study would suggest principals who comprehend

change management may be more effective at developing the culture needed to foster a school improvement initiative.

School improvement does not happen randomly. It takes strategic leadership to develop a school vision, manage change, clearly communicate, provide resources, and build a strong culture.

Research Question #2

Technology has permeated our society and can be a powerful tool to assist student learning. However, it is often difficult to implement (Anthony, 2012; Delgado et al., 2015; Friedman & Heafner, 2007; Hadjithoma-Garska, 2011). Technology provides limitless information and allows students to learn anytime and anywhere; unlike other curriculum initiatives, technology has the potential to redesign classrooms and schools (Christensen et al., 2011; Delgado et al., 2015; Horn & Staker, 2015). It is because of this powerful effect that the second research question asked: What is the responsibility of the principal in implementing technology in a school?

This question was answered through the participant interviews, observations, and a factor analysis. A Principal Component Analysis was used to determine what factors influence a principal's leadership in a technology implementation. The PCA indicated two primary elements:

- Change Management: Principals need to support changes in school-level policies, systems, and practices to support the implementation of technology.
- Clear Communication: Principals need to communicate and collaborate with stakeholders about the school's instructional programs and student learning.

The first factor indicates the importance of understanding change management. Varney (2017) reports that 70% of organizational change efforts fail. This alarming rate indicates a lack of understanding and application of how change management works. Poor change management can negatively impact a technology implementation (Waters & Cameron, 2007; Varney, 2017).

The first step in understanding change management is to understand the role of a change agent. This was a primary theme in the data, as principals routinely demonstrated this throughout the principal interviews and observations. Mr. Newman was a change agent in his school. Prior to his arrival, his school was consistently underperforming academically. He stated, "We were at the bottom of the state test scores, and we were watching movies every Friday." As the change agent, he began to redefine staff roles. He noted, "We put the good teachers as leaders. Not because of seniority, but because they were great teachers! We established non-negotiables for how to deal with kids, work with kids, and the expectations for our instructional practices." Another principal, Mr. McKnight, became a change agent when he took a risk and started a school within a school. He stated,

> The STEM Academy. I think that was another one for us when we actually put ourselves out there and did a school within a school with no bells. We're serious. We're not just jabbering about change. We're actually doing it!

School leaders, like other forms of managers, are change agents (Varney, 2017). Waters and Cameron (2007) define a change agent as someone who is willing to challenge the status quo of a school. However, Varney (2017) notes indiscriminately changing organizations without strategic knowledge will lead to failure. Therefore, it is important to have a plan when implementing change management. One teacher discussed the importance of their school's plan. She stated,

> There was a plan of how we can sustain our technology. We knew our grant was only for so long, and then eventually we would have to buy our own. I think making sure that there's a plan set in place is critical so that when you get to that point, you're not going without the technology.

To begin planning, principals need to create demand for the change. This is the first step in McRel's Change Management process; this initial step involves several leadership responsibilities. First, principals need to clearly define their ideals and beliefs about the purpose of their schools. For example, Mr. Young's believed students learn best through project-based learning. His school began to study project-based learning and visited several schools that had a similar philosophy. Upon their return, his school was excited about the change and began to shift their instructional focus. In another

school, students participated in activities that promoted deep thinking while integrating technology, such as a virtual Socratic Seminar that required them to think about a topic and converse on different points of view. The teacher stated, "They go around and read each others' questions and answers. They are getting the information, but they are just getting it in a different way." Each of these schools had a vision that was tied to the leader's beliefs.

Secondly, principals need to inform and stimulate the change, which can be done by educating the teaching staff on how technology will support their teaching efforts (Garza et al., 2014; Lemoine et al., 2014; Waters & Cameron, 2007; Varney, 2017). The data indicated principals did this by taking teacher leaders on vision trips to learn from other schools. Mr. McKnight took his staff to three different states over a six-month period. They were able to watch other innovative schools in action and learned from their past mistakes. They used this knowledge to create a school vision that was focused around personalized learning. Once the vision was formed, his teacher's began to "sell" the vision to their colleagues in meetings and informal discussions. This practice is supported by the literature as Seebaum et al. (2016) notes that teacher leaders can have a profound influence on the rest of the teaching staff. Furthermore, the principals also created demand by acquiring additional professional development for their schools. Teachers were sent to workshops and conferences where they could acquire new knowledge and skills. Mr. Newman paid for one of his teachers to become specially certified; she attended several trainings and, after a year, was a certified trainer for a large technology company. This enabled her to perform specific trainings to support their school. She was grateful to her principal for providing that opportunity and stated, "My career is moving forward because of him."

Another way principals performed change management was by using the latest research and literature. Waters & Cameron (2007) identify this as intellectual stimulation. Intellectual Stimulation involves continually and systematically engaging teachers on the most current educational practices

(Waters & Cameron, 2007). Mr. Young performed intellectual stimulation when he required his staff to read about a growth mindset. He felt it was important for his school to think the same way. He noted, "You can just kind of harness that energy and get everyone going in the same direction." This energy helped his school to move forward on several initiatives, including project-based learning and standards-based grading.

Beside creating demand, school leaders also need to have a clear focus on how technology will support the classroom instruction. This notion was apparent in both the principal interviews and observations. The principals continually kept their school improvement efforts on the forefront of their teachers' minds and articulated how technology could enhance the learning of their students. The STNA survey indicated that 70% of the teachers agreed or strongly agreed that their teaching practices emphasized technology to support student learning. However, leaders need to be flexible when implementing the technology into the curriculum. Mrs. Campbell, a first grade teacher, stated how her principal allowed their school to implement technology at their own speed. She stated, "Some of us jumped in clear up to our chin! But, we had other people that barely put their toe in." She explained how her principal encourage their growth and continually pressed them to move forward. Principals need to allow teachers to implement technology at their own pace. This flexibility in implementation is how principals can manage a teacher's transition (Rosenbaum et al., 2017; Waters & Cameron, 2007).

Managing personal transitions is done through building relationships (Goodwin et al., 2015; Rosenbaum et al., 2017; Waters & Cameron, 2007; Seebaum et al., 2016). There is little in the literature that speaks to how leaders specifically build relationships to support teachers through the change process. Rosenbaum et al. (2017) indicates organizational leaders can build relationships by including staff on decisions and by providing emotional support to teachers. The principals managed personal transitions in a variety of ways. Several leaders used leadership or vanguard teams to support

their colleagues. This included each member of the leadership team being assigned to a specific teacher as a mentor. Other principals used an instructional coach who mentored specific grade levels or departments during the implementation process. Still another, less formal way, was when principals exercised the leadership responsibility of situational awareness. Situational awareness is knowledge of the underlying issues within a school (Waters & Cameron, 2007). Several of the principals were intentional about meeting with teachers individually to listen to their concerns. One teacher indicated how her principal used situational awareness to gather feedback when some of her colleagues were having difficulty. She said,

> I think just having dialogue or having an opportunity to share your fear helps. Like "I've never used this before!" or "You know, I don't even know how this product turns on!" Having those conversations allows you to be heard, and that's an asset in any situation.

Likewise, another teacher indicated how important it was for her principal to have situational awareness about what is happening in the classrooms. She noted, "I think just being active in the classrooms and knowing what is going on with the students. I actively share projects with my principal and I'll invite him in so he can see what's going on."

Likewise, principals should be in classrooms to monitor the use of technology. Survey data indicated 100% of the principals believed technology had impacted the teacher's ability to promote real-world application through project-based learning. However, only 31% of the teachers felt similar. This disconnect suggests a lack of situational awareness about what is occurring in the classroom. The literature notes instructional leaders should be visible in classrooms to gain an awareness of what is occurring (Marzano et al. 2005; Pan et al., 2014; Seabaum et al., 2016). Mr. McKnight stated in his walk-throughs he gages whether teachers are communicating the vision of their school and promoting metacognitive skills to their students. He stated, "It's our staff that communicates that. That's where it (the vision) actually is sustained…I've been in quite a few classrooms where that's what they were talking about."

However, not every principal dictated or monitored the classroom instruction as closely. One principal stated, “I try my best to take a back seat and let it be their show. It’s not my show.” This leader attempted to provide flexibility to his teaching staff. However, some of the teachers saw this as being a passive leader with little direction. One teacher commented, “He’s not the one that will necessarily push for things.” Later the teacher added, “He just wants to keep a hands off approach which is not necessarily leading.” This frustrated the teacher because he desired more clarity and direction from the school’s leadership. This laissez-fiare approach to leadership may account for the disconnect that was apparent in the survey data. Thus, leaders should balance flexibility with accountability (Crum & Sherman, 2008). Crum and Sherman (2008) note successful leaders hold individuals accountable for “all activities” within the school (p. 571). Mrs. Anderson, a 4th grade teacher, explained how her principal provided both direction and flexibility. She stated, “He’s very flexible with timeframes, but we know that this needs to be done by a specific time.” This suggests the most effective principals provide flexibility within reason but routinely demand progress from their teachers.

These practices tied closely to the Principal Component Analysis’s second major factor: clear communication. School leaders need to clearly communicate with their stakeholders about the school’s instructional programs and student learning. This factor also supports one of the major themes in the qualitative data. Clear Communication was a major theme that included principals articulating the vision of the school to stakeholders. This not only includes teachers, but also the greater community at large. The observations, interviews, and surveys suggested that principals did this in several ways. Some schools held open house or exhibition nights. Other leaders were intentional about informing their parent groups. One principal did a book study with his parent group so they would understand the vision of the school. The school had developed a growth mindset based on the work of Carol Dweck (2008). Dweck (2008) argues that intelligence is not a fixed trait, rather it can be learned through

effort and resilience. The principal believed his parents needed to understand this so they could communicate a similar message to their students. He said, “If parents can use the language of a growth mindset then our students will begin to adopt that too.”

Likewise, principals can support clear communication by seeking input. The teachers felt supported and valued when the principals sought their input on various topics. Input was sought through leadership teams and by being visible throughout the school. Principals had many informal conversations with their teachers in classrooms, hallways, and the playground. One principal felt visibility was so important he abandoned his office. Instead, he chose to work on a movable lectern. This “movable desk” allowed him to work anywhere in the school. He set up his desk in the hallway, library, cafeteria, and in the main foyer. This made him more accessible to students and teachers. During one observation, several teachers approached him about some issues they were having with their device. He encouraged the teachers to put in a help request with the technology staff. He later explained that it was difficult to get work done because he was constantly being interrupted, but he knew his teachers valued his accessibility.

One of the keys to successfully implementing technology is having a solid understanding of leadership. The literature recommends three actions leaders should take to implement technology. First, school leaders should create a vision through transformational leadership. Second, principals should be competent in using technology. Finally, leaders need to provide professional development and promote student-centered learning (Aslan & Reigeluth, 2013; Chua & Chua, 2017; Means, 2012; Hillard, 2015; Fassbender & Lucier, 2014). However, the literature neglects to include change management, even though the PCA factor analysis indicated change management is one of the primary components to implementing technology into the curriculum. This implies a principal could be a transformational leader with a clear vision and still fail to implement technology effectively. Therefore, it is recommended that principals use a change management framework to assist their

efforts. This would allow school leaders to approach the complexities of change management with confidence (Fullan, 2001; Seabaum et al., 2016; Tomal et al., 2013; Waters & Cameron, 2007).

Furthermore, the literature also fails to identify which specific leadership responsibilities are needed to carry out a technology implementation. In order to be a transformational leader and promote an innovative environment, a leader needs to perform specific leadership responsibilities within their school. Therefore, the third research question was designed to assist leaders in identifying what specific leadership responsibilities are needed to lead a technology implementation.

Research Question #3

The third research question asked: Which of McRel's 21 Leadership Responsibilities are most influential when implementing innovative practices and technology in a school? Data from the major themes and PCA factor analysis identified five leadership responsibilities that can be influential in leading an innovative environment.

- Ideals & Beliefs
- Resources
- Communication
- Change Agent
- Culture

Figure 10 illustrates each of these leadership responsibilities and how they are connected to the major themes.

Ideals and Beliefs was foundational to the theme of School Vision. The interview and observation data indicated principals had developed a clear school vision based on their ideals and beliefs about schooling. Each principal desired for their schools to produce students who would be successful in a 21st century environment. "Successful" included having knowledge of content, but it

also included other skills such as problem solving, perseverance, collaboration, communication, and a desire to impact their communities.

Figure 10. McRel leadership responsibilities and areas of school improvement leadership

For example, Mr. Mitchell, a middle school principal, explained that his vision was built around preparing 21st century thinkers. He wanted students to think deeply and communicate about what they had learned. He stated, "We want students to be able to explain their thinking, because if they can explain their thinking, then they can translate that to any situation." Likewise, Mr. Young built his school vision around real-world learning. He believed if students could connect their learning to the world around them, then they would be more engaged. He explained how solving real-world

problems “added value” to their education. This idea of promoting 21st century skills is common in innovative schools (Anthony, 2012; Delgado et al., 2015; Friedman & Heafner, 2007; Horn & Staker, 2015. To promote these skills, the principals used their ideals and beliefs to create a vision for their school that was different from the traditional learning environment. The principal’s vision included less traditional lecture, and each school viewed the role of a teacher as a facilitator of learning. Mr. Newman explained that his teachers rarely lecture. Rather they are often “coaching” students. He explained,

> The most beautiful thing about what’s going on in this school is to walk into any classroom and see the teachers working with the students. In the traditional classroom, the teacher goes in front of the class and what happens to the class? They get off task! Or the teacher sits at their desk and waits for the student to need help. Now, teachers are always with students. In most classes, there are no teacher desks. They don’t need them anymore!

Furthermore, the principal’s ideals and beliefs were shaped in a variety of other ways. The data indicated the principals developed their ideals and beliefs through professional development, conferences, vision trips, and by reading about the latest educational research. This helped foster innovative learning environments such as blended learning, project-based learning, mastery learning, STEM instruction, and student ownership. Mr. McKnight changed his school from a traditional comprehensive high school to an innovative learning environment with three tracks for incoming freshman. The students could choose from a traditional track, a STEM track, and a personalized learning track. Mr. Young’s school adopted a project-based learning approach; his students are highly involved in community-oriented projects where students interact with the community. One project involved students beautifying a local park and raising social awareness around kindness and acceptance.

Resources is another leadership responsibility that was fundamental to the major themes. This responsibility not only included obtaining the actual technology but also providing the professional development. The literature indicates that professional development is one of the best indicators of a

successful technology initiative. It also mentions that trainings are often inconsistent or sporadic and rarely focus on changing the classroom instruction (Jones et al., 2011; Sheppard & Brown, 2014; Tropper & Lancaster, 2013). Each principal understood the importance of consistent professional development and how it can change classroom instruction. They often spoke about how technology was only a "vehicle" to their vision. They were cognizant of this and provided monthly trainings for their staffs that primarily focused on instructional strategies. Mr. Newman stated,

> So you can't do it without technology, but it's not about the technology. I think that's something we lose in education sometimes. We go run out and buy technology and put it in the hands of kids and then we don't know what to do with it. It becomes a textbook replacement. It becomes a tool that really is not a tool. It was meant to be a tool and that's how we utilize it here. It is something that we hand our students, but the capacity of our teachers to use the tool is significant. They understand the device. They understand how to use the device in order for students to be creative and to be innovative. We want kids to take that tool and create information for us, not just consume it.

Another school partnered with a local university to provide monthly trainings. These trainings helped the teachers to reflect on their student projects to see if they were meeting the cognitive rigor of the curriculum. The teachers worked in collaborative teams and made adjustments to their instruction to deepen the students learning.

Occasionally, there were technical trainings, but much of the focus was on pedagogy and how the technology should foster deeper levels of learning. This supports the literature that recommends teachers use technology to enhance their lesson and pedagogical skill. If professional development is not tied to student learning, then technology will not improve student achievement (Afshari et al., 2010; Arokiasamy et al., 2014; Flanagan & Jacobsen, 2003; Tropper & Lancaster, 2013).

The third leadership responsibility was communication. This responsibility had many facets and was directly tied to the themes and PCA factor analysis. Communication means principals build strong lines of communication with their stakeholders. One of the factors in implementing technology was how principals communicated with stakeholders about the school's programs. For example, principals held community nights where they would inform their parents or have students demonstrate

what they were learning. Mr. Young's student "showcase" nights brought in over 1,400 spectators. During these nights, students shared their projects with parents and the community. Principal Young believed showing his stakeholders how the technology supported the student's learning was his best form of communication.

Another way communication was supported was through teacher input. Each leader demonstrated their desire to gather and act upon their staff's input. Mr. Eric, an engineering teacher, explained how his principal used their input. He stated,

> We've got so many different things going on here. Last June we went into our meeting and I'm like, "Mr. McKnight, you need to sit everybody down and say this is where we are going in five years." And he did it.

This new focus helped provide direction for their school. Mrs. Anderson, a fourth grade teacher, explained how her old principal did not listen to her input. She stated, "What didn't work at my last school was our ideas weren't taken on by the principal." In her new school, she felt more supported because her principal listened and acted upon her suggestions.

Acting upon teacher input is one of the attributes that can build trust and relationships. Rosenbaum et al., (2017) identified relationships as one of the primary characteristics to changing an organization's culture. However, the literature neglected to identify how important visibility is to communication. Often the best communication occurs informally and on the spot. Thus, principals need to be out in their schools interacting with teachers and students. Visibility in the school also demonstrates to the teaching staff that the principal is highly invested in the teachers and their classroom instruction. The principals were often highly visible and spoke about the importance of being in classrooms so they could have a first-hand understanding of what was occurring in their school. Mr. Mitchell explained how he just likes "hanging in the halls" during passing periods. He said he gets to greet students but he also likes conversing with his staff. Mr. Young did walk-throughs

in every classroom so he could know what was occurring. This also allowed him to have informal conversations with his teachers.

Change Agent was the fourth leadership responsibility. It involved an incessant demand to strive towards the school vision. While the literature did speak about being a transformational leader, it did not identify several of the characteristics that separate the two. Researchers such as Arokiasamy et al. (2015) and Alfashari et al. (2012) recommend transformational leaders become competent and model technology to foster the necessary change. Yet, this is only one component of being a change agent. Change agents need to have a clear vision, receive teacher input, and use their knowledge of curriculum and instruction to drive the school towards the vision. For example, Mr. Newman became a change agent during his first year at his school. The school had traditionally underperformed academically. Therefore, he developed a vision based on mastery learning. This meant students passed through grades based on their content knowledge, not their age. To further aid this work, he developed a team of teachers who came together to make changes in the school. These changes included altering the schedule, limiting recess time, and focusing their lessons on the state standards. He stated, “It’s definitely a different world today!”

Furthermore, change agents have a strong understanding of the change process and how it affects individuals differently. Rosenbaum et al. (2017) notes a key element missing is an awareness of how change affects the individual. Change agents understand this and build relationships with teachers in order to assist their transition. The teacher interviews indicated teachers had a great deal of trust in their leadership and appreciated how the principals provide a safe environment to experiment with the technology. A change agent must leverage relationships and trust to build a safe culture. Mrs. Anderson, a fourth-grade teacher, explained how her principal earned her trust when she was frustrated with her technology. She was trying to learn how to use a certain platform, but her device was not working. She stated, “I was like, ‘Hey, Mr. Young, this didn’t work! I’m really frustrated.’ So he’s

like, 'I'll come by and we'll set up a time to go over it again. Just let me know when.' So we rescheduled for the next day." Other teachers felt their relationships were strengthened when their principals listened to their concerns. One teacher noted, being able to dialogue about her fear helped her. Another felt supported because the principal simply took the time to listen and was attentive to her needs.

The final leadership responsibility was culture. Culture is when a leader builds a strong sense of cooperation among the staff. The data from the interviews and observations indicated that the leaders built culture in multiple ways. The principals created a compelling vision and supported their vision with strong lines of communication. They also provided the necessary resources to support the technology initiative while successfully managing the change process. Each of these actions affected a school's culture in a positive way. The final element that was apparent in all of the study sites was a strong sense of collective efficacy. In Mr. Mitchell's school this was apparent when one teacher stated,

> Our leadership is amazing. I've never worked with principals that did this particular thing. What they do is they actually call a student down, and they'll say, 'I see you have missing work,' and they conference with the student. Anyone that has a D or below, they conference with them. I've never seen that before.

She explained how students are never allowed to fail. Mr. Newman's school felt similarly. They met weekly to review their students' progress. Some of their students were a year or more behind academically, but that did not stop them from believing they could impact the student's learning. The teachers talked about how they could provide extra instruction to catch their students up. Mr. McKnight's school celebrated overcoming student hardships in their staff meeting. Staff members stood up and recited a story of how they helped students persevere through their difficulties. After each success story the faculty would clap one time in unison, symbolizing the school had achieved a success.

Waters and Cameron (2007) note, "Collective efficacy is a shared perception or belief held by a group that they can organize and execute a course of action that makes a difference" (p. 51). This

sense of belief has an impact on student achievement and is the best indicator of a school's success (Goodwin et al., 2015; Marzano et al., 2005; Waters & Cameron, 2007). Principals need to build collective efficacy within their culture in order to develop an innovative environment.

Conclusions

There is a high demand to incorporate technology into schools. The literature illustrates that technology has become a staple in our society. Schools are now being asked to leverage this tool to increase student achievement (Chua & Chua, 2017; Cojocaru & Cojocaru, 2014; Jones et al., 2013; Sheppard & Brown, 2014). Findings indicate principals can create innovative learning environments in schools through effective leadership. This study suggests principals should develop a strong vision for how technology can support the teaching and learning in the school. A vision for a school should tie to the principal's ideals and beliefs about education. Waters and Cameron (2007) identify ideals and beliefs as strongly held ideologies about teaching and learning.

However, a vision can also be formed and shaped, and the findings indicated that principals did this through learning from others on vision trips and by reading the latest research on teaching and learning. Resources such as professional development and technology can also assist leaders. Furthermore, school principals need to have open lines of communication. Leaders sought out feedback from their staff through monthly leadership meetings. Other lines of communication included less formal ways such as being visible during passing periods or doing informal walk-throughs to observe the classroom instruction.

Principals must also be skilled in change management (Fullan, 2001; Tomal et al., 2013; Varney, 2017). The researcher performed a Principal Component Analysis that indicated two factors that support a technology implementation. The first factor indicated principals must strategically manage the change within their schools. A framework for change management should be used to help guide a principal through the change process. Data indicated principals performed change

management by creating demand for the change. This was done through vision trips, book studies, professional development, and by using the technology to challenge the status quo. The second PCA factor suggested school leaders should clearly communicate to their stakeholders about the school's instructional programs. Findings suggested leaders built strong lines of communication through formal meetings and through informal conversations. These informal conversations occurred because the principals were purposeful about being visible in the school. Leaders stood in halls, did informal walk-throughs in classrooms, and worked where teachers could have access to them. The principals also demonstrated that they listened to their teachers' concerns. This helped the teachers feel like their input was valued.

The literature recommends that principals be transformational leaders (Arokiasamy et al., 2014; Hadjithoma-Garska, 2011; Sheppard & Brown, 2014; Sun et al., 2017). This study affirmed this practice, but it also believes leaders should expand upon this and dive in with more specificity. School principals need to be more strategic in their leadership. Data from the study identified five specific leadership responsibilities that can enhance a principal's effectiveness.

- Ideals and Beliefs
- Resources
- Communication
- Change Agent
- Culture

The mixed methodology of this study suggests these leadership responsibilities are connected to the overall themes. It also indicates that two responsibilities, *Communication* and Change Agent, were connected to the PCA Factor analysis. The data indicates these leadership responsibilities, in conjunction with a change management framework, can increase the effectiveness of a transformational leader.

Recommendation for Further Research

This study was designed to explore the leadership of principals during a technology implementation. To better understand this topic, several recommendations for future research should be considered.

First, further case studies should be performed. The work of a school principal is a social profession with many unique features, influences, and constraints (Davis & Leon, 2014; Crum & Sherman, 2008; Forner et al., 2012; Lemoine et al., 2014). Therefore, the case study methodology provides an appropriate avenue to study these social influences and how they may impact a principal in the context of implementing technology (Creswell, 2015; Gerring, 2004; Houghton et al., 2015; McGloin, 2008). It may be beneficial to explore cases with greater diversity. This could include studying principals from large urban areas or small rural settings. Likewise, the participants in this study were all male principals. Future research should expand the participant pool to include more gender equality. It may also be valuable to explore principals with more experience in implementing technology. Each of the participants had a minimum of 2 years' experience implementing technology. Future studies could include more seasoned principals to learn how experience with technology impacts a school setting. These recommendations may provide a more diverse group of participants which would allow the findings of future studies to be more applicable to the profession.

It would be useful in future studies to conduct a large exploratory factor analysis. The literature is mixed, but generally a larger sample size is recommended to run a principal component analysis (Jung & Lee, 2011). A larger sample size would strengthen the findings of this study and would limit the margin of error that is often associated with a small sample. A larger sample size would also allow the findings to be generalized to a larger population (Field, 2013).

Finally, it would benefit the educational community to determine success criteria for technology implementation. While this study focused solely on the leadership of principals and how

they managed change, it did not focus on student achievement as measured through a standardized assessment. The literature is mixed on whether technology has an impact on student achievement (Delgado et al., 2015; Friedman & Heafner, 2007; Maniger, 2006; Reed, 2007; Sheppard & Brown, 2014). Perhaps a future direction would be to determine a student achievement measure in which to gage the effectiveness of the implementation upon student learning. This study could examine the leadership of principals and how the technology impacted student achievement. The findings of this data could be extremely beneficial as more technology becomes available.

Implications for Professional Practices

There are several implications for future practices that may benefit educational leaders. These include creating a vision based on a leader's ideals and beliefs, learning from other innovative schools, educating school principals on change management, and teaching principals specific leadership responsibilities to lead their schools.

It has been well-documented that school principals should create a vision for their schools (Fullan, 2001; Hillard, 2015; Raman et al., 2014; Topper & Lancaster, 2013; Wu, 2017). However, few principals understand how to create a vision based on their ideals and beliefs. This requires principals to become educated on the most current research in both instruction and technology. However, based on the author's experience as a school principal and as an assistant superintendent, many school principals still find themselves in the traditional role of operational management. Lemoine et al. (2014) notes that only 10% of principals spend their time on instructional leadership. Therefore, principals must perform the leadership responsibility of Intellectual Stimulation. Principals must seek out the latest research and become knowledgeable about current practices in education (Waters & Cameron, 2007). When principals become educated on best practices, they then can begin to shape their own visions about quality instruction and technology. This will allow principals to develop a strong vision based on proven practices.

Likewise, principals should seek out and visit other innovative schools. Many changes have occurred in education, yet, a majority of schools look the same today as they did decades ago (Christensen et al., 2011; Enăchescu & Damasaru, 2013; Horn & Staker, 2015; Rury, 2013). School leaders need to understand that education can look different, and many schools are being successful at promoting student-centered learning (Horn & Staker, 2015; Wagner & Compton, 2012). If school leaders are to develop strong visions for their schools, they need to immerse themselves with colleagues who have already moved toward innovation.

Another implication for practice would be to train school leaders in change management. Change management is difficult and complex (Fullan, 2001; Waters & Cameron, 2007; Varney, 2017). However, it can be learned (Varney, 2017). Principals will find more success as a leader if they know how to mange the change in a school improvement initiative. Superintendents and district leaders should provide professional development, book studies, and conferences as tools to equip effective principals. The researcher has seen few educators discuss or speak on the topic. In fact, the topic of change management is often overlooked in the day-to-day interactions of educational leaders. Thus, the recommendation would be for all educators, principals, and district leaders, to understand change management and how school leaders can strategically leverage change to enhance the effectiveness of their schools.

Finally, school leaders need to be taught specific leadership responsibilities. Strategic leadership has an impact on student achievement (Goodwin et al., 2015; Marzano et al., 2005; Waters & Cameron, 2007). Yet, few principals can articulate or define the leadership roles they perform to improve student learning. Waters & Cameron (2007) identified 21 leadership responsibilities that can assist school leaders. McRel's meta-analysis examined over 5,000 studies and determined these leadership duties can make principals effective (Waters & Cameron, 2007). It would be wise for principals to learn these skills and apply them in their daily duties. Furthermore, it would be beneficial

for principal preparation programs to consider teaching specific leadership skills that impact student achievement, as this would make them more productive and increase their effectiveness as school leaders.

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Appendix A

A. INTRODUCTION

Dear Superintendent/Principal,

My name is Gregg Russell, and I am a Ph.D. student in the Department of Graduate Education at Northwest Nazarene University. I am writing today to request your permission to conduct a research study within the _____ School District. The purpose of this study is to examine principal leadership and how principals implement technology into a school setting. The research will consist of a qualitative case study to determine which specific leadership responsibilities principals use to promote the use of technology in a school setting.

B. PURPOSE AND BACKGROUND

Gregg Russell, a doctoral student in the Department of Graduate Education at Northwest Nazarene University, is conducting a research study related to the leadership responsibilities within a technology implementation. The researcher will study the leadership responsibilities of the principal as it pertains to implementing technology within the school, along with the use of technology in the classroom, and the teacher's perceptions of how technology supports teaching and learning within the school.

You are being asked to allow the researcher to conduct research in your school/district.

C. PROCEDURES

If you agree to allow this study, the following will occur:

1. School principals will be contacted with a consent form explaining the research study.

2. Participants will be asked to sign an Informed Consent Form, volunteering to participate in the study.

3. One principal at each site will be observed several times during their daily work in front of but not limited to teachers, students, and parents.

4. One principal at each site will answer a set of interview questions and engage in a discussion on their leadership and their responsibilities as a principal as it pertains to the implementation of technology within their school. This interview will be audiotaped and is expected to last approximately 45-60 minutes.

5. Two classroom teachers at each site will answer a set of interview questions and engage in a discussion on their view of the principal's leadership as it pertains to the implementation of technology within the school. This interview will be audiotaped and is expected to last approximately 45-60 minutes.

6. Two classroom teachers at each site will be observed teaching and using technology in their classrooms.

7. All classroom teachers at each site will be asked to take an online survey. This survey is completely voluntary and teachers may refuse to partake in the survey.

8. One principal at each site will be asked to read a debriefing statement at the conclusion of the interview.

9. One principal at each site will be asked to reply to an email at the conclusion of the study asking them to confirm the data that was gathered during the research process.

These procedures are all completely voluntary and will be completed at a location mutually decided upon by the participants and the researcher.

D. RISKS/DISCOMFORTS

1. Some of the discussion questions may make principals uncomfortable; however, they are free to decline to answer any question(s) they do not wish to answer or to stop participation at any time.

2. For this research project, the researcher will be interviewing two teachers and surveying the entire teaching staff of the school. Due to the intricacy of teacher and principal relationships, the answers to these questions may make an individual person feel identifiable. The researchers will make every effort to protect participant confidentiality. Pseudonyms will be used to protect the identity of participants. However, if a participant feels uncomfortable answering any question(s), they may refuse to do so, leave them blank, or stop participation at any time.

3. Confidentiality: Participation in research may involve a loss of privacy; however, all records will be handled as confidentially as possible. No individual identities will be used in any reports or publications that may result from this study. All data from notes, audio tapes, surveys, or any other format, will be kept in a locked file cabinet, password-protected computer, or in a password-protected cloud service. In compliance with the Federal Wide Assurance Code, data from this study will be kept for three years, after which all data from the study will be destroyed (45 CFR 46.117).

4. Only the primary researcher will be privy to data from this study. As a doctoral researcher, all data is to be kept secure and confidential.

E. BENEFITS

There will be no direct benefit to principals from participating in this study. However, the information they provide may help educators and principals to better understand the factors that enhance technology implementation in the school environment. This information may help inform and focus principal leadership in the future.

F. PAYMENTS

There are no payments for participating in this study.

G. QUESTIONS

If you have questions or concerns about participation in this study, you should first talk with the researcher. Gregg Russell can be contacted via email at grussell@nnu.edu, or via telephone at 208-550-7635. If for some reason you do not wish to do this, you may contact Dr. Heidi Curtis, Doctoral Committee Chair at Northwest Nazarene University, via email at hlcurtis@nnu.edu or via telephone at 208-468-4500.

H. CONSENT

You will be given a copy of this consent form to keep.

PARTICIPATION IN RESEARCH IS VOLUNTARY. You are free to decline this study, or to withdraw from it at any point. Your decision as to whether or not to participate in this study will have no influence on your present or future status as a student at Northwest Nazarene University.

I give my consent to allow principals with in the _____ School District to participate in this study:

_____ _____

Signature of Superintendent/Principal **Date**

Appendix B

INFORMED CONSENT FORM

A. INTRODUCTION

Dear Classroom Teacher,

My name is Gregg Russell, and I am a Ph.D. student in the Department of Graduate Education at Northwest Nazarene University. I am writing today to request your permission to conduct a research study within your school and classroom. The purpose of this study is to examine principal leadership and how principals implement technology into a school setting. The research will consist of a qualitative case study to determine which specific leadership responsibilities principals use to promote the use of technology in a school setting.

B. PURPOSE AND BACKGROUND

Gregg Russell, a doctoral student in the Department of Graduate Education at Northwest Nazarene University, is conducting a research study related to the leadership responsibilities within a technology implementation. The researcher will study the leadership responsibilities of the principal as it pertains to implementing technology within the school, along with the use of technology in the classroom, and the teacher's perceptions of how technology supports teaching and learning within the school.

You are being asked to participate in this study because you are a healthy volunteer, a classroom teacher, and are over the age of 18.

C. PROCEDURES

If you agree to be in the study, the following will occur:

1. You will be asked to sign an Informed Consent Form, volunteering to participate in the study.

2. You will be observed during your daily work in front your students.

3. You will be asked to answer one online survey as it pertains to the use of technology in the school and in your classroom.

4. You will answer a set of interview questions and engage in a discussion on your perception of the leadership responsibilities of the school principal as it pertains to the implementation of technology within the school. This discussion will be audio taped and is expected to last approximately 45-60 minutes.

5. You will be asked to read a debriefing statement at the conclusion of the interview.

6. You will be asked to reply to an email at the conclusion of the study asking you to confirm the data that was gathered during the research process.

These procedures will be competed at a location mutually decided upon by the participant and researcher and will take a total time of about 90-120 minutes.

D. RISKS/DISCOMFORTS

1. Some of the discussion questions may make teachers uncomfortable; however, you are free to decline to answer any question(s) that you do not wish to answer or to stop participation at any time.

2. For this research study, the researcher will be interviewing two teachers and surveying the entire teaching staff of the school. Due to the intricacy of the teacher and principal relationship, the answers to these questions may make an individual person feel identifiable. The researchers will make every effort to protect participant confidentiality. Pseudonyms will be used to protect the identity of participants. All data from notes, audio tapes, surveys, or any other format, will be kept in a locked file cabinet, password-protected computer, or in password-protected cloud service. However, if at any time you feel uncomfortable answering any question(s), you may refuse to do so, leave them blank, or stop participation.

3. Confidentiality: Participation in research may involve a loss of privacy; however, all records will be handled as confidentially as possible. No individual identities will be used in any reports or publications that may result from this study. All data from notes, audio tapes, surveys, or any other format, will be kept in a locked file cabinet, password-protected computer, or in password-protected cloud service. In compliance with the Federal Wide Assurance Code, data from this study will be kept for three years, after which all data from the study will be destroyed (45 CFR 46.117).

5. Only the primary researcher will be privy to data from this study. As a doctoral researcher, all data is to be kept secure and confidential.

E. BENEFITS

There will be no direct benefit to you for participating in this study. However, the information you provide may help educators and principals to better understand the factors that enhance technology implementation in the school environment.

F. PAYMENTS

There are no payments for participating in this study.

G. QUESTIONS

If you have questions or concerns about participation in this study, you should first talk with the researcher. Gregg Russell can be contacted via email at grussell@nnu.edu, or via telephone at 208-550-7635. If for some reason you do not wish to do this, you may contact Dr. Heidi Curtis, Doctoral Committee Chair at Northwest Nazarene University, via email at hlcurtis@nnu.edu or via telephone at 208-468-4500.

Should you feel distressed due to participation in this study, you should contact your own health care provider.

H. CONSENT

You will be given a copy of this consent form to keep.

PARTICIPATION IN RESEARCH IS VOLUNTARY. You are free to decline to be in this study, or to withdraw from it at any point. Your decision as to whether or not to participate in this study will have no influence on your present or future status as a student at Northwest Nazarene University.

I give my consent to participate in this study:

Signature of Study Participant	**Date**

I give my consent for the interview and discussion to be audio-taped in this study:

Signature of Study Participant	**Date**

I give my consent for direct quotes to be used in this study:

Signature of Study Participant	**Date**

Signature of Person Obtaining Consent	**Date**

THE NORTHWEST NAZARENE UNIVERSITY HUMAN RESEARCH REVIEW COMMITTEE HAS REVIEWED THIS PROJECT FOR THE PROTECTION OF HUMAN PARTICIPANTS IN RESEARCH.

Appendix C

SAMPLE AUDIO/VIDEO RECORDING CONSENT FORM

Dear Participant,

This study involves audio and/or video recording of interviews. These recordings will assist the research in compiling data for the study. Neither your name nor any other personal information will be used to associate you with the audio or video recording(s). Only the researcher will be able to listen and transcribe the recordings. Once the audio or video recordings are transcribed and checked for accuracy, the audio or video recordings will be destroyed. Transcripts of the recording may be reproduced in part or in whole in order to assist the researcher in reporting the results of the study. Neither our name nor any other identify information will be used in presentations, reports, articles, or any other written products from the study. By signing this form, I am allowing the researcher to audio or video record me as part of his research. I also understand that this consent for recording is effective until date of completion for this study.

_____Date_____

Participant Signature

Appendix D

Principal Observation Protocol

Principal Observation Protocol

Name: Date: Location:

Time: Observer:

McRel's 21 Leadership Responsibilities

Affirmation ☐ Communication ☐ Culture ☐ Change Agent ☐ Optimizer ☐

Flexibility ☐ Discipline ☐ Input ☐ Intellectual Stimulation ☐ Order ☐

Knowledge of Curriculum and Instruction ☐ Involvement in Curriculum and Instruction ☐

Outreach ☐ Situational Awareness ☐ Relationships ☐ Contingent Rewards ☐

Resources ☐ Visibility ☐ Monitor/Evaluate ☐ Ideals/Beliefs ☐ Flexibility ☐

Length of Activity:	
Descriptive Notes	Reflective Notes

Appendix E

Classroom Observation Protocol

Classroom Observation Protocol

Name: Date: Location:

Time: Observer:

Bloom's Revised Taxonomy Levels of Learning:

Remember ☐ Understand ☐ Apply ☐ Analyze ☐ Evaluate ☐ Create ☐

Length of Activity:	
Descriptive Notes	Reflective Notes

Appendix F

Principal Interview Protocol

Verbatim Instructions for Interviews

Introduction:

Hi _____,

Thank you for participating in this interview; I truly appreciate it. I am going to explain the process of the interview and then we will get started.

Process:
First, one semi-structured, audio-recorded interview will be conducted. This interview will be completed at a public location mutually decided by the participant and researcher. Each interview will take approximately 45-60 minutes.

This process is completely voluntary and you can select to leave the study at any time. If you feel uncomfortable with any question you can select not to answer that question.

Do you have any questions for me?

Thank you for participating. Let's begin with the interview.

1) Tell me a little about yourself as a professional educator. What is your background?

2) Why did you become an educator? What makes you come to work everyday?

3) How long have you been at your school? How is your school unique?

4) Describe your vision for teaching and learning and how technology supports this within your school. How do you communicate this vision with your stakeholders?

5) What does student success look like in your school?

6) How is your school unique or different from a traditional school?

7) Explain your role as an administrator in providing access to technology for your students and teachers.

8) How does your schedule influence "innovation" in your school? Is there flexibility? How did you develop your schedule?

9) How does your school foster real-world learning? How does this connect to your vision for teaching and learning?

10) Describe to me how your teachers lesson plan for innovation. Is it different than a traditional approach to lesson planning?

11) In what ways do students use technology in your school? (Consumption vs. production?)

12) In what ways has your school fostered collaboration? How does this fit into your vision of teaching and learning? Do students collaborate digitally?

13) Are your students exposed to project-based learning? If so, in what ways? If not, what barriers are there to implementing this?

14) What skills do you feel a 21st century learner will need to be successful in the future work force?

15) Is there anything else you'd like to tell me about leading a technology implementation?

Appendix G

Teacher Interview Protocol

Verbatim Instructions for Interviews

Introduction:

Hi _____,

Thank you for participating in this interview; I truly appreciate it. I am going to explain the process of the interview and then we will get started.

Process:
First, one semi-structured, audio-recorded interview will be conducted. This interview will be completed at a public location mutually decided by the participant and researcher. Each interview will take approximately 45-60 minutes.

This process is completely voluntary, and you can select to leave the study at any time. If you feel uncomfortable with any question you can select not to answer that question.

Do you have any questions for me?

Thank you for participating. Let's begin with the interview.

1) How long have you been teaching?

2) Explain the technology initiative within your school.

3) What is your vision for the technology in your classroom? How do you foresee it affecting your teaching? Your students learning?

4) Describe to me your perceptions on how the technology imitative has been in your classroom.

5) How has your principal supported this initiative?

6) In what ways has your principal guided the work of the technology initiative within your school?

Appendix G (continued)

Teacher Interview Protocol

7) Describe the challenges you have faced implementing this initiative.

8) How has your principal managed those challenges?

9) In what ways could a principal's leadership support a teacher during a technology initiative?

10) Do you feel principals can have a profound effect on a technology initiative? If so, why? In what ways?

11) Is there anything else you want me to know about how principal leadership can affect a teacher's use of technology in the classroom?

Appendix H

Data Code Collection Tally Chart

Data Code Collection Tally Chart

Participant _____ Date _____

Data Type: Observation ☐ Interview ☐

Leadership Responsibility	Number of Codes	Total Codes
Affirmation		
Change Agent		
Communication		
Contingent Reward		
Culture		
Discipline		
Flexibility		
Focus		
Ideals/ Beliefs		
Input		
Intellectual Stimulation		
Involvement with CIA		
Knowledge of CIA		
Monitor Evaluate		

Appendix H (continued)

Data Code Collection Tally Chart

Optimize		
Order		
Outreach		
Relationship		
Resources		
Situational Awareness		
Visibility		

Appendix I

Classroom Observation Email

Date

Dear Mr./Mrs. Teacher Name,

Thank you for meeting with me last week. I greatly appreciate your time in helping me with my research study. As you know, I am interested in observing your classroom to learn how you incorporate technology into your classroom.

My observation will include a data collection protocol that will examine the activities in the classroom through descriptive notes and the level of learning students are performing on their classroom assignments. The level of learning is based on Dr. Benjamin Bloom's Revised Taxonomy. You can see a copy of the observation protocol attached in this email.

The purpose of my observation is to gain further insights into the technology implementation at your school. The proposed observation will be approximately 45-60 minutes in length. At the conclusion of the observation, you will receive a copy of the observation protocol.

I will be at your school on ***insert proposed date here*** to obtain the informed consent. If you have any questions or concerns, please feel free to contact me through email at grussell@nnu.edu or by phone at 208-550-7635. Again, thank you for your time and consideration.

Sincerely,

Gregg Russell
Doctoral Candidate
Northwest Nazarene University

Appendix J

Initial Superintendent Contact Email

Dear Superintendent,

My name is Gregg Russell and I am a Ph.D. student in the Department of Graduate Education at Northwest Nazarene University. I am writing today to request your permission to set up a meeting to discuss a possible research proposal within your school district for the 2017-2018 school year.

The purpose of this meeting would be for me to introduce myself and explain the research proposal and how it may benefit the _____ School District.

I appreciate you time and consideration.

Sincerely,

Gregg Russell
Doctoral Candidate
Northwest Nazarene University

Appendix K

Member Checking E-mail

March 4, 2018

Dear Participant -

Thank you for participating in this study over the past couple of months. I wanted to let you know of some of the themes that emerged from the observations, interviews, and surveys that were conducted during this study. Please let me know if these accurately depict our conversations and the events that were observed within your school. If you have any suggestions or modifications, please contact me through email at grussell@nnu.edu.

Sincerely,

Gregg Russell
Doctoral Candidate
Northwest Nazarene University

Appendix L

Initial Principal Participant Phone Call Script

School Principal Name,

My name is Gregg Russell and I am a Ph.D. student in the Department of Graduate Education at Northwest Nazarene University. I am currently studying principal leadership as it pertains to implementing technology into a school.

I am calling today to inquire about your school's use of technology in the classroom. Would you have a few minutes to be able to answer a few questions about your school's technology implementation?

1) Would you be able to explain to me your school's vision as it pertains to technology in the classroom?

2) What kind of learning environment do you envision for your students? How does technology support this environment?

3) How successful would you rate your technology implementation into the school? classroom?

4) Would you consider your technology implementation successful? Why or why not?

5) Would you be willing to be considered as a possible participant in my study?

Thank you for your time. I greatly appreciate it.

Appendix M

Pilot Study

Dear Principal Name,

I hope this email finds you well! As you know, I am currently a doctoral student at Northwest Nazarene University and I am studying principal leadership during a technology implementation.

I am contacting you today because I would like you to participate in a pilot study. This pilot study would entail an interview with you and one of your teaching staff as well as requiring some observations in your school. This pilot study would allow me to test various data instruments and gather input for my future study.

If you have any further questions I would be happy to speak with you on the phone (208) 550-7635 or through email grussell@nnu.edu.

Sincerely,

Gregg Russell
Doctoral Candidate
Northwest Nazarene University

Appendix N

STNA Informative Email

Date

Dear Mr./Mrs. Teacher Name,

My name is Gregg Russell and I am a doctoral student at Northwest Nazarene University studying principal leadership in a technology initiative. I am contacting you today to participate in an online survey called the STNA (pronounced “Stena”). The STNA is a survey designed to help educators plan and assess a technology initiative within a school. The STNA is a Likert scale survey that consists of five sections. It takes about 10-15 minutes to complete. Your input is valuable to the researcher process and I would greatly appreciate your input as it would help the research process.

This survey is completely voluntary. You may choose not to answer any question(s) or may stop taking the survey at any time.

You make take the survey by clicking **here.**

If you have further questions or would like further information about the STNA survey please contact me through email at grussell@nnu.edu or by phone 208-550-7635. Again, thank you for your time!

Sincerely,

Gregg Russell
Doctoral Candidate
Northwest Nazarene University

Appendix O

STNA Follow-Up Email

Date

Dear Mr./Mrs. Teacher Name,

Last week a link to an online survey called the STNA (pronounced “Stena”) was provided. The STNA is a survey designed to help educators plan and assess a technology initiative within a school. The STNA is a Likert scale survey that consists of five sections. It takes about 10-15 minutes to complete. Your input is valuable to the researcher process and I would greatly appreciate your input as it would help the research process.

You make take the survey by clicking **here.**

If you have further questions or would like further information about the STNA survey please contact me through email at grussell@nnu.edu or by phone at 208-550-7635. Again, thank you for your time!

Sincerely,

Gregg Russell
Doctoral Candidate
Northwest Nazarene University

Appendix P

School Technology Needs Assessment (STNA)

The *School Technology Needs Assessment* (STNA, pronounced "Stena") is intended to help school-level decision makers—administrators, technology facilitators, media coordinators, or technology committee members—collect data to plan and improve uses of technology in teaching and learning activities. The STNA is designed to be completed by teachers and other educators working directly with students, and should be administered to the entire staff of any school for which needs are being assessed. STNA results are not scored or reported for each individual respondent. Instead, each person's responses are combined with those of other educators in their building, and reported at the school level in terms of how many times each possible response is selected for each item. Pilot testing indicates that it should take approximately 25 minutes to complete the STNA.

On this paper-pencil copy of the STNA, responses are coded for use with the *STNA Scoring Tool* spreadsheet. The numbers located next to the response checkboxes have no meaning and are provided only to aid scoring.

I. Supportive Environment for Technology Use

Selecting Responses – Section I

1. For each item, check the box below the response that best matches how much you agree with the statement - "Strongly Agree," "Agree," "Disagree," or "Strongly Disagree."
2. If you do not have enough information to form an opinion about the topic of an item, select "Do Not Know."
3. If you have enough information to form an opinion but are simply split between "Agree" and "Disagree," select "Neither Agree nor Disagree."

"In my school…"		Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree	Do Not Know
Vision	1) A vision for technology has been developed through an effective collaboration among stakeholders, e.g., administrators, specialists, teachers, students, and community members.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
	2) The vision for technology use has been effectively communicated to the community.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
	3) Administrators model effective uses of technology.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
	4) Administrators support changes in school-level systems, policies, and practices related to technology.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
	5) Teachers who are innovators with technology receive non-material incentives, e.g., public recognition, special appreciation.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
	6) When administrators are evaluating teachers, they consider technology literacy and leadership for technology.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
	7) An effective long-range school technology plan is in place.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
Planning and Budget	8) The school technology plan is developed through an effective collaboration among stakeholders, e.g., administrators, specialists, teachers, students, and community members.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
	9) The school technology plan is monitored and updated at least once a year.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
	10) Teachers and other staff members support the school technology plan.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
	11) The amount of money budgeted for technology resources is sufficient for implementing decisions arising from planning.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
	12) The amount of money budgeted for technology resources is sufficient for continuously updating and replacing technology systems as they become outdated.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
	13) Supplemental sources of funding are actively pursued to support technology, e.g., external grants, collaboration with community or parent groups, support from businesses.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
	14) Multiple sources of data are used to evaluate the impact of technology initiatives on student outcomes.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
Communication	15) Technology is used to communicate and collaborate **with families** about school programs and student learning.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
	16) Technology is used to communicate and collaborate **with the community** about school programs designed to enhance student learning.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6

	"In my school…"	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree	Do Not Know
Infrastructure and Staff Support	17) There is at least one computer in every classroom.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
	18) Teachers have access to enough computers, in the classroom, in a lab, or from a mobile cart, so that they can have one computer for every two students when needed for an activity.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
	19) Teachers and students have sufficient access to projectors, printers, digital cameras, printers, and other hardware when they need it.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
	20) Electronic systems for communicating within the school are adequate, e.g., e-mail among teachers and staff, and network drives to upload lesson plans and grades to the main office.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
	21) Electronic systems for communicating with families and the community are adequate, e.g., e-mail, teacher, and/or school Web pages.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
	22) Reliability and speed of external connections are sufficient for connecting to the Internet, using online databases, viewing online video, and accessing other resources.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
	23) Students can access appropriate web resources and tools that teachers would like them to use without being blocked by filters.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
	24) Teachers have ready access to technical support, e.g., to troubleshoot hardware or software problems, maintain systems.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
	25) Library media coordinator and/or media assistant positions are adequately staffed.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
	26) Technology facilitator and/or technology assistant positions are adequately staffed.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
	27) Teachers and students have ready access to productivity software, e.g., graphic organizer, word processing, slide presentation, or drawing applications.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
	28) Teachers have ready access to a cataloging system they can use for searching and locating teaching materials.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
	29) Teachers and students have ready access to a good collection of print, multimedia, and electronic resources.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
	30) When educators are selecting resource media and software, they consider both the curriculum and the needs of learners.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
	31) The media center can be flexibly scheduled to provide equitable access to resources and instruction.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
	32) Computer labs can be flexibly scheduled for equitable access to resources and instruction. (Leave this item blank if your school has no computer labs.)	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6

	33) Mobile computers can be flexibly scheduled to provide equitable access to resources and instruction. (Leave this item blank if your school has no mobile computers.)	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6

II. Professional Development

Selecting Responses – Section II

1. For each item, check the box below the response that best matches how much you agree with the statement - "Strongly Agree," "Agree," "Disagree," or "Strongly Disagree."
2. If you do not have enough information to form an opinion about the topic of an item, select "Do Not Know."
3. If you have enough information to form an opinion but are simply split between "Agree" and "Disagree," select "Neither Agree nor Disagree."

	"I would benefit from professional development on…"	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree	Do Not Know
Professional Development Needs	1) Research-based practices I can use in my teaching.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
	2) Identification, location, and evaluation of technology resources, e.g., websites that I can use with my students.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
	3) Performance-based student assessment of my students.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
	4) The use of technology to collect and analyze student assessment data.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
	5) Learner-centered teaching strategies that incorporate technology, e.g., project-based or cooperative learning.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
	6) Online security and safety.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
	7) The use of technology for differentiating instruction for students with special learning needs.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
	8) Uses of technology to increase my professional productivity.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
	9) Ways to use technology to communicate and collaborate with families about school programs and student learning.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
	10) Ways to use technology to communicate and collaborate with other educators.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
	11) Alignment of lesson plans to content standards and student technology standards.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
	12) Use of research or action research projects to improve technology-enhanced classroom practices.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
	13) Use of data for reflecting on my professional practices.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
	14) Use of data to make decisions about the use of technology.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
	15) Use of technology to participate in professional development activities, e.g. online workshops, hands-on training in a computer lab.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6

"In my school…"		Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree	Do Not Know
Professional Development Quality	16) Educators in charge of professional development use data from teachers' need assessments to determine technology professional development topics and activities.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
	17) Technology professional development is timely.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
	18) Technology professional development is relevant.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
	19) Technology professional development is ongoing.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
	20) Teachers have an opportunity to evaluate technology professional development activities in which they participate.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
	21) The impact of technology professional development is tracked using data on **classroom practice**.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
	22) The impact of technology professional development is tracked using data on **student learning**.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6

III. Teaching and Learning

Selecting Responses – Section III

1. For each item, check the box below the response that comes closest to indicating how often you do the described activity - "Daily," "Weekly," and so on.
2. If you do not have enough information to select a number response for an item, select "Do Not Know."

	"In the settings where I work with children…"	Daily	Weekly	Monthly	Once per Grading Period	Never	Do Not Know
Teacher Technology Use	1) I consult publications, online journals, or other resources to identify research-based practices I can use in teaching with technology.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
	2) I identify, locate, and evaluate technology resources for use by my students, e.g., websites.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
	3) I apply performance-based student assessment to technology-enhanced lessons, e.g., student portfolios, student presentations.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
	4) I use technology regularly to collect and analyze student assessment data.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
	5) My lessons include technology-enhanced, learner-centered teaching strategies, e.g., project-based learning.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
	6) I apply policies and practices to enhance online security and safety.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
	7) I use technology to differentiate instruction for students with special learning needs.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
	8) I use technology to support and increase my professional productivity.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
	9) I use technology to communicate and collaborate with families about school programs and student learning.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
	10) I use technology to communicate and collaborate with other educators.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
	11) My lesson plans refer to both content standards and student technology standards.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
	12) I do research or action research projects to improve technology-enhanced classroom practices.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
	13) I use multiple sources of data for reflecting on professional practice.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
	14) I use multiple sources of data to make decisions about the use of technology.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
	15) I use technology to participate in professional development activities, e.g. online workshops, or hands-on training in a computer lab.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6

"In the settings where I work with children…"		Daily	Weekly	Monthly	Once per Grading Period	Never	Do Not Know
Student Technology Use	16) Students use a variety of technologies, e.g., productivity, visualization, research, and communication tools.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
	17) Students use technology during the school day to communicate and collaborate with others, beyond the classroom.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
	18) Students use technology to access online resources and information as a part of classroom activities.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
	19) Students use the same kinds of tools that professional researchers use, e.g., simulations, databases, satellite imagery.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
	20) Students work on technology-enhanced projects that approach real-world applications of technology.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
	21) Students use technology to help solve problems.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
	22) Students use technology to support higher-order thinking, e.g., analysis, synthesis, and evaluation of ideas and information.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
	23) Students use technology to create new ideas and representations of information.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6

IV. Impact of Technology

Selecting Responses – Section IV

1. For each item, check the box below the response that best matches how much you agree with the statement - "Strongly Agree," "Agree," "Disagree," or "Strongly Disagree."
2. If you do not have enough information to form an opinion about the topic of an item, select "Do Not Know."
3. If you have enough information to form an opinion but are simply split between "Agree" and "Disagree," select "Neither Agree nor Disagree."

"In the settings where I work with children…"		Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree	Do Not Know
Teacher Impact	1) My teaching is more student-centered and interactive when technology is integrated into instruction.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
	2) My teaching practices emphasize teacher uses of technology skills to support instruction.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
	3) My teaching practices emphasize student uses of productivity applications, e.g., word processing, spreadsheet.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6

	4) My teaching practices emphasize student uses of technology as an integral part of specific teaching strategies, e.g., project-based or cooperative learning.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
Student Impact	5) Technology has helped my students become more socially aware, confident, and positive about their future.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
	6) Technology has helped my students become independent learners and self-starters.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
	7) Technology has helped my students work more collaboratively.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
	8) Technology has increased my students' engagement in their learning.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
	9) Technology has helped my students achieve greater academic success.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6

Appendix Q

Research Proposal

Date:

To: School Districts

Re: NNU Doctoral Student Research

From: Gregg Russell, ED.S

Background: My name is Gregg Russell and I am a Ph.D. student in the Department of Graduate Education at Northwest Nazarene University. I am studying principal leadership and how principals implement technology into a school setting. Leadership is a critical component to student success. Great schools are led by great principals, and great principals have a profound impact on student achievement (Bouchama, 2012; Crum & Sherman, 2008; Forner, Bierlein-Palmer, & Reeves, 2012; James-Ward & Abuyen, 2015; Lemoine, Greer, McCormick, & Richardson, 2014; Marzano, Waters, & McNulty, 2005; Waters & Cameron, 2007). Today, technology is becoming an ever-present component of students' lives. Principals must learn how to leverage technology in a school in order to enhance student success. This includes learning how to implement technology into the curriculum to enhance pedagogy, improve student engagement, and increase student efficacy (Delgado et al., 2015; Friedman & Heafner, 2007; Schrum & Glassett 2006).

Proposal: Current research suggests that technology is an ever-increasing component of a student's life. Schools are beginning to use technology more and more frequently to improve student engagement and achievement (Bekele, 2010; Friedman & Heafner, 2007; Jones et al., 2013; Levin & Schrum, 2013; Maniger, 2006; Sheppard & Brown, 2014). Therefore, principals must learn how to incorporate technology effectively into their schools. The researcher proposes to conduct research aimed at determining how principals implement technology in a school setting by examining their specific leadership responsibilities. To that end, the researcher will examine this topic through the following questions:

- What strategic leadership responsibilities do education leaders perform to promote a school improvement initiative?
- What is the responsibility of the principal in implementing technology in a school?
- Which of McRel's 21 Leadership Responsibilities are most influential on implementing innovative practices and technology in a school?

Appendix Q (continued)

Methods: To answer these questions, the researcher would observe the principal leading in a variety of settings throughout the school, observe the teachers' use of technology in the classroom, and conduct interviews with the principal and the teachers. Also, the researcher would administer a survey to the teachers to gather information about the technology implementation in order to gather information about how the technology was implemented in the school, its purpose, and how it supports teaching and learning.

Assessment Timeline:

Stakeholder Group	Assessment	Timeline
Building Principal(s)	Observation of Leadership	August - December 2017
Building Principal(s)	Semi-Structured Interview	September & October 2017
2-Classroom Teachers	Observation	September - December 2017
2-Classroom Teachers	Semi-Structured Interview	September & October 2017
All Classroom Teachers	Online Survey	September-November 2017

The researcher will seek approval from the Human Research Review Committee at Northwest Nazarene University prior to conducting any research in the _____ School District. As a part of ethical research, the researcher will ensure that all participants will be volunteers. They will also have the opportunity to refuse to answer any questions or discontinue being a participant of the research at any time. For those who do participate, the researcher will protect the identity of the participants by using pseudonyms. All data and information pertaining to the study will be kept secure and will not be shared with anyone. At the completion of the research process all information and data will be destroyed.

The researcher is seeking permission from the _____ School District to conduct this study. It is believed that the study will benefit the district and the greater educational community. The information gathered in this study will help inform the the school or district on what specific leadership responsibilities principals perform to successfully lead technology initiatives. It is believed this information can be used to help provide clear communication, focus, and possible professional development on how to lead technology implementations in the future. This information could also help principals currently in the field to focus their leadership in strategic ways.

If you have further questions please feel free to contact me by email at grussell@nnu.edu or by phone (208) 550-7635. You may also contact my chair, Dr. Heidi Curtis at hlcurtis@nnu.edu.

Appendix R

Principal Follow-Up Email

Date

Dear Principal Name,

I hope this email finds you well. I appreciate you taking the time to speak with me last week about your school. It was very exciting to hear about some of the great things you have going on. Based on our initial discussions, I am interested in learning more about your school and your leadership as a principal.

I have attached a research proposal that includes the specific details of my study. If you choose to participate I would need an email or a signed letter stating, you agree to participate in this study.

I greatly appreciate you considering this study and I hope to be able to learn more about your school.

Sincerely,

Gregg Russell
Doctoral Candidate
Northwest Nazarene University

Appendix S

INFORMED CONSENT FORM

A. INTRODUCTION

Dear School Principal,

My name is Gregg Russell, and I am a Ph.D. student in the Department of Graduate Education at Northwest Nazarene University. I am writing today to request your permission to conduct a research study within your school. The purpose of this study is to examine principal leadership and how principals implement technology into a school setting. The research will consist of a qualitative case study to determine which specific leadership responsibilities principals use to promote the use of technology in a school setting.

B. PURPOSE AND BACKGROUND

Gregg Russell, a doctoral student in the Department of Graduate Education at Northwest Nazarene University is conducting a research study related to the leadership responsibilities with in a technology implementation. The researcher will study the leadership responsibilities of the principal as it pertains to implementing technology with in the school, along with the use of technology in the classroom, and the teacher's perceptions of how technology supports teaching and learning within the school.

You are being asked to participate in this study because you are a healthy volunteer, a classroom teacher, and are over the age of 18.

B. PROCEDURES

If you agree to be in the study, the following will occur:

1. You will be asked to sign an Informed Consent Form, volunteering to participate in the study.

2. You will be observed during your daily work in front your students, staff, and parents.

3. You will be asked to answer one online survey as it pertains to the use of technology in the school and in your school.

4. You will answer a set of interview questions and engage in a discussion on your perception of the leadership responsibilities of the school principal as it pertains to the implementation of technology with in the school. This discussion will be audiotaped and is expected to last approximately 45-60 minutes.

5. You will be asked to read a debriefing statement at the conclusion of the interview.

6. You will be asked to reply to an email at the conclusion of the study asking you to confirm the data that was gathered during the research process.

C. RISKS/DISCOMFORTS

1. Some of the discussion questions may make principals uncomfortable; however, you are free to decline to answer any question(s) that you do not wish to answer or to stop participation at any time.

2. For this research study, the researcher will be interviewing principals and surveying the entire teaching staff of the school. Due to the intricacy of the teacher and principal relationship, the answers to these questions may make an individual person feel identifiable. The researcher will make every effort to protect participant confidentiality. Pseudonyms will be used to protect the identity of participants. All data from notes, audiotapes, surveys, or any other format, will be kept in a locked file cabinet, password-protected computer, or in password-protected cloud service. However, if at any time you feel uncomfortable answering any question(s), you may refuse to do so, leave them blank, or stop participation.

3. Confidentiality: Participation in research may involve a loss of privacy; however, all records will be handled as confidentially as possible. No individual identities will be used in any reports or publications that may result from this study. All data from notes, audiotapes, surveys, or any other format, will be kept in a locked file cabinet, password-protected computer, or in a password-protected cloud service. In compliance with the Federal Wide Assurance Code, data from this study will be kept for three years, after which all data from the study will be destroyed (45 CFR 46.117).

4. Only the primary researcher will be privy to data from this study. As a doctoral researcher, all data is bound to be kept secure and confidential.

D. BENEFITS

There will be no direct benefit to you for participating in this study. However, the information you provide may help educators and principals to better understand the factors that enhance technology implementation in the school environment.

E. PAYMENTS

There are no payments for participating in this study.

F. QUESTIONS

If you have questions or concerns about participation in this study, you should first talk with the researcher. Gregg Russell can be contacted via email at grussell@nnu.edu, via telephone at 208-550-7635. If for some reason you do not wish to do this you may contact Dr. Heidi Curtis, Doctoral Committee Chair at Northwest Nazarene University, via email at hlcurtis@nnu.edu via telephone at 208-468-4500.

Should you feel distressed due to participation in this, you should contact your own health care provider.

G. CONSENT
You will be given a copy of this consent form to keep.

PARTICIPATION IN RESEARCH IS VOLUNTARY. You are free to decline to be in this study, or to withdraw from it at any point. Your decision as to whether or not to participate in this study will have no influence on your present or future status as a student at Northwest Nazarene University.

I give my consent to participate in this study:

_____ _____
Signature of Study Participant **Date**

I give my consent for the interview and discussion to be audio taped in this study:

_____ _____
Signature of Study Participant **Date**

I give my consent for direct quotes to be used in this study:

_____ _____
Signature of Study Participant **Date**_____

_____ _____
Signature of Person Obtaining Consent **Date**

THE NORTHWEST NAZARENE UNIVERSITY HUMAN RESEARCH REVIEW COMMITTEE HAS REVIEWED THIS PROJECT FOR THE PROTECTION OF HUMAN PARTICIPANTS IN RESEARCH.

Appendix T

PCA CORRELATON MATRIX

Correlation Matrix

		Q.4	Q.15	Q.16	Q.17	Q.18	Q.19	Q.20	Q.21	Q.27	Q.30	Q.35	Q.38	Q.63	Q.65	Q.73	Q.74	Q.80
Correlation	Q.4	1.000	.370	.257	.318	.262	.122	.200	.290	.118	.184	.260	.406	.267	.076	.000	-.176	.153
	Q.15	.370	1.000	.723	.561	.338	.295	.389	.481	.492	.416	.315	.304	.054	.003	.018	-.048	.286
	Q.16	.257	.723	1.000	.390	.181	.258	.241	.438	.322	.458	.280	.157	-.057	-.087	.056	.069	.159
	Q.17	.318	.561	.390	1.000	.580	.296	.398	.504	.372	.393	.203	.231	.139	.141	.226	-.039	.270
	Q.18	.262	.338	.181	.580	1.000	.425	.202	.302	.246	.289	.090	.117	.061	.181	.219	.127	.168
	Q.19	.122	.295	.258	.296	.425	1.000	.455	.383	.283	.262	.172	.146	-.127	.238	.114	-.007	.176
	Q.20	.200	.389	.241	.398	.202	.455	1.000	.646	.244	.446	.355	.203	-.009	.008	.053	-.226	.212
	Q.21	.290	.481	.438	.504	.302	.383	.646	1.000	.326	.590	.321	.399	-.092	-.058	.231	-.131	.100
	Q.27	.118	.492	.322	.372	.246	.283	.244	.326	1.000	.463	.197	.176	-.062	.034	.121	-.072	.280
	Q.30	.184	.416	.458	.393	.289	.262	.446	.590	.463	1.000	.365	.184	-.050	.106	.080	-.057	.139
	Q.35	.260	.315	.280	.203	.090	.172	.355	.321	.197	.365	1.000	.643	-.068	.023	.025	-.058	.251
	Q.38	.406	.304	.157	.231	.117	.146	.203	.399	.176	.184	.643	1.000	.113	.163	.165	.102	.263
	Q.63	.267	.054	-.057	.139	.061	-.127	-.009	-.092	-.062	-.050	-.068	.113	1.000	.379	.100	.145	-.008
	Q.65	.076	.003	-.087	.141	.181	.238	.008	-.058	.034	.106	.023	.163	.379	1.000	.277	.191	.128
	Q.73	.000	.018	.056	.226	.219	.114	.053	.231	.121	.080	.025	.165	.100	.277	1.000	.386	.173
	Q.74	-.176	-.048	.069	-.039	.127	-.007	-.226	-.131	-.072	-.057	-.058	.102	.145	.191	.386	1.000	-.201
	Q.80	.153	.286	.159	.270	.168	.176	.212	.100	.280	.139	.251	.263	-.008	.128	.173	-.201	1.000