AN EXAMINATION OF HOW PRINCIPALS IN RURAL K-12 SCHOOLS FOSTER TECHNOLOGICAL LITERACY AMONG TEACHERS: A MULTI-SITE CASE STUDY

by

Kathleen M. Grad

Liberty University

A Dissertation Presented in Partial Fulfillment

Of the Requirements for the Degree

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ABSTRACT

The purpose of this bounded multi-site study was to understand how the technological practices of principals in small K–12 rural schools in western Canada foster the technological literacy of teachers. Technological practice was defined as the ability to support the application of technology by guiding, managing, and developing different aspects of the organization to improve performance. The theory guiding this study was the social cognitive theory of Albert Bandura, based on triadic reciprocal determinism which involved personal, behavioral, and environmental experiences. The sample for this research study were principals and teachers in small K–12 rural schools in western Canada. Data were collected through documents, interviews, and two focus groups. One focus group included principals and the other included teachers. Data from individual cases were analyzed first followed by a cross-case synthesis. The central research question asked, How do principals in small K–12 rural schools in western Canada use their technological practices to foster technological literacy among their teachers? Five themes emerged from three sub questions. The themes support and connection developed from sub question one which asked about the personal leadership practices of the principals in fostering technological literacy. The two themes sub question two presented were the relationship skills of principals which was the ability to deal with the challenges of becoming technologically literate and the ability to give opportunities to teachers to become technologically literate. The theme that emerged from sub question three in regard to the type of environmental surrounding that was important to foster technological literacy in teachers was having the technological tools available to the teachers.

Keywords: principal leadership, rural education, teacher-student relationships, technological practices, technological literacy

Copyright Page

Dedication

My work is dedicated to God the Father, Son, and Holy Spirit. It has been a long journey with hurdles that were surmounted and redirections that were taken. It is in Hebrew 12:1–2 that St. Paul said, “Run with patience the race set before you.” Well, I did that. Thank you, God, for the struggles and the triumphs. You have given me the opportunity to grow!

I also dedicate my work to my mom and dad who instilled in me the need to find something I was passionate about and “go for it.” Thank you for giving me life and love. Words cannot express what you have done for me in the most loving ways. I love you.

I dedicate my work to my sisters, brothers, sisters-in-law, bothers-in-law, nieces and nephews who were always supportive of what I was doing and were always interested in knowing where I was at with my work. Thank you for your love, support, and the laughs that we always share. I love you all.

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I dedicate my work to our dog, Jesse, who just knew when I needed to take a break from reading, researching, or writing. Thank you, Jesse, for wanting to be held and cuddled. I love you.

And finally, I dedicate my work to my husband who made the meals, did the dishes, cleaned the house, bought the groceries, left the house (took the dog with him occasionally) and was supportive in every way he could be. He grew to understand the importance of my work to the extent that as a farmer/rancher he has dedicated himself to going to university as well. I love you.

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I would like to acknowledge my husband, family, friends, and colleagues who have supported me in my journey. I thank you.

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List of Abbreviations

Information and Communication Technology (ICT)

Institutional Review Board (IRB)

Professional Development (PD)

Project Based Learning (PBL)

Voice over Internet Protocol (VoIP)

CHAPTER ONE: INTRODUCTION

Overview

A third-grade student was standing at the phone that was located on the wall just outside the office in a pre-kindergarten to fifth-grade school. She was instructed by the school secretary to call her mother at home. The school secretary happened to notice that this third-grade student was standing there with a puzzled look on her face. Finally, the student looked at the school secretary and said, "Where's the 'send' button?" This is the reality for the students in our schools. Technology has greatly changed our world and so many of our students do not know a world that is digital free. Technology offers our students an unlimited opportunity to explore everything and anything that exists in our world both locally and globally. It is at their fingertips with a press of a button or command of a voice. Students no longer need to rely on a textbook to learn about other cultures in our world as they use the Internet to have conversations in real-time with other students on the other side of the world. Students no longer need an extensive laboratory to complete a biology experiment when they can now do a virtual biology experiment with the use of the Internet. Supporting students who use technology in their learning is not a problem for some teachers. However, this becomes a real challenge for other teachers as they strive to make learning exciting for students in the digital world. The problem that I investigated was how principals use their technological practices to foster technological literacy in small K–12 rural schools among their teachers.

This first chapter introduces the study and includes the background examining the historical, social, and theoretical context of the study. The situation to self discusses my motivation for the study. The problem statement addresses the main challenge of the study. The focus of the study is clarified in the purpose statement. The significance of the study identifies

the contributions that the study makes to the literature. This first chapter also includes the proposed research questions and sub-questions and the definitions used throughout this study. The chapter concludes with a summary.

Background

The literature on rural schools and the use of technology presents convincing arguments as to why technology use in rural schools is well suited to assist students in their learning. Because some rural schools are small (less than 200 students), technology is used as an important tool for learning, but there are challenges. Teachers in rural schools face limited resources, time restraints, multi-grade classrooms, limited professional support, and heavier workloads (Azano, Callahan, Missett, & Brunner, 2014; Burns & Machin, 2013; Cuervo, 2014; Yettick, Baker, Wickersham, & Hupfeld, 2014). The distinct challenges that teachers who try to use technology face are lack of technology, outdated technology, poor technology management, insufficient time to learn how to use technology, attitudes about technology, perceived effectiveness, and usefulness (Garba, Byabazaire, & Busthami, 2015; Tsai, 2015; Vatanartiran & Karadeniz, 2015). It is typically the principal of these small rural K–12 schools who needs to find the resources to have updated and working technology, manage the technology, support the frustrated educator, and provide the necessary professional development to use technology efficiently. The principal also needs to offer support and apply just the right amount of pressure to help the teachers to develop in ways to provide the best learning environment for their students.

Schools in rural areas started to use technology in the early 1980s to give students a chance to take courses that were not offered by a teacher face- to face- in their schools (Helge, 1984; Hofmeister, 1984). This was especially important for senior students who needed specific courses to graduate that were not being offered in the classroom setting. Rural schools wanted to

create for their students the opportunity to take a variety of courses that would help the students achieve their goals.

Historical Context

Historically it has been reported that rural teachers found using technology a challenge as access to computers were not readily available and teachers did not have the training that was necessary to use technology. Hofmeister (1983) commented that the assistive technology used for special needs students could also be widely used with everyone. Hofmeister (1984) also noted that educators "[had] much to gain by developing their technological literacy" (p. 348). Helge (1984) stated that technology "offers particular benefits for rural schools. Many of the most frequently identified rural service delivery problems (e.g., professional isolation and long distances between services and those needing them) can be partially ameliorated by increased use of advanced technologies" (p. 351). McQuaide (2009) stated that technology was seen as a way to give access to a higher quality of rural education. Rana, Greenwood, Wise, and Fox-Turnbull (2018) explained that teachers using technology in rural settings improved the learning environment as well as aspects of their teaching. In addition, research found that during this same time period some teachers were reluctant to try to use technology and were seen as too conservative when it came to fully using technology in the classroom (Bandura, 2002; Li, Worch, Zhou, & Aguiton, 2015; Vatanartiran & Karadeniz, 2015). Teachers who did not understand technology and how to use the various technologies were likely to impede educational progress especially in this very digital 21st century world.

Social Context

Society has embraced the use of technology in education. Studies have shown that teachers are willing to use technology if they have the technology, support, understanding, and

leadership to become technologically literate (Balkar, 2015; Baran, 2014; Phiri, Foko, & Mahwai, 2014; Sebastian, Allensworth, & Huang, 2016; Vatanartiran & Karadeniz, 2015). Bandura (2002) advised that the various social realities such as the advances in technology, the local and global economic climate of our world, and the complexities of our local and global social systems required a higher level of thinking. These advancements also demand different approaches to learning. Instead of just passing on information to students, teachers need to help students to become self-directed learners who have the ability to solve life problems (Wan Husin et al., 2016). Becoming self-directed learners assists students in working toward discovering ways in which to find solutions to our many local and global economic and social system challenges. Using technologies in their self-directed learning, students have a choice regarding where, when, and how they learn (Bandura, 1997). Students need to be able to find solutions with a different level of thinking than what caused situations in the first place. Teachers need to assist students in discovering how to think on this different level and using technology brings knowledge more quickly (Clycqa, Nouwen, & Vandenbroucke, 2014; Nordholm & Blossin, 2013). Teachers need to feel confident that they provide for the students all the necessary technological tools to become self-directed learners.

Theoretical Context

Moving teachers from being reluctant to embracing the use of technology has its theoretical foundation in social cognitive theory and more specifically in human agency (Bandura, 2002). To put this study into a theoretical context, Bandura (2002) stated that "unless people believe that they can produce desired outcomes and forestall undesired ones by their actions they have little incentive to act or to persevere in the face of difficulties" (p. 3). Bandura (2001) in his social cognitive theory also said that people both influence and are influenced by

the social interactions around them. This leads to the possibility that teachers help themselves and each other become technologically literate. This is where the principal takes the lead role in becoming an effective catalyst for teachers to become technologically literate as they work together to achieve that. This is done through modeling and direct experience on the personal, behavioral, and environmental levels (Bandura, 1971). The social cognitive theory supports the principal in leading the teachers to achieving technological literacy through the appropriately shared experience.

For the purpose of this study, small rural K to 12 schools are defined as having between 50 to 200 students with a complement of four or five teachers who attempt to deliver as many if not all subjects to all the students. Technology gives both the teachers and students more opportunities to learn. The principals' roles are important to support not only the teachers but the students as they use technology to learn. To hear the voices of principals and teachers in small rural K to 12 schools regarding what they have to say about the practices they use to support technological literacy adds to the literature as their thoughts become a part of a collective approach to using technology in education.

Situation to Self

My motivation for doing this study was to give voice to principals and teachers as they strove towards increased technological literacy. At the time of this study, I had 20 years of school-based administrator experience in the capacity of a vice principal in a suburban elementary school, a principal in a rural K–12 school, a vice principal in a high school, and a principal in a rural pre-kindergarten to fifth grade school. Being in those various roles gave me a perspective on the challenges that teachers face with new pedagogies or tools that are considered essential for the learning of our students. As a principal, I spent many staff meetings, small

group discussions, and private conversations with teachers who were either excited, frustrated, or excited and frustrated with the technology that was available to them. I spent numerous occasions trying to calm nerves and boost morale when teachers were feeling overwhelmed with what they needed to implement. Every teacher needed to be taken care of in a different way. But the one common element that all teachers, in my experience, wanted were principals who supported what they were doing in the classroom and especially in technology. In talking with fellow principals, I found that some teachers appreciated solutions provided for them, whereas others almost demanded that solutions and support be forthcoming and timely. The solutions and support that I gave the teachers under my watch were either from a personal, behavioral, or environmental perspective. For example, from a personal perspective there were many times when I listened to the frustrations of a teacher. I grew to understand that if a teacher walked into my office and left the door open to my office, we both spoke equally in the conversation. If a teacher walked into my office and partially closed the door, I listened more than I spoke. And if a teacher walked into my office and closed the door, I just listened. From a behavioral perspective, as a principal I was constantly aware of the internal and external stimuli that could possibly affect the teachers in the building. For example, I decided what I shared with the teachers and when I shared it as to not overwhelm them. I also needed to be sensitive to the fact that they would need that information eventually, such as a change in curriculum or the latest survey that was sent by central office. From an environmental perspective, I worked to make the teachers' tasks as easy as possible such as setting up a natural flow for arriving and exiting assemblies, minimizing the paperwork that needed to be done, or gathering the technological resources that they needed. As a principal, I did these things to create an atmosphere in which they would be at their best for the learning that they would be leading. Teachers wanted to have

a flow to the learning, use the new tools, and help students learn and be happy learning. As a principal, it was my responsibility to help them make that happen.

I have always been a type of educator and school-based administrator who ensures that everyone's needs are met. I was raised in a home where our parents instilled in us the importance of making sure that everyone was taken care of all the time and that no one was left out. My greatest reward as a principal was to see the smile on the face of the teachers whom I served when what they were doing in the classroom was fun, educational, and exciting. My other greatest reward as a principal was to see the smile on the faces of the students and their parents when the learning was fun, educational, and exciting. What was even greater than that was when using technology in the learning was met with enthusiasm. What I also saw was the frustration on the part of the teachers when they did not know how to use a computer program or their computers were not working or they felt overwhelmed because they were afraid that they would lose their jobs if they were not technologically literate. If I saw this frustration occurring, I first assured the educator that we would find a solution and then I would contact the appropriate technological support person to assist the teacher in solving the frustration.

Teachers exist in a very vulnerable state every day (Tse, Abra, & Tanaka, 2017). Decreasing that state of vulnerability was very important to me. Furthermore, as a principal I wanted to hear from the teachers I served about their needs in terms of their own technological literacy. In this study, I gave voice to the principals and teachers as they worked towards increased technological literacy.

The philosophical assumption I worked by was ontological which examined the characteristics of the nature of reality (Creswell, 2013). Principals work in different realities. The nature of what happens in one school may not be the nature of what happens in another

school. I was interested in gathering different perceptions from different principals. I discovered and examined what existed in the lives of these principals in small rural K–12 schools. These principals led every day in a technological world that had the potential to change very quickly with the numerous technologies constantly created. To assist students in being competitive in our global world, it was imperative that these principals supported the teachers in supporting the students. I sought to know how principals fostered technological literacy among teachers. I heard the principals' and teachers' different perceptions and understood their realities.

I approached this research from a social constructivist paradigm that, according to Creswell (2013), is an interpretive framework in which "individuals seek understanding of the world in which they live and work" (p. 24). As a principal, the perceptions of my staff became my reality. I wanted to know how principals and teachers viewed their realities in their buildings (Creswell, 2013). I wanted to hear about what these principals and teachers knew about what had worked for them. In giving these principals and teachers a voice, I hoped to discover the practices principals employed to support teachers in increased technological literacy. To assist me in bracketing myself out of any biases, I created a reflective journal that is found in Appendix G.

Problem Statement

Bandura (2002) stated that education was being altered by the ever-evolving technologies that allowed students more access to a global world of learning. In addition, he stated that students, teachers, and administrators with low technological literacy were at a disadvantage. Studies have shown that not only has the access to technologies been limited in rural schools, but rural teachers believed that their preparation to use technologies was also limited (Guofang Li, Youngeun Jee, & Zhuo Sun, 2018). Research exists regarding the amount of learning that was

available for pre-service teachers and urban teachers in elementary, middle, and high school in order to increase technological literacy (Baran, 2014; Burns, Pierson, & Reddy, 2014; Ekanayake & Wishart, 2015; Gökçek, Günes, & Gençtürk, 2013; Inserra & Short, 2013; Li et al., 2015; Liu, Tsai, & Huang, 2015; Tsai, 2015). However, very little research exists regarding how principals foster technological literacy for teachers in small rural K–12 schools in western Canada. Therefore, the problem this study examined was how principals used their technological practices to foster technological literacy in small K–12 rural schools among their teachers.

Purpose Statement

The purpose of this bounded multi-site study was to understand how the technological practices of principals in small K–12 rural schools in western Canada foster the technological literacy of teachers. Fostering technological literacy is defined as the ability to support the application of technology by guiding, managing, and developing different aspects of the organization to improve performance (Chang, 2012). The theory guiding this study was Bandura's (2001) social cognition based on triadic reciprocal determinism which involved personal, behavioral, and environmental experiences. Humans learn from each other by the experiences that they have with each other. These experiences are observed and processed internally (personally). The behavioral experiences (external) are ones that are processed based on the interactions with other people. The environmental experiences are those that people process based on the surroundings in which they function. Principals and teachers learn from each other as they work together in their educational setting in a personal, behavioral, and environmental way.

Significance of Study

The practical significance of this study was to examine how principals in rural K–12 schools foster technological literacy among teachers in a western Canadian province. The importance of the perception on the part of the principals and the teachers was to understand what in their experiences constituted the fostering of technological literacy (Chang, 2012). Understanding what constituted the fostering of technological literacy is critical as small rural K–12 schools of 50 to 200 students have five or six teachers who are expected to teach all the subjects from kindergarten to Grade 12. It is the expectation of the parents of these students that their children are getting a quality education, one that prepares them for whatever they want to do after graduation. The learning experience of students in small rural K–12 schools should not be diminished in any way just because they are in small rural K–12 schools. These students are just as deserving as students in large urban schools when it comes to getting a quality education. Teachers in small rural K–12 schools are just as deserving as the teachers in large urban schools when it comes to technological practices to support learning. In addition, having principals who foster technological literacy is just as important in small rural K–12 as having principals who foster technological literacy in large urban schools. Discovering what principals in small rural K–12 schools are doing to foster the technological literacy of their teachers offers other principals approaches that may possibly work in all schools, both urban and rural.

Twelve percent of all the K–12 schools in this western Canadian province were small rural K–12 schools with 50 to 200 students (Ministry of Education, 2017). Empirically, studies have shown that implementing technology in small rural schools benefits students (Abawi, 2015; Deed, Lesko, & Lovejoy, 2014; Dorça, Araújo, de Carvalho, Resende, & Cattelan, 2016). Although some rural teachers are seeking opportunities to improve their technological literacy

(Al Bataineh & Anderson, 2015; Garba et al., 2015; Liu, 2016; Parlakkılıç, 2014; Safitry et al., 2015), there are still some teachers who struggle with the use of technology (Abramovich & Loria, 2015; Garba et al., 2015; Liu, 2016; Safitry et al., 2015). Principals are key in helping teachers embrace the need to become more technologically literate (Baglibel, Samancioglu, Ozmantar, & Hall, 2014; Qian & Walker, 2013), and this is especially important in small K–12 rural schools (Preston, Jakubiec, & Kooymans, 2013).

Theoretically, it is always beneficial when principals find ways to support teachers personally, behaviorally, and environmentally. Principals do numerous things in any given day. Time is always at a premium so sharing with each other what is working is also beneficial. Bandura (2001) called this reciprocal determinism where people learn from each other. Principals journey with their teachers through the experiences that they have daily. They constantly try to understand and implement what they believe will be effective for their teachers especially in technological literacy. Both the principal and the teachers learn from each other personally, behaviorally, and environmentally. By interacting with one another (behaviorally) in imposed (one of school policies and procedures), selected (one of choice), and constructed (one created) environments, the principal and teachers increase their own personal technological literacy. Bandura (2002) stated that "by acting on their efficacy beliefs, people ply the enabling functions of electronic systems to promote their education, health, affective well-being, work life, organizational innovativeness and productivity and to change social conditions that affect their lives" (p. 1). Using the social cognitive theory to guide the work of principals in small K–12 rural schools helps to support the fostering of the technological literacy of teachers.

Research Questions

The following research questions guided this study of the technological practices of principals in small K–12 rural schools in western Canada who foster their teachers toward increased technological literacy. Reciprocal determinism of the social cognitive theory (Bandura, 2001) provided the framework for the central research question, the sub-questions, and the data collection tools.

Central Research Question

How did principals in small K–12 rural schools in western Canada use their technological practices to foster technological literacy among their teachers?

The role of principal as technological leader in the 21st century is to improve, channel, oversee, and support the implementation of technology as a viable avenue in learning (Chang, 2012). The expectation of education is that students are prepared to become contributing persons in our knowledge society (Barter, 2013) using technological skills. Educating in small rural communities creates unique and challenging opportunities for the principals who lead them. How these principals perceive their effective leadership (Mosley, Boscardin, & Wells, 2014) in small K–12 rural schools and what they provide for their teachers in supporting the learning of the students using technology is essential to building our knowledge society.

Sub-questions

1. How did principals in small K–12 rural schools in western Canada use their personal leadership practices to foster technological literacy of teachers?

Bandura (2001, 2002) stated that personal leadership practices deal with the incremental development that shapes a person's future. This includes intrapersonal (growth within oneself) and interpersonal (growth in relationship with a group of people). It also deals with efficacy and

change. One of the most important characteristics of principals effecting change is their own ability to recognize their personal efficacy as well as knowing how to recognize the need to change, which would and could move themselves as well as teachers closer to realizing self-efficacy.

2. How did principals in small K–12 rural schools in western Canada use their relationship skills to foster technological literacy of teachers?

Bandura (2001) stated that behavioral leadership practices deal with how a person reacts to external stimuli such as economic realities, the family and friend social structure, self-efficacy, and self-motivation. Bandura (2002) also stated that one's behavior allows individuals a certain amount of control over what is happening in their lives. Principals have a certain amount of control over what happens in their buildings and with their teachers.

3. How did principals in small K–12 rural schools in western Canada use their environmental surroundings to foster technological literacy of teachers?

Bandura (2001) discussed three types of environmental structures such as the imposed environment, the selected environment, and the constructed environment. Each requires a person to approach the type of environment in a different way and the responses in each environment will be different. In the imposed environment, "there is the physical and socio-structural environment that impinges on people whether they like it or not" (Bandura, 1997, p. 163). An imposed environment includes the policies and procedures that need to be followed such as school year start and end, school day start and end, curricular outcomes, and report cards. The selected environment is one of choice for a person. Bandura (1997) called this the "potential environment" where "some people take advantage of the opportunities it provides and its rewarding aspects" (p. 163). A person chooses to be a part of an already established

environment such as educator teams for which an educator volunteers for things like noon hour supervision, sport teams, drama clubs, and bus supervision. The constructed environment is one that is created by the person. Bandura (1997) stated that "people create social systems that enable them to exercise greater control over their lives" (p. 163). An educator chooses to further his or her own education out of personal interest, the educator chooses to teach a different subject, or the educator decides to change careers. Principals deal with and supported imposed, selected, and constructed environments very regularly.

Definitions

1. *Information and Communication Technology (ICT)* –digital technology that supports the use of information through the Internet, personal computers, and mobile devices. (Parlakkılıç, 2014).
2. *IRB* – acronym for the Institutional Review Board.
3. *Professional Development* –professional learning in pedagogy and curriculum (Jensen & Møller, 2013).
4. *Reciprocal Determinism* – a theory that states that personal, behavioral, and environmental factors influence human behavior (Bandura, 2001).
5. *Rural education* –education that occurs in a rural setting. A rural setting is characterized by the population density, remoteness, and relationship to urban centers (Koziol et al., 2015).
6. *Technological leadership* – the ability to support the application of technology by guiding, managing, and developing different aspects of the organization to improve performance (Chang, 2012).

7. *Technological literacy* – the ability for an educator to use various technological skills to increase the academic performance of students (Chang, 2012).
8. *Technologies* – a variety of technological instruments such as computers, laptops, and mobile devices (Li et al., 2015).
9. *VoIP – Voice over IP* – multimedia and voice communication over the Internet such as Zoom (Chen & Vannoy, 2013).
10. *PAA* – Practical and Applied Arts

Summary

In summary, the background to the study reveals that technology is a natural fit in small rural K–12 learning environments (historical context), there is a willingness to use technology (social context), and that using technology in small rural K–12 schools supports learning (theoretical context). My motivation for this proposed study was to give voice to these principals and teachers in small rural schools as I believed they have a wealth of knowledge and information to share with other principals from both urban and rural settings. There was not much research in the area of rural principals assisting teachers in becoming more technologically literate. The purpose of this bounded multi-site study was to understand how the technological practices of principals in small K–12 rural schools in western Canada foster the technological literacy of teachers. To know and to foster technological literacy of the teachers in these small rural K–12 schools was the significance of this study. The research questions and sub-questions addressed how these principals used leadership practices on the personal, behavioral, and environmental levels to foster technological literacy in teachers. Finally, terms and their definitions that were used through the study were given.

CHAPTER TWO: LITERATURE REVIEW

Overview

Principals are the most effective agents of change in a school system because of their decision-making opportunities and responsibilities. These decision-making opportunities and responsibilities include one of the most important aspects of the principal's life which is to create an environment in which the students are learning, the parents are supported in supporting their children's learning, and the teachers can achieve what they need to achieve to help the students learn. Of the many ways that principals can foster effective learning environments, one essential way is by being reflective practitioners (Ersozlu, 2016). Being a reflective practitioner is to have an awareness, a sensitivity, and an insight as to what is occurring in their schools which assists with the growth of their learning communities. This will amount to the perceptions that one has including what has happened, what is happening, and what needs to happen to ensure the growth of the people one is serving.

This chapter will explore the theoretical framework of the social cognitive theory of Bandura (2001) as it guides this study of how principals in rural K–12 schools in a western Canadian province foster technological literacy among teachers. This chapter will also consider the related literature that deals with seven aspects that principals must consider when creating an environment that supports learning and most specifically technological literacy for teachers in small rural schools.

Theoretical Framework

The theoretical framework for this study is Bandura's (2001) social cognitive theory involving triadic reciprocal determinism which includes personal, behavioral, and environmental experiences. In 1971, Bandura first introduced the social learning theory, stating that people

learn through direct instruction or observation. Then in 1986 Bandura changed social learning theory to social cognitive theory. Bandura (1986) later added that people also reach self-efficacy through self-regulation, observations, and reciprocal determinism which became the social cognitive theory. Bandura (2001) stated that people "are agents of experiences rather than simply undergoers of experiences" (p. 4). Bandura (2001) also stated that "agency embodies the endowments, belief systems, self-regulatory capabilities, and distributed structures and functions through which personal influence exercised, rather than residing as a discrete entity in a particular place" (p. 2). Through these experiences, Bandura (2001) indicated that people experience agency in four ways: through intentionality, forethought, self-reactiveness, and self-reflectiveness. According to Bandura (2001), intentions "center on plans of action" (p. 6). "Through the exercise of forethought, people motivate themselves and guide their actions in anticipation of future events" (Bandura, 2001, p. 7). To be self-reactive is to compare one's "performance . . . with personal goals and standards" (Bandura, 2001, p. 8). Self-reflectiveness lies in the "metacognitive capability to reflect upon oneself and the adequacy of one's thoughts and actions" (Bandura, 2001, p. 10). Individuals are influenced by what they see and experience. Individuals can also influence those around them by what they say and what they do. Bandura (2001) also stated that triadic reciprocal determinism involves human agency which is one's ability to act in an environment in one of three ways such as autonomous agency, mechanically reactive agency, or emergent interactive agency. Autonomous agency, which is an individual acting independently, does occur on rare occasions (Bandura, 2001). Mechanically reactive agency is an individual reacting without much thought and as a response to some stimulus. Emergent interactive agency happens between two individuals by the very nature of their interaction with each other in which both can influence and be influenced. Humans engage in

not just one type of agency but participate, knowingly or unknowingly, in all three types of agency through personal, behavioral, and environmental experiences.

The personal determinants include self-efficacy, goal setting, the ability to analyze one's experiences, and effective reactions to those experiences (Bandura, 2001). The behavioral determinant manifests itself in the reactions or responses of the personal determinants. The environmental determinant consists of the positive and negative experiences of the person (personal determinants), the encounters that occur, and the reactions (behavioral determinant) to these experiences and encounters.

The growth of principals and teachers happen in a reciprocal way. Each member of a school has a responsibility to support each other to evolve in the direction that education needs to go. This occurs in personal, behavioristic, and environmental ways. The principal is ultimately responsible for ensuring that growth takes place. The social cognitive theory supports what principals need to do and the principals' work further advances the social cognitive theory in a reciprocal deterministic way by reinforcing the theory by what has been done. The following related literature supports the personal, behavioral, and environmental foundations of the necessary work that principals need to do to move education forward, and specifically how principals in small K–12 rural schools can support teachers in becoming more technologically literate.

Related Literature

There are seven areas that are important for principals to consider when leading a small rural K–12 school (Cherkowski, 2016). The first area that is the most important is the teacher-student relationship. The teacher-student relationship is what makes learning successful. The bond that is created between the teacher and the student will lay the foundation of trust that will

ensure that risks can be taken and challenges will be supported (Thompson, 2018). Understanding the elements that make rural education successful, including understanding the uniqueness of rural living, is important. The uniqueness lies in the relationships that are created between the principal, the teachers, the parents, the community, and the students. Often survival in a small rural community is very dependent on the viability of the school in that particular community (Rana et al., 2018). Next, understanding the place that technology has in education and student learning is vital to understanding how students can learn better and become more engaged in our competitive world (Unal & Unal, 2017). In order for teachers to foster the technological skills of the students, professional development (PD) is essential for teachers to hone their technological skills (Dlamini & Mbatha, 2018). Understanding and embracing change may support the acquisition of these new technological skills. Helping students to understand and embrace change is also very important in helping them to develop the necessary technological skills (Weston, Ferris, & Finkelstein, 2017). Understanding the organizational health, culture, climate, and commitment assists in establishing an environment in which learning and especially technological learning can flourish (Arslan & Yildiz, 2015). Finally, principal leadership in general and then specifically principal technological practices may help to bring about the necessary direction toward increased teacher technological literacy (Chang, 2012).

Importance of Teacher-Student Relationships

To educate is to take the students from where they are to where they need to go (Moore, 1997). Potentially this could mean that if there are 23 students in a classroom, there could be 23 different styles of learning. The impact that teachers have on each of the students in that classroom can be very powerful. Teachers support, encourage, lead, redirect, and inspire

students to become well-resourced contributing members of society. The quality of the teacher will affect the quality of the student's learning (Cook et al., 2018). Teachers work to instill in students the desire for life-long learning through discovery, understanding, and the utilization of what is learned (Cook et al., 2018). Teachers can have a profound impact on the lives of the students in how they interact with them on a daily basis. Teacher-student relationships that do not start in a positive way can adversely affect the year of learning for the students. It also can affect the year of instructing or teaching for the teachers.

Parents will always be the first teachers of their children. Teachers are the second teachers of the children, so the key to a successful learning environment has always been and will always be the teacher-student relationship (Unrau, Ragusa, & Bowers, 2015). Starting the first day of public education, students rely on teachers not only for academic support but also for behavioral, emotional, and social support. Behavioral support primarily involves motivation. Emotional support can include role modeling on the part of the educator. Social support encompasses interaction. These elements are key to building healthy teacher-student relationships.

Student motivation is one of the primary aspects with which teachers are concerned when it comes to behavior. Students' behaviors can become negative when they are not motivated, engaged, or excited about their learning. Students' behaviors can become positive when they are interested, involved, and enthusiastic about their learning. Student motivation typically involves student choice that is deliberate and interactive (Deed, Cox, et al., 2014; Deed, Lesko, & Lovejoy, 2014; Maulana, Opdenakker, & Bosker, 2014). Deliberate and interactive can be translated into purposeful and collaborative learning. When there is a reason to learn and the opportunity to learn not in isolation but with other learners, behavior and motivation take on a

new meaning for the student. There is a sense of teamwork and community that authenticates what is needed to be studied and learned. If the students understand the purpose of the learning and see the value in the learning, the level of motivation to learn will increase their level of motivation (Pekel, 2016).

Teachers need to learn quite early in their working with students what motivates each student and what does not motivate each student. Emphasis on what does and does not motivate students should be considered separately and individually as what may work for one student may not necessarily work for another student. Teachers also need to learn quite early in the learning process what the individual students like to learn, how they like to learn, and the struggles that they face with their learning. How a student learns, how that student likes to learn, and how that student's self-efficacy beliefs in his or her learning will indicate the level of his or her effort (Şen, 2016). Teachers need to get to know their students very quickly on a personal level. Relating to students on a personal level will assist teachers in recognizing students' strengths and interests, which adds to students' motivation and a more positive behavior (Unrau et al., 2015). In addition, the behavior of students becomes positive when they feel a sense of support. The students will view learning as valuable which will help students to understand the expectations of their teachers (Unrau et al., 2015). Teachers need to create positive learning environments through positive motivation. Students can learn well if they are provided with the appropriate level of supports (Thompson, 2018).

Another avenue of building that teacher-student relationship is through emotional support. The emotional support of students presents very differently for each student and exists on a wide spectrum of support. On one end of the spectrum are the very confident students who need very little prompting to dive into learning. They need a certain type of emotional support

from the teachers which typically translates into a type of encouragement that acknowledges what they are doing and the success that they are having in their learning. On the other end of the spectrum of emotional support are the students who need constant attention, encouragement, and support. These are the students who struggle and typically do not believe that they can experience learning on their own and need that regular reassurance that what they are doing is right, good, and productive. Not to be forgotten are the students who exist somewhere in between these two extremes. These students need to be acknowledged in a way that is supportive and encouraging to their learning personalities.

One of the most important forms of emotional support that teachers can provide for their students is their own role modeling. Demonstrating to students how to be emotionally healthy can come in the form of a teacher's own excitement for learning (Unrau et al., 2015). Healthy emotions will show students how to deal with situations that are tough and uncomfortable. If teachers can show students how to experience success, work through conflict, and see themselves as learners, students can become successful learners themselves (Hiralaal, 2018). Emotional support also manifests itself when students feel cared for in a positive way which leads to resilience on the part of the students (Masko, 2018). How students view themselves emotionally is very important to their learning state of mind. How teachers can show students how to deal with their emotions when the learning can be challenging sometimes is very important to their learning state of mind as well. No matter where a student exists on the wide spectrum of support, being present for the students is integral to their success as learners.

Teacher-student interaction is a type of social interaction that is key to successful learning for students. Peer interaction is also a type of social interaction that is key to successful learning for students. Teachers still play an important role in monitoring and supporting the

social interactions in the lives of students. Peer interaction assists students' learning in three ways such as learning to rely on other learners, supporting other learners, and celebrating achievements collectively. Students sharing learning goals develop a strong sense of community which supports them in their learning (Ertürk, Gönen, & Pianta, 2017). Having a sense of belonging, understanding social values, having collegial relationships with peers and teachers, and participating in a safe learning environment are vital for students to be at their optimum for learning (Unrau et al., 2015). Learning to collaborate in group work, learning to assist one another in a project, learning to accept each other's strengths and successes as well as challenges and struggles are all part of the work that students need to do with each other every day. Teachers' active involvement in supporting students in their learning with peers becomes the catalyst for student learning success (Pribeanu, 2016). Healthy relationships for both the students and the teachers as they work together ensures that everyone learns to the best of their abilities. Healthy relationships are especially important in rural education where learning can be approached very differently than in an urban setting. Living and learning in a small rural community has its positives and its challenges, and the work that the teachers and students do together in the name of learning can take on a whole different context.

Learning in a Rural Community

Rural schools are as unique as the small towns to which they belong. Education in a rural setting is very different than educating in an urban center. Schools in urban centers have conveniences that rural schools may not have such as easier access to resources, more access to resources, more access to learning opportunities and a larger pool from which to access personnel. Schools in rural communities may have different budgetary requirements, may lack the availability of resources, and may have school closure concerns that are rarely concerns for

their urban counterparts. These would be such things as funds for travel to extra-curricular activities that are a four-hour round trip, the necessary science supplies for a biology lab, and a declining enrollment that may force the closure of the school. The focus on learning in a rural community is different in terms of the viewpoints, activities, and outcomes (Mette, 2014). Learning in a rural community must be articulated clearly within society to understand what is necessary to create a successful and viable learning environment, including strong governmental support, healthy societal relationships, and responsible economic stewardship (Cuervo, 2014). The governmental support, the healthy societal relationships, and the responsible economic stewardship that need to support learning in a rural community will be unique to that community. The uniqueness of each rural community lies in the culture of that small town, the challenges and benefits of learning in a rural community, the growth and stability of that rural community, and the importance of the role of the principal in that rural community. The culture, the challenges, the benefits, the growth, the stability, and the importance of not only the principal but the teachers and the support personnel in the rural school will be critical to the survival of that small town.

The culture of each small town will contribute to the uniqueness of the rural school that is found in that small town (Koziol et al., 2015). Quite often the heart of the small town is very much attached to the heart of the school. Quite often small towns exist because there is a school, and often small towns struggle if the school closes. Residents of small towns will look to the school for stability through the leadership and the staff involvement in the small town. Such leadership and involvement usually manifest themselves in community activities such as dinner theatres, Fair Days, hockey teams, curling teams, Fowl Suppers, town council meetings, and other activities. Residents in small towns have high expectations of the principal and the teachers

and expect to see them involved in the town in some way, not just once or twice but continuously. When one leads and educates in a small town, one becomes a part of the fabric of the small town and that will look different for each principal and each teacher in each town.

The principal of a rural school in a small town is often a teaching principal in which not only are there administrative duties but there are teaching duties in the classroom as well. A teaching principal can find this dual role either burdensome or inspiring (Newton & Wallin, 2013). A teaching principal assumes two very distinctive roles: one of the classroom teacher and one as the leader and manager of the school. Often, because of these dual roles, the management of the school takes a considerable amount of time as the principal constantly deals with problem-solving, discipline, community concerns, division office requests, and any other issues that are presented in the building on any given day. The most important responsibility a teaching principal has is to develop and nurture relationships with students, teachers, parents, and the community (Wallin & Newton, 2014).

Teachers in a rural school in a small town will often teach 10 or 11 different subjects in a semester or in a year in multi-age classrooms. Often the teachers feel isolated and sense that they are missing educational opportunities that their urban counterparts have available to them. Some rural teachers believe that they have limited support and resources for students with challenges and for students who may be seeking enrichment (Azano et al., 2014; Yettick et al., 2014). Rural teachers often do not have the opportunity to take in PD after the school day like their urban colleagues. Teachers often wait weeks for resources to arrive at the schools. Teachers need to plan far in advance to ensure that the materials that they need for a lesson will arrive in time for that lesson and they cannot just "run to the city" to pick up a missing resource. It is not unusual for teachers who are coaching sports teams to travel a couple of hours just to get

to a basketball or volleyball game after school and then travel back to the school only to have to plan lessons for the next day before their day is over. Teachers in rural communities also tend to be more scrutinized in their demeanor and behavior than their urban colleagues. Closer scrutiny may be especially concerning if the principal and the teachers live in the rural community as the scrutiny may be more apparent on a daily basis.

Although there are challenges in rural education, there are positive experiences as well. Rural school have advantages that urban schools may not. In the rural school, class sizes may be smaller. Communication with parents may be better. There may be better discipline procedures because there are fewer students to care for as teachers have better opportunities to work with the fewer students. It has been reported that goal setting is better, decision-making is shared and more effective, the climate is more positive, and the staff communicate better with each other (Blanks, 2014; Burns & Machin, 2013). If the principal and teachers live in the rural community and this is a good experience, the relationships that are formed, the peacefulness of rural living, and the sense of belonging to a vibrant community can be a very healthy, rewarding, and satisfying way to live. This can express itself in the pride in the community, the support from the community, and a genuine sense of appreciation which can appear in the form of a thank you or an apple pie.

The expectation of how principals are to serve the small rural community is much different than how the principals in the cities are expected to serve their learning communities (Barrett, Cowen, Toma, & Troske, 2015). Schools in urban centers tend to be larger in order to serve a larger community. Principals of larger schools in urban centers may only be responsible for the school during the day and not have to be concerned with developing relationships outside of the school day and school year. Principals in urban centers are not expected to become

involved in the community in which their schools are located. For principals in small towns, this is not the case. Principals in small towns are sometimes expected to show leadership around the town as well as in the school. The people of the small town expect the principal to participate in community events, possibly chair committees, become part of the town council, live in the town, and help to make decisions in the town. A principal in a small town is held in high esteem and the expectation is that he or she will be a model citizen. When there is an issue of any type in the town, the principal may be called upon to render an opinion which can be awkward and, if not dealt with appropriately, can affect how the families in the town will perceive the principal.

Students, teachers, and principals in small rural schools share a lived experience that creates connections that are authentic to the degree that these connections promote growth and stability of the rural community (Croft-Piggin, 2014; Eppley, 2015). The expectation is for the school to be a vibrant, contributing part of the small town. The expectation is that events will be planned that will include all members of the small town. People who live in the small town will attend sporting events, dance recitals, Christmas concerts, and awards nights at the school. The expectations may be that these events are planned around seeding and harvest times so that all members of the small town can participate if they so desire. Living and learning in a rural community has its advantages and disadvantages. The one opportunity that can prove to be an advantage is technology.

Technology

Technology has offered education a global perspective on learning. It has created a world for all students who have an opportunity to use it. The challenge will be to infuse technologies into the curriculum in order to give the students every possible avenue of learning that is available to them (Unal & Unal, 2017). The Internet has offered education an invitation to

become a part of the revolution that is changing society in which information and knowledge are shared in an innovative way (Holmes, 2013). Because of this, technology offers students new approaches to motivation, encourages curiosity, supports a new sense of creativity, and promotes learning efficacy (Molins-Ruano et al., 2014). Software programs have been created to help the struggling learner as well as the learner who needs more challenges. Software programs in personalized learning have been created to support the learning styles, interests, and strengths of each student. Teachers are facilitators of learning when each student has access to an electronic device. Teachers are innovators of learning and can encourage students to be creative critical thinkers. Teachers are supporters of students who want to create and develop new ideas and concepts through the abilities that technology has presented to the students. Students working individually, in pairs, or in groups on research topics can do so in greater depth with the information that is available to them digitally. Students can set up their learning environment to learn new concepts and explore new pathways of learning using a combination of print resources and digital resources. Students can choose between using their desks for learning or walking across to the other side of the school to sit and use their iPad, tablet, or laptop to work on the latest Project Based Learning (PBL) assignment they have. Students can communicate with students in another school building in their community, their town, or city, or their province. Students can also communicate with students on the other side of the world and can experience in real time the culture and the social conditions of the students with whom they are communicating.

Using technology in education requires that teachers and students adopt a new learning process (Li et al., 2015; Thota & Negreiros, 2015). This is a paradigm shift for both the teachers and the students. No longer are teachers and students just confined to the chalkboards, the

textbooks, or the library books in their school. Now, teachers and students can use such technological tools as whiteboards, digital textbooks, and online encyclopedias to direct their learning experiences. Whiteboards act not only as gateways through which learning subject matter is unlimited but they also act as portals through which students can tell their teachers how they are learning the subject matter (Skutil, 2014). Technology creates access to digital textbooks that are current with emerging information. Access to online encyclopedias can be free and varied.

The most powerful influences on student learning using technologies are the intentions, attitudes, and confidences that teachers can discover and then instill in their students (Ching & Hursh, 2014). There is no waiting for information as it is at the fingertips of the students and the teachers. Teachers can give students more opportunities to learn on their own and to devise learning opportunities for fellow students. Most teachers have embraced the massive learning opportunities that technology has created in their learning environments. Teachers recognize and acknowledge how using technology can motivate the students to learn (Skutil, 2014). Using technology can assist the students in developing within themselves a deeper interest in subject matter, a more developed set of research skills, a more developed set of problem-solving skills, and a deeper sense of success (Lamanauskas, 2013). The Internet has made subject matter more accessible which requires the students to develop more advanced and ethical research skills. Using technology as a research tool has also given students an opportunity to develop technological problem-solving skills that, when facilitated properly by the teachers, will create an environment in which students can experience the type of success that is necessary for their learning.

Reluctance and challenge on the part of the teachers are two of the barriers to using technology in the classroom (Koehler, Mishra, Kereluik, Shin, & Graham, 2013). Some of this reluctance on the part of teachers with greater than 12 years of experience is the result of not having any formal training using ICT and, therefore, they lack the knowledge of how to use technology and integrate technology into the learning (Safitry et al., 2015). Which technology is made available to teachers is continuously changing. Teachers must embrace this changing technology in a way that suits their own pedagogical beliefs and philosophies. New technologies, programs, platforms, and applications are constantly being added to what is available in technology. Keeping up with all the new innovations that technologies have to offer can be daunting and exhausting. Teachers who find their own pedagogical foundation and who can make sense of how technology can enhance and not hinder their pedagogical foundation will find success in supporting and inspiring students in their use of technology in learning.

But integrating technology into the classroom as well as the effective use of technology in the classroom can become a barrier (Delgado, Wardlow, McKnight, & O'Malley, 2015). The limited technology use in the classroom occurs due to the teachers' lack of technological skills, the lack of time to learn these technological skills, and the lack of resources to support this lack of technological skill (Delgado et al., 2015). Students can sometimes be more fluent than their teachers in these new technologies and that can be intimidating for teachers. What is needed to overcome this intimidation is teacher training and collaboration to integrate technology into the classroom (Baran, 2014; Demiraslan Cevik, Daghan, Barin, & Savran, 2015; Lehiste, 2015). What is needed is for teachers to reach a level of technological literacy that supports the academic pursuits of their students. Teachers need to become fluent in using technology in the classroom and reach a level of self-efficacy that will propel them into a stream of personal

technological development that will support a constant and continuous learning journey for themselves to achieve technological literacy.

Technological literacy is how teachers incorporate technology into the daily learning of the students with the goal of increasing the academic performance of their students. It includes understanding how the hardware and software operates, the responsibility to adhere to the law in terms of intellectual property and copyright, how to integrate it into the learning, and how to evaluate online materials for learning (Chang, 2012). The best way to move towards technological literacy is through professional development.

Professional Development

There are many avenues through which to become technologically literate. Professional development (PD) has always been one possible way for teachers to acquire the numerous skills that are required for teachers. The not for profit Canadians for 21st Century Learning & Innovation organization re-released in June 2016 the following list of 21st century competencies that are considered essential skills for our students such as creativity and innovation, critical thinking, collaboration, communication, character, cultural and ethical citizenship, as well as computer and digital technologies (Canadians for 21st Century Learning & Innovation, 2016). There is a sense of urgency for our students to develop these 21st century learning skills (Soine & Lumpe, 2014). Developing computer and digital technology skills creates a new approach or foundation that will affect the other six 21st century competencies.

Using technology provides a new platform for creativity and innovation where the possibilities for learning is limitless. Using technology requires critical thinking to solve the various challenges that students face as they are exposed to more thoughts, ideas, and trends in our world. Collaboration and communication through the lens of technology provides a new

stage on which students can not only be working with their peers in a classroom or school but can also be working with students around the globe. With the opportunity to work with other students or people outside of the classroom and school through technology, good character, cultural, and ethical citizenship are important to ensure that learning is for the greater good. More than ever before, teachers need to have the same skills as the students to guide, facilitate, and protect the students. PD for teachers in the realm of technology provides the opportunity for them to develop a technological self-efficacy that involves self-growth in the areas of improvement, knowledge, realization, development, and determination (Sharifzyanova, Shtreter, & Nauryzbayeva, 2015). Engaging in PD that involves increased technological literacy will build the necessary skills for teachers to support the learning in the technologically advanced classrooms. In a study conducted by Delgado et al. (2015), 80% of teachers surveyed reported that their attitude about using technology as a pedagogy improved significantly after attending a technology workshop.

It starts with teachers believing that using technology is an effective pedagogy (Gökoğlu & Çakıroğlu, 2017). PD opportunities for teachers give them time to reflect on their pedagogy, boost their confidence, and offer a feeling of empowerment (Main, Pendergast, & Virtue, 2015; Slimani-Roll & Kiely, 2014; Winslow, Smith, & Dickerson, 2014). One must also realize that approaching pedagogies that will support technological literacy on the part of the teachers and the students may often evolve in a new direction. The confidence level of the teachers will need to change as technologies change. This will lead to a sense of empowerment knowing that one can confidentially embrace whatever changes will occur. PD in technology will need to be continuous (Dlamini & Mbatha, 2018; Melki, Nicolas, Khairallah, & Adra, 2017; Uslu, 2017).

PD for teachers must be very specific. Teaching using technologies in a Grade 2 classroom is different than teaching using technologies in Grade 5, 7, 10, or 12 classrooms. Teachers found PD most useful when PD was grade-level appropriate, catered to their individual learning activities, challenged their individual pedagogies and philosophies, had input from the teachers, was action orientated, and was flexible (Bleach, 2014; Gamrat, Toomey Zimmerman, Dudek, & Peck, 2014). Teachers must understand the level of technological abilities of their students. Technology will look different as a tool in the hands of a student with a disability, a student who struggles, a student who follows a regular stream of learning, and a student who constantly needs more challenging learning opportunities. Teachers need to be able to offer explanations to students on how technology works and how technology can provide for them the access to the materials that they will be using to learn. Teachers must be able to go to PD with simple, specific questions on how to use technology. The PD must be specific to the types of technologies that are available to the teachers to use such as iPads, tablets, laptops, or desktop computers. Teachers need to be able to sit and work on their iPads, tablets, laptops, or desktop computers to develop the necessary skills to be able to use the technologies. Flexible technological PD for teachers must be available to assist teachers in troubleshooting issues that arise in the classroom on a daily, weekly, and monthly basis.

PD offers teachers time to be creative in viewing new material, taking training courses, discovering new ways to create learning opportunities and finding anything that would be easy to pick up and implement immediately (Burns et al., 2014; Letitia, 2015). The best PD for teachers is when they can learn from each other, share their experiences, share their challenges and struggles, and create a network that is available every day and for every need that exists. This is especially true with using technology as sometimes what is perceived as a complex challenge has

a very simple solution coming from an educator who has had that experience. Ongoing field experiences as additional technological PD opportunities will benefit teachers as they acquire, improve, and demonstrate the necessary information, abilities, and the nature applicable to using technology in the classroom (Williams & Casale, 2015).

The more teachers learn about technologies and use them, the more they will understand how the technologies can support the learning in the classroom. Melki et al. (2017) found that the more technologically literate teachers became, the more the teachers embraced technological literacy and sought out technological education. The more teachers become accustomed to technology and the changes that it introduces, the more comfortable teachers become with the rapid change that technology tends to bring. Change can be a challenge but there are ways to minimize that challenge.

Change

There are many unknowns when teachers start their day such as how students will react, how students will work, what parents may be seeking, or whether what they had planned for that day will work. To this end, teachers exist in a state of vulnerability (Tse et al., 2017). What the teachers may have initially planned for the lessons that day may need to change in order to deal with any number of circumstances that may arise such as an unexpected guest speaker, an unannounced safety drill, an unexpected problem to deal with, to name a few.

Teachers also live in a realm in which they have a limited control on how their day changes. Change can bring with it challenges. Senge (1990) in his seminal work on learning organizations and systems thinking talked about how change involves four tasks such as (a) a compelling need for changes, (b) a period in which to make the changes, (c) a process that will support the change, (d) and how to overcome challenges that will not create new challenges to

change. Using technology can constitute a major change for teachers. This is an organizational change. It becomes a process as it changes a mindset from a traditional type of instruction to a new, creative, and technological pedagogy (Weston et al., 2017). The more that teachers have to deal with change, the easier it gets for teachers to deal with change. Teachers, through change, will come to understand what compelling change means. Teachers will also understand the various nuances of change, such as the period in which effective change takes place, how the process of change will be supported, and how to deal with the challenges of change.

The first major change teachers experience is the change from a non-technological classroom into a technological classroom (Hultén, 2013). This is a compelling need for change as some students, parents, and some teachers fear that not using technologies will place them at a real learning disadvantage. That may be the initial largest change in the classroom that will be experienced by the students. Moving from relying on textbooks, paper, and pencil to trusting a digital computer screen to show students' work can be daunting but one that is the reality of learning. With this comes an entirely different submission of assignments or assessment protocol. Issues to deal with are not whether the paper copy of an assignment has been handed in but will the technology deliver the assignment to the educator through the right portal, on time without getting lost somewhere in cyberspace.

It is important for teachers, students, and parents to understand that there needs to be a period in which to comfortably make the change from non-technologies to technologies. What also needs to happen is that teachers, students, and parents need to understand or agree upon the length of the time to allow change to happen. This length of time needs to be reasonable and realistic with goals set and responsibilities agreed upon as one part of the process to support the change (Maulana et al., 2014). Which technologies will be supplied by the school and which

will be supplied by the parents needs to be discussed. Which procedures need to be put into place regarding digital citizenship needs to be examined.

Careful consideration must be given to how to meet these challenges so new challenges are not created. Making technologies available can be a costly endeavor. Adequate funding must be available to support the technologies that are needed in the school (Ikpa, 2016). The budget assigned to a school needs to support the initial purchase of iPads, tablets, laptops, and desktop computers. Then the budget of the school needs to support any upgrades, repairs, and any additional devices that need to be purchased. The budget of the school will also need to support the purchase of software programs, online subscriptions, and additional platforms that are needed to enhance the learning.

Setting timelines in which to implement technologies needs to be agreed upon by all parties. Digital citizenship needs to consider privacy laws (Hernández, Robles, & Martínez, 2013). Careful storage of student technologies that are brought from home needs to be well-thought-out. Trusting that the work will save in an electronic file or folder is very different from trusting that the work on paper will make it to the assignment basket at the back or front of the classroom. Teachers must also trust that all the electronic devices will work on any given day or have a second lesson plan ready if the electronic devices do not work that day. Trusting that teachers know how to deal with technological problems in the classroom now is a consideration. These challenges that could arise when trying to implement a new change using technology could possibly create other new challenges that may need to be addressed.

Kotter and Cohen (2002) in their seminal work created eight considerations when implementing change. When implementing technologies into the classroom teachers must consider the following approaches to change as these eight recommendations will support the

teachers in building their technological confidence. First, when implementing change, creating short-term wins to promote lasting and healthy change is essential. Teachers need to create short-term successes in using the technologies in the classroom such as quick, successful logins, successful research results on the Internet, and successful production of a project using the technological tools. Second, the right vision is important. Teachers must know why they want to use technologies in the learning. Third, communicating the right vision is essential to all stakeholders. Teachers need to communicate the vision by sharing why they believe that technology, as a part of learning, is an important path to take. Fourth, the sense of urgency is significant. Teachers need to decide on how quickly they need to implement technologies. Fifth, guidance during the change requires attention. The teachers need to remind the students and parents of the rationale behind using technologies for learning and the expectations that come with using technologies in the classroom. Teachers might also consider the ethics of introducing the use of technologies into the classroom by developing a digital citizenship protocol to ensure that students understand the expectations and the boundaries when using technologies for learning. Sixth, changes require an investment of time. Teachers will need to make a conscious effect to invest the time in technological implementation and that a routine of using the devices is established. Seventh, there needs to be a level of persistence. Teachers will need to be persistent and consistent in the expectations in making the use of technologies a reality in the classroom. Finally, careful planning and execution are needed to make change last. Teachers will need to show determination in working toward establishing technological use in the classroom as a norm.

Pavlovic and Oljacha (2011) outlined the following considerations in regards to changing the learning environment. Change can start in the classroom but needs to move throughout the school. Implementing technology into learning in an entire school ensure that no students are at

a disadvantage. Using technology in the classroom instead of textbooks becomes a major shift in the pedagogy because technological devices are more readily available to everyone. The success of the change will depend on the health, climate, culture, and commitment of the learning community.

Importance of Organizational Health, Climate, Culture, and Commitment

Considering the health, climate, culture, and commitment of a learning environment is important in establishing a solid foundation for increasing technological literacy. Learning organizations have the following four attributes: (a) personal mastery, (b) mental models, (c) a shared vision, (c) and team learning (Senge, 1990). Personal mastery is improving oneself through constant, conscious effort. Using one's experiences to discover one's true potential and making it part of one's daily life is personal mastery. Mental models are the realities that people create for themselves based on what is happening around them. The more people reflect on what is happening around themselves, the more the mental models become a reality. Sharing a vision is what makes the experience of the learning organization strong. Not only is sharing the vision important but so is the execution of that vision. Sharing a vision creates learning opportunities for the team to make the vision a reality.

The use of technology will redefine a school. The use of technology will promote a new personal mastery. New skills will be learned. A new mental model within each educator will be established as each educator learns how to use technology for learning. Sharing the experience which was precipitated by a new shared vision will support the teachers, students, and their parents. Truly sharing this vision will create a team mentality in which everyone helps everyone to realize that vision. If this is done in a genuine way, the team becomes an authentic team.

Authentic teams create vibrancy in the workplace, integrity, individual work as well as group interaction, regular updating and upgrading, flexibility and a willingness to change (Mehta, Atkins, & Frazier, 2013). Vibrancy in the learning workplace, such as the school, provides the necessary fuel in which to grow the culture and climate especially when there is a paradigm shift such as using technologies in learning. Integrity is achieved when team members trust the work that they are doing and are true to the vision and mission of what they are doing. Healthy organizations become interdependent when the work of the individual is considered important for the work of the group. Organizations are healthy when they are committed to seeking improvements as they present themselves. In this case, organizations are willing to grow in a positive direction and will work together so everyone can achieve that growth. Stability is reached when authentic teams support each other in the flexibility that embraces change to ensure growth as well. The school has an organizational healthy culture and climate when the use of technology can create vibrancy in the school, trust in the work that is being done, support interdependence among the teachers and students, create a willingness to learn more, support each other's growth, and encourage flexibility and change. Culture defines the organization, and climate is how that occurs.

Organizational culture and climate are healthy when there is authentic organizational commitment. Organizational commitment is healthy when leadership, trust, and fairness are present (Arslan & Yildiz, 2015). Being trusted and fair are two of the essential qualities of influential leaders. Influential school principals create healthy school cultures and climates because they can be trusted and teachers and students know that influential school principals will be fair. When teachers and students feel safe in a trusting and fair environment, their work efficacy and job satisfaction rises and they become committed to what they are doing.

Work efficacy and job satisfaction exist within healthy cultures and climates (Ali & Patnaik, 2014). Working in an environment where teachers and students are confident in what they are doing offers them a sense of security and pride. Students achieve higher scores on standardized tests when the schools that they attend are healthy learning organizations (McCluskey, 2017). It gives them encouragement to try new things and it inspires them toward new heights of achievement. Thapa, Cohen, Guffey, and Higgins-D'Alessandro (2013) reported that healthy school climates consist of a) a sense of safety, b) healthy relationships, c) authentic teaching and learning, d) a structure environment, e) and an ongoing school improvement protocol. A healthy school climate promotes among students and staff a sense to take risks and to be confident that in risk takin failure is not something of which to be fearful. They can be confident knowing that failure in risk taking can propel them into a new direction of learning. Empowerment for both the students and the teachers occurs when they experience self-efficacy, satisfaction with the work they are doing, strong relationship bonds, and effective, efficient, and productive leadership (Balkar, 2015). This effective, efficient, and productive leadership builds confidence in using technologies in learning which will find its foundation in a leadership that does not expect perfection but encourages excellence and in one that has built a healthy culture and climate. The type of leadership that builds the organizational health, climate, culture, and commitment of the community lies in the hands of the principal and specifically the principal's technological practices.

Principal Leadership and Principal Technological Practices

The characteristics of effective principals has changed over the years. In the past, principal leadership was viewed as management indicated by goal setting and monitoring (Banjarnahor, Hutabarat, Sibuea, & Situmorang, 2018). While management is important,

principal leadership is now seen as being caring, being of service, being respectful, being collegial, being collaborative and synergistic as well as having effective communication skills, and being patient (Mosley et al., 2014). The principalship has evolved into a caring, compassionate, and creative leadership position, one that concentrates more on encouraging growth then demanding compliance.

Technology being successfully implemented in the classroom is led by the principal (Claro, Nussbaum, López, & Contardo, 2017; Pollock, 2016). This technological leadership takes on many forms with the contentment of the teachers and the students being an integral one. In Ozgenel and Gokce's (2019) study concerning the use of technology in learning a comment was made on the well-being of staff and students: one participant remarked that in regards to using technology in learning, a happy teacher made the children happy, which in turn made the children make each other happy, which made a happy learning environment. One of the principals' major roles is to ensure that the teachers are happy. This happiness or contentment lies initially in the realized accomplishments of the teachers. The leadership style of the principal helps to shape the well-being of the teachers, establishes the teachers' emotional attachment to the learning environment, and will determine if teachers will stay at the school (Heidmets & Liik, 2014).

Bandura (1977) discussed varying aspects of self-efficacy, one of which was performance accomplishments. Even though the person grows through the experiences of performance accomplishments, to feel that one is accomplishing what one has set out to do works well when support is given. Principals play the role of a supporter and at the same time exert just enough pressure to move teachers beyond their present capabilities. Spears and Lawrence (2004) in their seminal work on servant leadership identified listening, empathy, persuasion, stewardship, and

commitment to the person's and community's growth as important traits of a servant leader. Teachers who are supported through servant leadership are empowered, inspired, and feel a connection with their principals (Russell, 2013; Shaw & Newton, 2014; Van Winkle, Allen, DeVore, & Winston, 2014). Principals also need to be aware of how they support and encourage growth in their teachers. The needs of a novice teacher are very different from the needs of the more experienced teacher. Whereas the novice teacher may need more guidance and mentorship, the more experienced teacher will appreciate more independence, trust, and mentorship responsibilities (Munir & Khalil, 2016).

To be empowering and inspiring, principals participate in their own continuous professional growth which includes technological fluency as an instructional leader (Brown & Jacobsen, 2016). This also gives the principal the opportunity to be current in the leadership and professional development that is available to them. Teachers' perceptions of principals and their leadership behaviors should also be a part of PD that principals experience (Munir & Khalil, 2016). This provides them not only with technological practice skills but also with the skills that are important to inspire and encourage teachers to be inspiring and encouraging of their own students.

Moving teachers in a new direction involves change on the teachers' part. Some teachers find this acceptable while other struggle with the challenges. Burns (1978), in his seminal work on transformational leadership, stated that moving in a new direction transforms all persons involved with the change as it challenges each person to reach a higher level of morality and motivation. Principals who are transformational leaders develop in their teachers a sense of positive perceptions as well as an ethical approach to learning with high expectations of their own pedagogical delivery in the classrooms (Munir & Khalil, 2016). Transformational

leadership in principals also includes “idealized influence, individual considerations, inspirational motivation, and intellectual stimulation” (Hauserman & Stick, 2013, p. 196). Principals who lead as transformational leaders are driven by personal determination and concern for PD, are supportive of school values and cohesive school communities, and desire to achieve authentic results (Navickaitė, 2013). Principals who are transformational leaders are intrinsically motivated to achieve the best learning environment for their teachers and their students. These principals strive to reach the highest level of self-actualization for everyone that they serve. These principals are unselfish and lead without ego in the humblest of ways and are more concerned with the greater good then they are with achieving accolades for themselves. They pride themselves on a job well done when students and their teachers are acclaimed for the good work that the students and teachers do. A principal who is a transformational leader develops people and helps them achieve their level of self-efficacy (Lowery, 2014). As a transformational leader, the principal works with teachers to set a vision and to collectively decide on a focus and a route to take to become successful in supporting the learning experience of their students (Cerni, Curtis, & Colmar, 2014; Stein, Macaluso, & Stanulis, 2016).

To transform teachers in moving them closer to increased technological literacy transformational leaders become persuaders, and colleague-centered supporters (Lowery, 2014; Ruggieri, Boca, & Garro, 2013). Transformational leaders become encouragers, caregivers, promoters of prospective efficiencies, revolutionaries, and creators of healthier environments (Lowery, 2014; Ruggieri et al., 2013). The principal as transformational leader works to provide authentic learning experiences so that the teachers and the students find an atmosphere and environment in which they discover for themselves their own strengths and the potential that lies within each one of them. The principal as transformational leader strives to move learning

forward in an evolutionary and revolutionary way. The principal knows that there is no status quo and that if there is no progression, there is potential for regression. In the age of technologically based learning, there is no room for regression and to continue this learning evolution and revolution the transformational principal needs to approach learning in a very different way that will support the skills that are necessary in this 21st century learning environment.

To integrate technology into 21st century learning, there are ideas to consider such as visioning, change, teaching and learning, curriculum and ethics (Chang, 2012; Kin, Kareem, Nordin, & Bing, 2014; Lowery, 2014; Vatanartiran & Karadeniz, 2015). In addition, safety and security, infrastructure, technology planning, technical support, staff development**,** and technological leadership are also important in the integration of technology into 21st century learning (Chang, 2012; Kin et al., 2014; Lowery, 2014; Vatanartiran & Karadeniz, 2015). Principals need to be technologically proficient and lead in evaluation and research as well as interpersonal and communication skills (Arhipova, Kokina, & Rauckienė-Michaelsson, 2018; Chang, 2012). Principals need to concentrate on their own continuous professional development in technological literacy if they want to be effective in inspiring and leading their teachers toward increased technological literacy.

Teachers' technological literacy improves when principals encourage teachers to integrate technology into the learning (Chang, 2012). Teacher technological skills improve when they perceive themselves as proficient and creative (Oskay, 2015). Students benefit from the proficiency and creativity that teachers embrace and implement in the classrooms daily. Principals who assist and nurture teachers in increasing their own creativity and proficiency in their technological literacy will foster a safe sense of self-efficacy among teachers, which will

transfer to the students whom they serve. This is achieved through continuous staff training. Staff training involves planning strategically, planning goals, sharing the vision, allocating funds for resources, a process for ongoing implementation, integration into the curriculum, evaluating the program and doing an impact assessment, and ensuring that there are ethical protocols in place (Anderson & Dexter, 2000). Evaluation and research involve measuring the growth of the teachers and supporting the appropriate PD. Interpersonal skills and communication may override technological skills in the sense that empowerment of teachers will be best supported by genuine interpersonal skills and communication (Aslanargun, 2015). Fullan (2011) stated that leadership empowers people to be (a) active and responsive participants, (b) effective and motivated team members, (c) cooperative collaborators, (d) confidently humble, and (e) focused team members.

Technological practices in small K–12 rural schools of 50 to 200 students has yet to be examined. This study examined the perceptions of principals as technological leaders as they lead teachers toward increased technological literacy. In many cases, technology used in learning in a small K–12 rural school creates the world of learning for the students and ensures the survival of that rural school, which in turn may ensure the survival of that small town. The effectiveness of the rural principal and how he or she perceives this effectiveness is key to safeguarding the learning that can take place in his or her small K–12 rural school.

Summary

Because principals are the most effective agents of change, they use decision making abilities to create an effective learning environment for the students, teachers, and parents. This chapter identified the seven aspects in creating these effective learning environments that effective principals need to consider when supporting the increased technological literacy of

teachers. This chapter also identified the social cognitive theory of Bandura (2001) on which this study was based. It is from these seven aspects and the social cognitive theory that principals base their perceptions on how effective they are in leading teachers to technological literacy.

First, the most significant aspect of learning is the teacher-student relationship as it needs to be understood and nurtured. Second, understanding learning in a rural community is imperative because of its uniqueness in how it can support the existence of the small rural community. Once the foundation of the teacher-student relationship is established and the nature of rural education is realized, the third aspect to consider is the implementation of technology in rural education as it gives those teachers and students more access to resources and tools for learning. The fourth aspect to recognize as important in implementing technology is educator PD in which each educator can build their technological literacy. Fifth, accepting and understanding change is paramount to increasing technological literacy. Sixth, change is most successfully achieved in an environment of a healthy organization, culture, and climate with healthy commitments. Finally, principal technological practice goes beyond general principal leadership to support a very exact type of pedagogy in increasing technological literacy.

Understanding how principals perceive their technological practice abilities in leading teachers toward increased technological literacy has its foundation in the social cognitive theory of Bandura (2001). The social cognitive theory of Bandura (2001) through the triadic reciprocal determinism in the personal, behavioral, and environmental experiences is the theory supporting this research study.

CHAPTER THREE: METHODS

Overview

The purpose of this bounded multi-site study was to understand how the technological practices of principals in small K–12 rural schools in western Canada foster the technological literacy of teachers. The research design, research questions, setting, participants, procedures, researcher's role, data collection, and data analysis are considered in this chapter. Trustworthiness and ethical considerations are also discussed in this chapter. The purpose of this chapter offers more detail into the methods that were used in conducting this research.

Design

This study was qualitative in nature. Corbin and Strauss (2008) stated that qualitative research "allows researchers to get at the inner experience of the participants, discover how meanings are formed through and in culture, and to discover rather than test variables" (p. 12). Researchers like the adaptable, ever-changing, and developing quality of qualitative research compared to the set format of quantitative research (Corbin & Strauss, 2008). Merriam and Grenier (1998) stated that the case study "is an intensive description of a bounded, integrated system (the 'case'), was more of a format or structure for focusing an investigation, as well as conveying the findings of an investigation" (p. 12). To discover what principals have done to lead their teachers to becoming more technologically literate was best served through a qualitative study because the inquiry was done as an investigation at a much deeper level through document analysis, individual interviews, and more probing through focus group questions.

The research design was a multi-site case study. Dating back to the 1920s and 1930s with its origins in anthropology and sociology (Creswell, 2013), the case study has a long history of delving into real life experiences that has developed throughout the last decades to become

one of the most challenging types of study to undertake (Yin, 2014). This case study was a bounded multi-site case study. Multi-site case studies address one issue through studying multiple cases (Creswell, 2013). The bounded nature of a case study are the limits around which the research occurs (Patton, 2002). In this study, the boundary that was established were principals and teachers in small K–12 rural schools of 50 to 200 students in a province in western Canada. Studying principals and teachers from multiple sites and their perceptions of their experiences in increased technological literacy strengthened the findings and ensured that the findings were more robust (Yin, 2014). Each school was considered a separate case. The phenomenon studied was the technological practices of principals and teachers in these small rural K–12 schools. The central research question and the subsequent sub-questions were descriptive in nature, which dealt with discovering the perceptions of the organizational and managerial real-life experiences of these teachers. The descriptive research questions addressed the "what" aspect of these real-life experiences. The interview questions were explanatory in nature as they addressed the "how" and "why" of these experiences.

In designing this bounded multi-site case study, key assumptions were made from a theoretical perspective in the form of the research questions. The logic of inquiry included confirmatory cases because the intent of the research was with similar phenomenon (Yin, 2014). The research initially began from a theoretical perspective aimed at analytical generalizations which were generalized outside of this study (Yin, 2014). The use of literal and/or theoretical replications assisted in supporting the findings (Yin, 2014).

Research Questions

Central Research Question

How did principals in small K–12 rural schools in western Canada use their technological practices to foster technological literacy among their teachers?

Sub-questions

1. How did principals in small K–12 rural schools in western Canada use their personal leadership practices to foster technological literacy of teachers?
2. How did principals in small K–12 rural schools in western Canada use their relationship skills to foster technological literacy of teachers?
3. How did principals in small K–12 rural schools in western Canada use their environmental surroundings to foster technological literacy of teachers?

Setting

Small rural school divisions in a western Canadian province were considered for this study. There were 37 K–12 rural schools in 11 different school divisions with enrollments of 50 to 200 students and four or five teachers in this western Canadian province. The rationale for this setting was that data were collected from different rural school divisions representing a wide range of experiences including geographical experiences, leadership, and availability of technology. The uniqueness of being a principal and leading in these small rural schools provides a different perspective in leading in a world that has become increasingly technological. The relationship that exists between principals and the teachers in these small rural schools is distinctive in the sense that this small group of people still needs to provide a competitive and viable learning experience for their students. The extent to which the principals and teachers need to work together is like no other learning environment. These principals and teachers rely

heavily on each other to ensure the success needed to produce an effective learning environment. The principals' perspectives on their effectiveness in these small rural schools adds to the research literature and supports future principals in creating a foundation of leadership for themselves.

Typically, rural school divisions have a director, superintendents of learning, business, technology and operations, consultants, and learning coaches. Each school in a rural school division has a principal and a vice-principal depending on the enrollment within their schools and often these principals and vice-principals educate along with their administrative responsibilities. Small rural schools of 50 to 200 students have a principal but not a vice-principal and these principals have administrative duties as well as being educating principals which adds another dimension to understanding the realities of the classrooms. Pseudonyms were used for the different school divisions, principals, and teachers who participated in this study to ensure confidentiality.

Participants

The participants were chosen using purposeful and criterion sampling. Patton (2002) defined purposeful sampling as "information-rich cases for study in depth. Information-rich cases are those from which one can learn a great deal about issues of central importance to the purpose of the research" (p. 46). Criterion sampling occurs when participants meet certain criteria (Creswell, 2013). According to Creswell (2013), it is also important that the research involves participants from multiple perspectives. The group of participants were chosen from principals and teachers in small rural K–12 school who were moderately comfortable or very comfortable with using technology as well as moderately comfortable or very comfortable with implementing new technologies in their schools. In order to create a participant pool from

multiple perspectives, the other criteria taken into consideration were the participants' gender, type of degree, years in education, length of the principalship (for principal participants), types of technologies in the school, and length working in a small rural school. A screening survey (see Appendices C and E) was sent to each potential participant in order to create the participant pool. The desired number of participants was eight (Creswell, 2013). Pseudonyms were used for the participants to ensure confidentiality.

Procedures

I sought expert reviews of my individual and focus group questions from two university professors in the College of Education at a local university. One professor is in Educational Administration and the other professor is an Assistant Professor in Curriculum Studies. Both guided me in considering questions that would solicit more in-depth responses which would make the data richer. They also encouraged me to ask additional questions based on the responses from the initial open-ended interview questions.

In preparation to submit my IRB application, I contacted the directors of education from thirteen school divisions via letter and received four letters of permission (via email) to conduct research in their school divisions. In Appendix A, I have placed the Institutional Review Board (IRB) approval letter to preserve the confidentiality of these school divisions. Prior to conducting any research, I sought approval from the IRB at Liberty University.

Immediately after receiving IRB approval, I conducted a pilot study to check and refine my research questions and procedures (Creswell, 2013). I asked two principals and two teachers I knew to act as participants for the pilot study. I asked them for their documents to analyze as well as engaged them in the individual interviews and a focus group interview. None of their data were used in the study.

After completing the pilot study, I sent the potential study participants a recruitment email with a screening survey explaining the research study (see Appendices B, C, and E). Once I created my participant pool based on the results of the screening survey, I sent each respondent who completed the screening survey either an acceptance email (those who were well suited for the research) or a rejection email (those who were not well suited for the research) as found in Appendix B (Recruitment Letters). With the acceptance email, I sent the chosen participants the appropriate consent form (see Appendices D and F). Via email, I invited the participants to send me the following documents for document analysis such as, but not limited to, meeting minutes in which technology was discussed, notes and PowerPoint presentations from professional development within the school setting, notes and PowerPoint presentations from professional development outside the school setting, and school improvement plans that indicated increased technological literacy.

I did not receive the minimum number of participants for my study initially, so I asked permission of the IRB to include principals and teachers from my own school division. Once I got that permission, I sent out the recruitment letters and the screening surveys. With that, I received interest from three principals and three teachers. Upon receiving the screening survey from the three principals and three teachers, I sent out the consent forms which were signed and returned. However, I still needed at least two teachers to meet the minimum requirement for participants. At that point I sought permission from the IRB to ask for participants who have worked in small rural schools within the last three years. Permission from the IRB was granted and I was able to recruit two more teacher participants. Two principals and one teacher were accepted as participants through the screening surveys but did not return the consent forms; they did not participate in the study.

I conducted the individual interviews in person or through VoIP. I invited the participants to participate in a focus group, which occurred in person or through VoIP. I had one principal focus group of four participants as well as one teacher focus group with four participants. I gathered the data by using two recording devices. For the face-to face-interviews I used two Sony Digital Voice Recorders. For VoIP interviews, my primary recording device was Zoom Video Communications. As a back-up I used the Sony Digital Voice Recorder. I transcribed all interview and focus group data. I analyzed the data as they were generated so the experience was fresh in my mind (Yin, 2014) and then produced the findings in a report.

The Researcher's Role

My role as the human instrument was to act as a skillful gatherer and interpreter of the data that I collected (Lincoln & Guba, 1985). I needed to approach the collection and analysis of the data with rigor and competence and without bias. I also needed to be aware of the possibility that my 20 years of school-based administration biased how I asked the questions (such as leading questions) and how I visually reacted to their responses. I did know some of the participants and I was familiar with their settings; however, I was aware of bias that could occur (Corbin & Strauss, 2008). I used a reflexive journal to document any potential biases that I had.

The perspective from which I researched was one of an ontological philosophy and a constructivist point of view. I relied heavily on the quotes of the participants to delve into their meanings (Creswell, 2013). Patton (2002) stated that direct quotes are "a basic source of raw data in qualitative inquiry, revealing respondents' depth of emotion, the ways they have organized their world, their thoughts about what is happening, their experiences, and their basic perceptions" (p. 21). Quotations from participants were a critical component of my data analysis. As a case study researcher, I attempted to ask good questions, listen attentively, be

adaptive, hold myself to high standard of research integrity, and develop a protocol to guide my data collection (Yin, 2014).

Data Collection

I used triangulation in my data collection. Triangulation involved using different sources of evidence to corroborate the findings (Creswell, 2013). Triangulation provided validity to the findings by comparing and contrasting the data that were collected from more than one vantage point (Schwandt, 2007).

I collected data through documents, interviews, and focus groups. Looking at the documents indicated to me what the principal had considered important as reference materials for technological literacy. Interviewing participants told me of their perceptions of technological literacy. The focus groups supplemented their perceptions of technological literacy.

Document Analysis

Available documents such as meeting minutes, professional development notes, and school improvement plans were analyzed to add to the richness of the collected data. Document analysis offered an opportunity to compare or contrast data from the interviews and focus group as well as analyzing and interpreting data (Schwandt, 2007). It also provided a reference from which more interview questions were generated for the focus group interviews. Meeting minutes provided discussions about the direction in which technology was taken in the school as well as any PD plans that were made for the future. PD notes included agendas for an in-school PD day, notes that were taken at a PD event outside of the school, PowerPoint presentations used at the school, and other potential activities. School improvement plans showed what technological goals had been realized as well as the ones that were presently being used. The document

analysis provided additional data for the sub-question regarding the environmental surroundings that fostered the technological literacy.

Interviews

The individual interviews used an open-ended interview format with a conversational tone to put the participants at ease. Patton (2002) defined open-ended interviewing as an approach where "each interviewee gets asked the same questions—the same stimuli—in the same way and the same order, including standard probes" (p. 344). The participants' responses took the interview into a new direction beyond the initial questions. The length of the interview was no longer than one hour unless the participant wanted to continue the conversation beyond the hour.

Asking questions regarding the principals' and the teachers' views and experiences was important in understanding their perceptions of how technology is used and can be used in education (Al Bataineh & Anderson, 2015; Safitry et al., 2015; Tsai, 2015). The individual interviews were conducted either in person or through VoIP at the convenience of the participant. The interviews took place in the location of the participants' choice within 100 kilometers of my home. If within 100 kilometers of my home was not practical for the participant, I suggested that the interview occur via VoIP. The interviews were recorded using at least two electronic recorders to ensure that at least one recording was successful. These questions asked the participants to reflect on their perceptions of the practices that they were using to lead their teachers toward increased technological literacy.

Standardized open-ended interview questions for the principals:

1. Tell me about your educational experiences.
2. How important is the use of technology in education?

3. What types of technologies are available for the students and teachers to use in their learning?
4. How much autonomy are the teachers given in terms of implementing technology in the classrooms?
5. What are the challenges your teachers encounter when using technology?
6. How did you create a climate and culture that welcomed new technologies or technological pedagogies into the school?
7. How did the commitment to use technology change for the teachers as new technologies became more available?
8. Tell me about how you support the teachers in their technological PD.
9. What are the three most effective strategies that you implemented that led to a more technologically successful school?
10. What would be the advice you would give to a principal who wants to implement technology in the school?

Standardized open-ended interview questions for the teachers:

1. Tell me about your educational experiences.
2. How important is the use of technology in education?
3. What types of technologies are available for you and your students to use in the learning?
4. How much autonomy are you given in terms of implementing technology in the classroom?
5. Tell me about a time when you and the students were using technology to learn.

6. How did you create a climate and culture that welcomed new technologies or technological pedagogies into your classroom?
7. How did the commitment to use technology change for you as new technologies became more available?
8. Tell me about the technological PD that is available to you.
9. What has been the three most effective strategies that were implemented that led your school to being more technologically successful?
10. What would be the advice you would give to a principal who wants to implement technology in his or her school?

The basis for the interview questions are similar for both the principals and the teachers. Question 1 contained prompts to get acquainted with the participant at the beginning of the interview. It also started the conversation about technology in education. It gathered information about the participant and the intention was to ease into the conversation.

Questions 2 was a general question about technology to solicit information regarding the participant's view on technology in education. It was reported that even though teachers find themselves lacking in the area of using technology, principals still found it as an important tool to be used in students' learning (Chang, 2012). The types of technologies varied from school to school, but the implementation of some types of technological tools was essential.

Question 3, 4, and 5 dealt with the autonomy that teachers experienced in implementing technology in the classroom (Li et al., 2015). Each teacher's experience was different when dealing with different students and their level of comfort when using technology. A teacher also needed to be able to adjust how to implement technology based on what was available to the teacher and the student.

Questions 6 asked the participant to consider how he or she created a climate and culture in which the implementation of technologies in the learning was adopted. Question 7 inquired about the commitment gained on the part of the teachers (Arslan & Yildiz, 2015). Creating a healthy culture, climate, and commitment was critical in creating an environment in which teachers were willing to take risks in order to grow.

Question 8 involved discovering the types of PD that the teachers were engaged in and to which they had access (Ekanayake & Wishart, 2015). It encompassed how the principal supported PD for the teachers and the type of PD (Liu et al., 2015). The role of the principal in supporting teacher professional development was vital in helping teachers flourish in their roles in the classrooms (Evans, 2014). It also explored how often the teachers engaged in PD outside of the school (Vatanartiran & Karadeniz, 2015).

Question 9 asked about the three effective strategies that the participant believed that led to a successfully technological school (Chang, 2012). It also addressed what the participant would try in the future. Question 10 asked for advice that could be given to principals who were struggling (Anderson & Cohen, 2015).

Focus Groups

The validity of a focus group exists in the outcomes that it produces (Patton, 2002). Patton (2002) said, "In a focus group, participants get to hear each other's responses and to make additional comments beyond their own original responses as they hear what other people have to say" (p. 386). I created two focus groups of five from the original group of participants. (Patton, 2002, p. 385). The purpose of forming a focus group with the same participants as the individual interviews was to create an environment in which a more in-depth discussion could occur which would lead to a sharing of ideas and possible strategies for the future. Probing the efficacy level

of the teachers in regard to technology and the types of supports that they would appreciate was paramount to understanding how to promote their technological self-efficacy (Gökçek et al., 2013; Hasslöf, Ekborg, & Malmberg, 2014). I hoped that the conversation created through the focus group would reveal a deeper essence of the challenges of technological literacy. The responses collected from the focus group questions provided data for the personal, behavioral, and environmental technological practices.

Standardized open-ended focus group questions for principals:

1. If you were to fall asleep then wake up in three years and technology in education was much closer to what you'd love to imagine it to be at its best – what might have caused these positive changes?
2. Please comment on how comfortable your teachers are when using technology in education.
3. How do you promote and support healthy teacher-student relationships in your school?
4. What challenges have you encountered in your rural community, including your parents, regarding the implementation of technology in your school, and how did you work through those challenges?
5. What challenges have the teachers encountered in your school in becoming more technologically literate?
6. How did you help teachers who were or are resistant to moving in the direction of becoming more technologically literate?
7. How did you support PD in technological literacy?

8. How did you change the culture and climate in your school to support technological literacy in your teachers?
9. What aspect of your technological practice (email, Scheduler Assistant in Outlook, Basecamp, Teams, PowerPoint, Prezi, etc.) had the most positive effect on the teachers as they improved and improve their own technological literacy?
10. Collectively speaking, what advice would you give to a principal who would like to raise his or her teachers' technological literacy level?

Standardized open-ended focus group questions for teachers:

1. If you were to fall asleep then wake up in three years and technology in education was much closer to what you'd love to imagine it to be at its best – what might have caused these positive changes?
2. Please comment on how comfortable you and your colleagues are with using technology in education.
3. How do you create a healthy working relationship with your students when working with technology?
4. What challenges have you encountered in your rural community, including your parents, regarding the implementation of technology in your school, and how did you work through those challenges?
5. What challenges do the teachers in your building encounter in becoming more technologically literate?
6. How have you helped fellow teachers who were or are resistant to moving in the direction of becoming more technologically literate?
7. What was/is your experience with PD in technological literacy?

8. How did you change the culture and climate in your school to support technological literacy?
9. What technological practice (email, Scheduler Assistant in Outlook, Basecamp, Teams, PowerPoint, Prezi, etc.) of your principal had the most positive effect as they improved and improve the technological literacy in the school?
10. Collectively speaking, what advice would you give a principal who would like to raise his or her teachers' technological literacy level?

The first focus group question for both the principals and the teachers sought to understand the group's view on the place of technology in education (Demiraslan Cevik et al., 2015; Liu et al., 2015). In order to be able to compete in our global world in which technology has become a part of the fabric, creating a solid foundation of technology is important in helping our teachers assist our students. As a principal and a teacher, defining, and modeling technological literacy was key in encouraging both teachers and students to become technologically literate. To ask a question about the participants' views on technology in education in the future reveals the mindset of the principals and the teachers.

The second question dealt with understanding the ease with which teachers were using technology (Al Bataineh & Anderson, 2015). The level of technological literacy varied as to the number of teachers in the school. The level of comfort of each of these teachers was different. It was important to ask a question regarding the comfort level of the teachers.

Question 3 investigated the importance of the relationship between the teachers and the student as a foundation for a successful academic experience. Healthy teacher-student relationships were key in motivating students to do well academically as well as relationally with not only their teachers but their peers as well (Maulana et al., 2014). It was also noted that as

their relationships continue over time, the quality of the relationships increase. Asking a question about the state of health of the educator-student relationships was important as these relationships can grow in an unhealthy direction very quickly if the relationships do not have a solid foundation with which to begin.

Question 4 addressed some of the barriers that the participants encountered with their communities and how they had overcome those challenges. The strategies that were implemented at the rural municipal level needed to be realized and nurtured (Lind & Stjernström, 2015). With this realization and nurturing, there were still some constraints that needed to be acknowledged and dealt with. Identifying challenges and barriers and how they were overcome was an important question to consider as not dealing with challenges and barriers hinder any significant growth in the future.

Leaders in the school were key in implementing technology in their schools (Arokiasamy, Abdullah, & Ismail, 2014). Building the appropriate culture, securing the resources, and inspiring the teachers to embrace technology was imperative to the successful use of technology (Arokiasamy et al., 2014). Questions 5 and 6 addressed the challenges that the participants faced when trying to support teachers in becoming more technologically literate. A question dealing with challenges bypassed any potential derailment of technological advancements in the school.

Question 7 addressed the importance of PD for teachers in the area of technology. Teacher PD included a thorough experience of technological pedagogy, infrastructure, and content (Kihoza, Kalegele, Zlotnikova, & Kizito Bada, 2016). Discovering the technological skill abilities of the teachers was paramount in supporting the growth of technology in the schools.

Collaboration with others and concentrating on their own professional growth paved the way for teachers to improve school climate and culture (Kilinc, 2014). Creating a supportive, healthy culture and climate was instrumental in supporting the growth of technological literacy. Question 8 explored how the participant created their supportive, healthy school cultures and climates.

Question 9 explored the positive effect that the participants' technological practice had on the technological literacy of the teachers. Chang (2012) found that principal technological practice encouraged teachers to integrate technology into the learning in the classrooms. Barter's (2013) study also found that principal technological leadership helped teachers to be more effective as teachers in the classroom. A question about principal technological practice shapes the point of departure for the successful implementation of technology in the school.

Question 10 was a culminating question to solicit suggestions or advice on how to raise the technological literacy level of the teachers. A list of suggestions would be invaluable for all principals and especially for those principals who were struggling not only in small rural schools but in any school whether it is urban or rural. Being skillful as a transformational leader especially in technology assisted a principal in raising the commitment level of the educator (Chen, 2013). A question such as this supported principals who needed timely advice whether they were struggling or were successful and wanted to continue to be successful. Getting information from people who were experiencing success or who had experiences that led to success was the most valuable information that was passed along to others who were seeking the information.

Data Analysis

Yin (2014) remarked that case study data analysis is one of the most challenging because the data gathered to address the research questions and the protocol by which the data are analyzed is not so easily defined. The first experience in the data analysis occurred in the actual collecting and examining of the data through the document analysis, the transcription of the individual interviews, and the transcription of the focus group interviews. Yin (2014) stated that much analysis and reanalysis needs to take place while the data are being collecting to ensure that the propositions of the research are authentic real experiences of the participants. Each participant was considered an individual case.

The actual data analysis created a detailed description of the data collected. The first step was to analyze the data from the perspective of determining codes. Saldaña (2013) defined a code as "a word or short phrase that symbolically assigns a summative, salient, essence-capturing, and/or evocative attribute for a portion of language-based or visual data" (p. 3). The data were examined a number of times to ensure that a pattern of coding was established (Yin, 2014). In the first cycle coding, I identified either a single word or a paragraph (Saldaña, 2016) through circling, highlighting and underlining. During the second cycle coding, I identified "longer passages of text, analytic memos about the data, and even a reconfiguration of the codes themselves" (Saldaña, 2013, p. 3) through circling, highlighting, and underling. To dig deeper into the data, a third, fourth, and fifth cycle occurred (Saldaña, 2016).

Once the coding has been complete, categories were created. Through categorizing, similarities started to emerge (Saldaña, 2016). Recategorizing needed to occur a number of times. Sub-categories emerged as well. Once categories had been created, themes were developed. Saldaña (2013) described themes as "notable patterns" (p. 21).

A number of data display boards and data flowcharts (Appendices H to S) display the codes, sub-categories, categories and themes in the data analysis. Miles, Huberman, and Saldaña (2014) stated that "formats can be as varied as the imagination of the analyst" (p. 109). Using the data display boards found in the Appendices after five rounds of data analysis allowed me careful thought of the codes, categories, and themes. It created for the data collected from each participant a foundation to make a full analysis, it made available all the information, and it helped to focus and organize the potential amount of data that were collected.

The data from the document analysis, the individual interviews, and the focus group interviews are displayed on data analysis boards found in Appendices H, I, and J. The data from the support theme are found in Appendices K to M. The data from the connection theme are found in Appendix N. The data from the challenge theme are found in Appendices O to Q. The data from the opportunities theme are found in Appendix R and the data from the tools theme are found in Appendix S.

It was interesting to see if rival explanations appeared in the data collection phase (document analysis, individual interviews, and focus group interviews) as well as the data analysis phase. If rival explanations appeared, a new dimension was added to the data analysis. After the data were analyzed on a per case base, a cross-case synthesis took place. Cross-case synthesis investigated the similarities and the differences between the individual cases (Cruzes, Dyba, Runeson, & Host, 2015). Appendix N was used as the analysis table for each case.

As case study data analysis does not follow any particular form of reporting (Yin, 2014), being as creative as possible in the composition of the findings allows the readers to decide for themselves the richness of the research findings. The next step was to move beyond these raw

accounts into discovering explanations. The lens through which the data were examined was how the findings related to the social cognitive theory of Bandura (2001).

Throughout the data analysis, writing about the findings was a form of data analysis (Miles et al., 2014). In addition to providing writing about the findings, tables and charts were provided to give the audience an opportunity to draw their own conclusions on the data that were collected. Miles et al. (2014) stated that "when you include displays in a final report, the reader can re-create your intellectual journey with some confidence" (p. 108).

Trustworthiness

According to Lincoln and Guba (1985), trustworthiness in research is critical to evaluating its worthiness. Trustworthiness in this research study was established through attention to credibility, dependability, and confirmability as well as transferability of the data. Credibility established internal validation. Dependability verified reliability while confirmability authenticated objectivity. Transferability endorsed external validity.

Credibility

Credibility assured the participant that the researcher represented the participant accurately in the collection, the analysis, and in the findings (Schwandt, 2007). Credibility in this study included member checking and peer debriefing. Member checking had the participants review the raw data and at the final analysis. This ensured that their views were precisely represented and my bias was minimized, and it was viewed as a courtesy so the participant to see what I have gleaned from their conversations (Schwandt, 2007). (It is also one more opportunity to gather information.) I used peer debriefing as another procedure to check for credibility. Peer debriefing was having a trusted colleague be a listening ear during the data collection and analysis. This added to the credibility of the study. Peer debriefing also took

place in the form of reactions and thoughts about the procedures throughout the research (Schwandt, 2007). I enlisted an educational colleague from our local university or one who was working on a terminal degree to assist me with this.

Dependability and Confirmability

Dependability and confirmability were utilized through an external audit. Data were examined once and then re-examined and both analyses were compared so that the process was reasonable, observable, and verifiable. An external auditor, such as an expert in case study research, was asked to check the soundness of the data analysis (Creswell, 2013) both times. This validated the consistency of the results. The external auditor decided if the data supported the interpretation of the findings and the conclusions drawn from the interpretations of the findings (Creswell, 2013). I used an external auditor who had no association with this study. Triangulation was used to make certain that findings were consistent among the three forms of data that were collected (Yin, 2014). Comparing the data contributed to this triangulation through literal replication. Contrasting the data collected added to this triangulation through theoretical replication.

Transferability

Transferability was guaranteed when rich and thick descriptions of the research method existed. The setting, participants, and the procedures were detailed to create a study that can be replicated by an outside researcher. The possibility of ongoing research can be conducted if the transferability is strong (Creswell, 2013). I was able to provide a very thorough description of the setting, participants, and the procedures after the data collection had occurred. An audit trail (Appendix O) was created to ensure the rigor of the research.

Ethical Considerations

Because the research involved humans, the following are ethical considerations as outlined by Creswell (2013). Permission to conduct this research was obtained from the directors of education to approach their principals prior to the submission on my IRB application. There was IRB approval. Permission from the principals to solicit their participation occurred through emails, telephone calls, and consent forms. Participation was voluntary on the part of the participants. They had an opportunity to withdraw from the study at any time. Upon their withdrawal from the study, their data collected were destroyed promptly as an electronic deletion and/or through paper shredding. All obtained data from the participants were stored in a locked file cabinet or password protected in an electronic file for a period of three years after which they will be destroyed by shredding the documents. There was an acknowledgement of any pre-existing relationships with any of the participants with careful consideration of any conflict of interest. There was careful consideration to the potential sensitivities of the participants. There was a collection of multiple perspectives and the use of pseudonyms for all participants. The reporting was conducted with integrity and honesty. The findings were provided to the participants, the directors of education, and any other interested parties.

Summary

Chapter Three created a framework on which the research and data analysis were based. The research design for this study was a bounded multiple case study. The research question and sub-questions involved exploration into the perceptions of principals as they lead their teachers to technological literacy in small K–12 rural schools in a province in western Canada. Participants were chosen from 37 small rural schools in four school divisions in a western

Canadian province. Once I secured research permission from the IRB, 10 participants were chosen using purposive and criterion sampling. I acted as a human instrument keeping in mind my various biases and assumptions that could affect the data collection and data analysis. The data collection included individual interviews, document analysis, and focus groups. Data analysis included the development of matrices to glean understanding of the responses to the research question and sub-questions. Trustworthiness ensured the validity (both internal and external) and reliability of the study in the form of credibility, dependability, confirmability, and transferability. Ethical considerations of the participants and the securing of the data collection as well as the anonymity of the participants were adhered to with the highest level of respect and confidentiality.

CHAPTER FOUR: FINDINGS

Overview

The purpose of this bounded multi-site study was to understand how the technological practices of principals in small K–12 rural schools in western Canada foster the technological literacy of teachers. Five principals and five teachers were selected from two different school divisions. The principals and teachers were also given pseudonyms randomly chosen by me as the researcher. This chapter presents the data collected through document analysis, individual interviews, and the focus group interviews. The quotes of the participants were transcribed verbatim to reflect each participant's responses, which included verbal ticks and grammatical errors in speech and writing to accurately depict the participants' voices.

Chapter Four restates the central research question and the sub-questions which were the foundations for this study. A description of each of the participants in the study is also provided. The outcomes from the analysis of the documents, individual interviews, and the focus group interviews were indicated. Also included in this chapter are the findings and the themes.

The central research question asked how principals in small K–12 rural schools in western Canada used their technological practices to foster technological literacy among their teachers? The sub questions for this study were as follows:

1. How did principals in small K–12 rural schools in western Canada use their personal leadership practices to foster technological literacy of teachers?
2. How did principals in small K–12 rural schools in western Canada use their relationship skills to foster technological literacy of teachers?
3. How did principals in small K–12 rural schools in western Canada use their environmental surroundings to foster technological literacy of teachers?

Participants

The participants were chosen from small rural schools in western Canada with student enrollment of 50 to 200 students using purposeful and criterion sampling. The participants were either working in a small rural school or had worked in a small rural school within the last three years. Each of the five principals and each of the five teachers were involved in the individual interviews. Five principals and two teachers supplied documents for the document analysis. Five principals had intended on participating in the focus group, but one principal had to drop out of the focus group interview. Five teachers had intended to participate in the other focus group, but one teacher had to drop out of the focus group interview. Pseudonyms were used for all of the participants and any other identifying aspects. Table 1 gives general information about the principal participants who came from two different school divisions and five different schools. Table 2 gives general information about the teacher participants who came from one school division and three different schools. Following each table are the individual descriptions of the participants represented in each preceding table.

Table 1

Principal Participants

Name	Gender	Education Level	Years in Education	Years as Principal in Rural Schools
Nicole	Female	M. Ed.	26 +	11 to 15
Dawn	Female	PhD Candidate	26 +	1 to 5
Rayna	Female	B. Ed.	26 +	11 to 15
Laine	Female	M. Ed.	21 to 25	6 to 10
Evan	Male	M. Ed.	11 to 15	1 to 5
Total			110 to 118 +	30 to 50

Nicole

Nicole went to school in a K–9 elementary school of about 85 students in the northeastern part of the province:

> Then in my Grade 10, 11 and 12 there were three feeder schools that fed into the high school so there were in our grade 10, 11 and 12 about 85 students per grade so there was a bit of an adjustment to go from a small rural school to a bigger rural school. I graduated in ’87.

Nicole attended university and received a Bachelor of Education degree with a major in history and a minor in math and physics. She started teaching when she was 21 years of age and had students who were not that much younger than she. She has taught a number of different subjects throughout her career in a K to 12 rural school, staying mainly in Grades 7 to 12. She has been in three different schools throughout her career as a teacher, vice principal, and presently a principal. Nicole has spent much of her teaching career as a teaching principal in the area of senior math. She received a Bachelor of Arts in history in 2003 and her master’s in educational administration in 2013. She has been an educator for 26 plus years and a principal in a small rural school for more than 11 years. Nicole has a moderate comfort level of using technology herself as well as a moderate comfort level of implementing new technologies in her school.

Dawn

Dawn’s interest in technology started when they got a computer at her school in the 1980s and it was solidified when she received a computer one year from her aunt and uncle at Christmas time. Dawn was very interested as a young person and as she became a teacher, she was very interested in how to “use technology as a tool for learning.” She received her Bachelor

of Education degree in the 1990s, at which time she took a number of educational technology courses. She became a learning coach that included supporting teachers with online learning. She decided to pursue her master's in educational technology as she

> could learn about how to be very intentional in bringing technology into the classroom. At that time, I had a dual focus; one was online learning and the second was assistive technology. So those were the two areas that I was exploring with tech under the big umbrella, how do we use tech purposefully for student learning experiences?

After she completed her master's program, she became a consultant in her school division which included being an educational technology consultant. At that time, her school division was exploring blended learning. She was able to secure funding to lead a project to find ways "to bring online and technology integration in a really purposeful way." She is presently a principal in a K–12 school where she is supporting the teachers and students as they look at blended learning in a personal and electronic way. She is pursuing doctoral studies that have nothing to do with technology. Her comment was, "Isn't that interesting?" She is presently a teaching principal in a small K–12 school. She has been in rural education for 26 plus years and a principal for three years. Dawn is very comfortable with her own technological skills and implementing technology in her school.

Rayna

Rayna "graduated from a Kindergarten to Grade 12 school in Small Town, Province." She received her Bachelor of Education degree in 1987. She has also taken the advanced placement program in education. She began her teaching career in a small rural town, and since that first small town experience, she has been in four other small towns as a teacher, a counselor, a vice principal, and presently a teaching principal. She has been in education for 26 plus years

and as a principal for more than 11 years. Rayna is very comfortable using technology as well as implementing it in her school.

Laine

Laine graduated in 1995 and started teaching at a private educational facility as well as substituting in the classroom for the first year. She started in a small rural school in 2001 and is presently there. Her experiences include a learning support teacher and a half-time kindergarten teacher.

> So, I started off as a learning support teacher and a half time kindergarten teacher. I've taught everything, almost every class and every grade in the building. I had middle years, elementary and high school and right now I'm the administrator and I have a 5/6 homeroom.

Laine has been in education for 22 years and a teaching principal for 10 years. She has her master's in education and a diploma in inclusive education. Laine is very comfortable with using technology as well as implementing it into her school.

Evan

Evan was born in a small rural community and spent his entire kindergarten to Grade 12 in that small rural community. After receiving his Bachelor of Education degree, he took his first teaching position in another small K–12 rural school teaching Grade 5 to 12 physical education and a variety of other subjects. After two years he was transferred to a junior high school teaching middle years physical education and social studies.

> I was there for five years, once again doing a focus on middle years physical education and social. We closed that school down actually as there was an amalgamation with the high school in Small Town. So, then I taught there for one year.

Evan took his first administrative role at a different small rural school. He has been a teaching principal for three years now. He has also completed his Master of Education degree. Evan feels moderately comfortable using technology and implementing it in his school.

Table 2

Teacher Participants

Name	Gender	Education Degree	Years in Education	Years in Rural School
Sarah	Female	B. Ed.	21 to 25	21 to 25
Maddie	Female	PhD Candidate	11 to 15	1 to 5
Karen	Female	B. Ed.	1 to 5	1 to 5
Heather	Female	B. Ed.	21 to 25	21 to 25
Adam	Male	B. Ed.	11 to 15	11 to 15
Total			65 to 85	55 to 75

Sarah

Sarah graduated from high school in another province and received her Bachelor of Education degree in 1991. She got her first teaching job in a small town and was there for nine years. She transferred to another province and has been teaching there since 2000. She took one year off three years ago to study at a Christian college. Presently she teaches kindergarten, Grade 1, and Grade 2 and has a total of 14 students whom she thoroughly enjoys. Sarah feels moderately comfortable using technology and implementing it with her students.

Maddie

Maddie has a Bachelor of Education degree and a master's in curriculum studies. Presently she is a PhD candidate in curriculum studies. She is an online teacher as well as being a classroom teacher. She has been in education for more than 11 years and has been in a rural

setting for five years. Maddie feels very comfortable using technology and moderately comfortable implementing it with her students.

Karen

Karen receive her Bachelor in Secondary Education degree in 2019 with a major in language arts and a minor in biology. Her first teaching experience was in a small rural school with about 170 students where she was covering for two back-to-back maternity leaves.

> I taught middle years math and high school science, high school history, um, and yeah that was about it. It was definitely a little challenging for me. I had no math background. I was actually learning how to keep Grade 4 students engaged. Coming from a high school background that was very interesting. I moved out there by myself into a tiny little house.

She found that the community that she moved into was very accepting and that she did not have any problems with the families. Presently she is an online teacher. Karen was moderately comfortable using technology and implementing it with her students.

Heather

Heather has been at her present school for 21 years. She completed her Bachelor of Education degree in 1993, has worked in two different provinces and has primarily taught Grade 5 and 6, although she has also taught kindergarten as well as Grade 2. When asked if she has seen a lot of changes, she replied, “Oh yes, I’ve often said the pendulum swings many times.” Heather is moderately comfortable using technology and implementing it with her students.

Adam

Adam has been an educator in three small rural schools in his 14 years as an educator. He has primarily been a practical and applied arts (PAA) teacher:

> After five years, I moved to another small town and started teaching a little bit of English and social studies as well. And then I moved into the PAA trades with welding and construction and eventually other trades as well.

Presently he is an online teacher. Adam was very comfortable using technology and implementing it with his students.

Results

This section will examine the results obtained after research data were collected using document analysis as well as individual interviews with principals and teachers. A focus group meeting occurred with principals, and a focus group meeting occurred with teachers. The top five themes that emerged from the data collection were support, connection, challenges, opportunities, and tools. The development of the themes, categories, and sub-categories are presented in the next section.

Theme Development

Data were collected through documents, individual interviews, and focus group interviews. The data were analyzed through a number of stages until the sub-categories, categories, and themes emerged. The themes, categories, and sub-categories were discovered from the study as indicated in Figure 1.

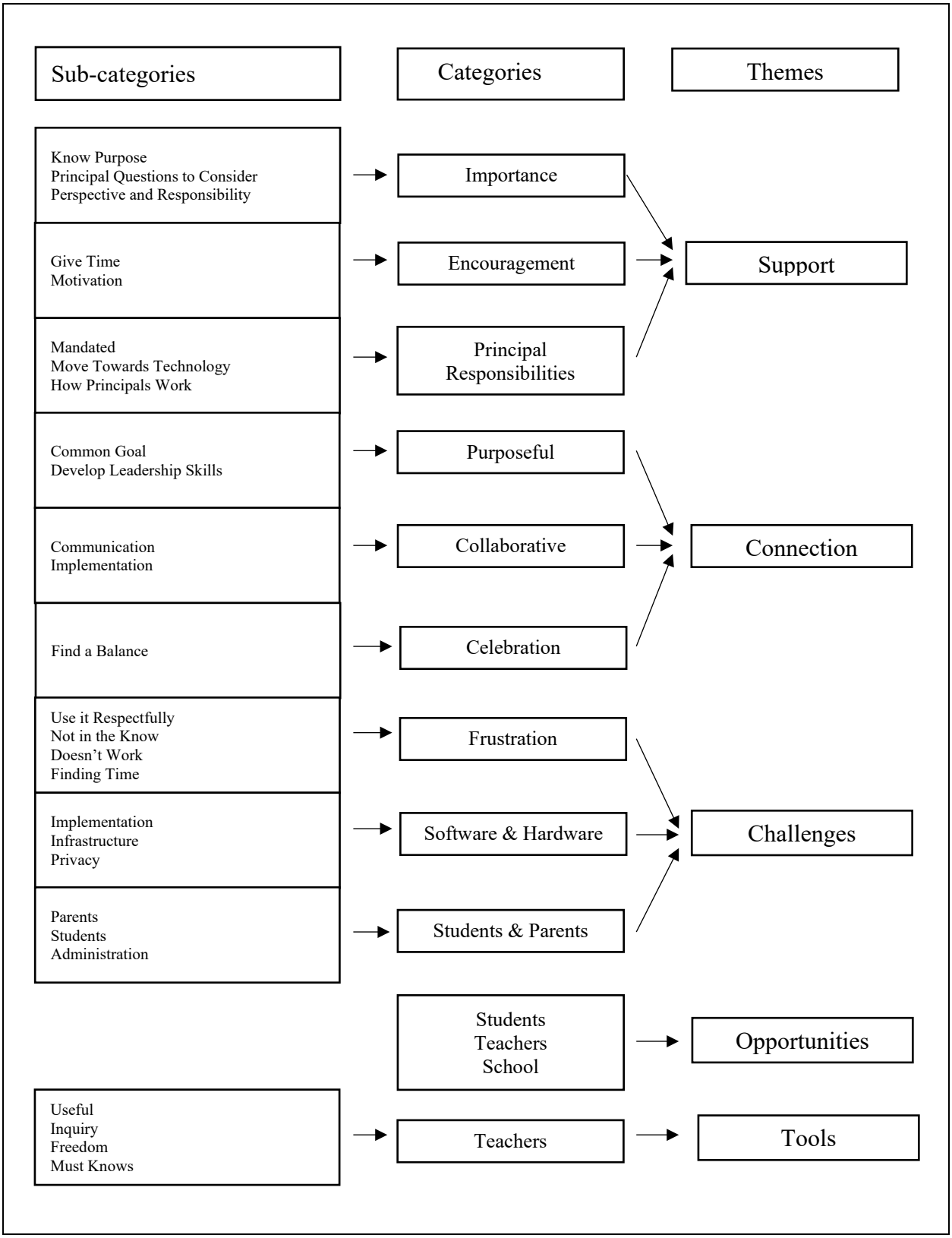

Figure 1. Sub-categories, categories, and themes.

Support. The types of support through documents included meeting notes, acceptable use of technology admin policies, emails with technology instructions, "how to" documents, and manuals created for teachers and students. Websites were designed for teachers and students which gave direction and support for teachers and students when using various types of technologies in various situations. Meeting notes included meetings which occurred through Skype or Zoom. The acceptable use of technology admin policies indicated the responsibility both teachers and students agreed upon when using technology. Teachers used an absence management system to record absences. Principals included directives to the teachers to access the helpdesk for technology support when software and hardware was not working properly. Describing her documents, Laine shared that she

> created several websites using Wix. The math one is more of a student resource. The personalized learning one is my master's project. I've also done others for school fundraising registrations, etc. Here is the link to my YouTube channel. Videos for Grades 5–8 and some 9 math outcomes are all stored here. There is also a video overview of the process that I used to start personalized learning in my classroom.

One principal created an infographic highlighting the importance of the 21st century skills development. Critical thinking, creativity, collaboration, citizenship, and character were the 21st century skills highlighted in the infographic. Another principal sent an email response from an IT person letting a teacher know a particular app would be pushed out to the teacher's school that may have been missed.

Importance. The category of importance was divided into the following sub-categories: know the purpose of technology, questions to consider, and perspective and responsibility. Principals and teachers expressed the purpose of technology as vital, very important, extremely

important, it is a very powerful tool, makes learning better for students, tech is everywhere, tech makes the learning process easier, and impacts the level of learning. Heather stated, "I think for kids growing up in today's world [technology] is really important."

Principal questions to consider. Dawn, one of the principals interviewed for this study, listed questions important to consider when using technology:

> Is tech better than pen and paper? Is it quicker? Where do I start with someone who doesn't feel comfortable? How do we support teachers who don't feel comfortable with tech? What is most efficient? Which is better for student learning? Where are the gaps? What's going well? Where do we want to go? What are the gains using technology? Where can we do better? Do I have the time to learn it? How can I help them as an instructional leader? How can I bring in the learning coaches?

Perspective and responsibility. The teachers expressed the notion that even though technology was important in the students' lives, there were responsibilities and perspectives of which to be aware. It was felt that students needed to know the restrictions and to understand that whatever they could do at home with their electronic devices, they may not be able to do the same thing at school. Sarah said during her interview that she needed to explain to her students that "technology is a tool, and not just a toy." Heather added during her interview, "They use that iPad daily, not 9 to 3 every day or minute of the day, but they have access to it if it is applicable." The teachers felt conversations needed to occur to discuss what behavior was appropriate and inappropriate when using electronic devices such as iPads. Evan captured the sentiments of both the principals and the teachers when he stated during his interview that "not everything was a tech piece."

Encouragement. The category encouragement was divided into the sub-categories such as give time and motivation. Teachers felt encouragement even though they felt they needed more time to learn and work with technology. They talked about being motivated by the experiences they had with their principals.

Time. The one thought echoed by the teachers and the principals a number of times was teachers simply needed time to work with technology, get comfortable using it, and not be pressured to use it immediately. In regard to using technology, Maddie remarked in her interview about "accepting that this is the way we are going to use it to your best discretion as a teacher." Sarah commented during her interview, "We go slow to go fast . . . because if teachers get frustrated, the tool will just collect dust."

Motivation. Motivation was often talked about as a form of support to use technology and all it had to offer by both the principals and the teachers. Laine commented during her interview that one of the motivating factors was that "data is contagious when we see progress" as she talked about the digital data wall she and her staff use to chart the learning progress of their students. Nicole talked about encouraging teachers to "get devices and use these devices with the students" during her personal interview. Teachers talked about how motivating it is to discover how easy it can be to use technology when supported by their principals, their IT persons, and the support given to them through a helpdesk. For instance, Sarah stated during her interview, "I have never had an administrator tell me what I could and could not have." Both the principals and the teachers agreed having mentors available not only encouraged them but also motivated them to desire to learn more.

Principal responsibilities. Principals' responsibilities covered the sub-categories which were mandated technologies, moving teachers toward technology, and how principals worked to

make technology happen for the teachers. Although it was felt there were lots of freedom to use technology as each principal and teachers deemed, one of the juggling acts with which principals had to contend was the mandated directives imposed by the division office. During his interview, Evan mentioned there were system practices they were asked to follow and mandates that needed to be accomplished. When it comes to using technology, he explained, "We are to ensure that there is system and school alignment." Laine had commented when it came to using certain technologies being available, there were "some aspects [that were] quite tight," referring to what was to be happening with the use of technology in the school division. Dawn echoed that sentiment when she said during her interview, "It was important to move everyone forward with technology."

Mandated. In listening to the principals talk about the fact technology was mandated to a certain extent and they had a responsibility to move toward technology, much of the thought hovered around thoughts like defining what was important and having many sit-down sessions with teachers who needed individual help. Principals commented on how they were dealing with the most basic questions from teachers, not pushing anything down the teachers' throats, providing support networks for teachers, and making consultants feel welcome in the school to support the teachers. What was talked about was the degree to which the consultant knew what they were doing. Laine noted during her interview, "There is a big difference when the consultant is an expert."

Move towards technology. The teacher focus group discussed that when the mandated technology was encouraged, it was important to have recorded tutorials for constant review. One of the other thoughts agreed upon in the teacher focus group was if technology was mandated, Adam stated that it was important that teachers were encouraged to "find something useful in

[their] area of teaching" instead of always having to use technology for the sake of using technology on something that might not be of interest to the teachers.

How principals work. When it came to how principals worked in supporting technological literacy in their teachers, a number of thoughts were shared. One of the ideas all principals had was how to help both the teachers and the students reach their potential when using technology. Rayna said it would serve the principal well if they had a "good background in tech." Evan agreed and said that "someone needs to have the basic knowledge." A couple of the principals commented it is best if in the first year with a new staff, the needs of the teachers were identified. In the principal focus group, it was stated that in many cases, teachers were encouraged to learn by trial and error, seek help from colleagues or a learning coach, and go to the principal as a "last resort." Laine commented that teachers "shouldn't be afraid to break [the technology]." It was felt the principals' job was to encourage teachers to strike out and learn how to manage and maintain devices, identify gaps needing to be filled, go back and review, and get more traction in tech. The principals remarked their job was to support the teachers through daily help, balancing what the teachers needed with what the teachers wanted, following up with technological action items, advocating to get external things changed, promoting technologies available, and looking for infrastructure challenges and barriers. Evan noted how principals can expand their own technological knowledge by "talking to 10 different people at every admin meeting, knowing who to phone to get answers, finding the person who can help, and going to public, private, and business for ideas and support." In all of the support given to the teachers, the one thing agreed upon in the principal focus group was to know "when to hand things to the teachers."

Connection. Principals provided many documents showing the level of connection they had with their staff through being purposeful, collaborative, and celebratory. The individual interviews provided many instances where having a good connection between principals and teachers was essential in fostering technological literacy. The principals and teachers in the focus groups talked about the importance of feeling connected with one another when working with technology.

Purposeful. A purposeful connection was described as setting a common goal and developing leadership skills. Common goal setting typically occurred at the beginning of the school year where the principal and staff members could decide on a technology focus for the year and not be overwhelmed by all that they could have done with technology that year. Principals were always looking for ways to help teachers develop their own technological leadership skills to feel confident that they can work with technology effectively.

Common goal. Common goal was a sub-category of the category purposeful. Laine explained that she lived by OneNote, which was the foundation of the entire staff's life:

> All of our schedules are stored on OneNote, allowing for convenient communication. Teachers can post their own sports schedules and quickly check classes and other info. I created the supervision schedule on here and teachers are able to edit and make changes if they need to. This allows for some flexibility in our scheduling and takes work off my plate for two reasons: I don't have to edit the changes and I don't have to resend the "new" schedule every time there is a change. Teachers know that they are expected to check the OneNote. All school procedures are there as well, similar to a staff handbook. I created a section on our staff OneNote for technology support. If the division sends out

> instructions for a program, I copy it here. There are about 40 different pages in this section for various programs. Teachers are able to search for their own solutions.

Another principal, through links in a document attached to an email, sent out choices for PD days such as math learning opportunities, OneNote tutorials, Digital Compositions and Authentic Audiences, Station Based ELA, and Skype in the Classroom. The principal created "how to" documents that provided teachers with a step-by-step tutorial on how to access certain things and how to make certain things work for themselves and for the students in such areas as Adobe Create Cloud Learning, Adobe Education Exchange, and Create and Teach Infographics in the Classroom. According to one of Dawn's documents, the instructions to the staff when using the dictation feature in Microsoft were as follows:

> Students using laptops with an internal microphone or on a desktop with an external mic can access the dictation feature. This allows students who may be slower to write ideas on paper or type still use the programs. This feature works on Microsoft products such as Word and PowerPoint.

In building a connection with their teachers and the students the principals in the focus group talked about the importance of building trusting relationships through common goals such as weekly strategies of support, creating a common language and understanding, consistency, taking the pulse of where the teachers and students were at, and keeping that connection with the teachers and students by maintaining a "we do" approach for a long time. The principal focus group talked about the need to have good connections with students through extra-curricular activities.

Laine and Dawn mentioned having students and teachers work together to create behavioral expectations; establishing their trusting relationship was important to avoid any

power struggles that might be manifested, especially when using technology. Dawn mentioned connection was important so that technology "doesn't become a roadblock or hurdle" needing to be overcome. Nicole mentioned their parent group ensured food was available for the students because "feeding the kids" was another great way to make connection.

Developing leadership skills. Helping teachers to develop leadership skills promoting a sense of connection was identified as essential for principals to aid in teacher confidence. Dawn said that teachers needed to know when to "take it slow, when to be strategic, when to be thoughtful, and when to share what is not overwhelming." It was mentioned by the principals the importance of being able to know the difference between teachers being reluctant and being resistant to using technology. The principals said teachers were not resistant merely reluctant to try new technologies. The principals in the focus group also indicated whatever principals do, they need to be intentional meaning they are being very strategic in knowing when to "push and when to back off." Teachers needed to know when to push and back off as well. Rayna said that "letting people who need six months know that that is okay" if they need that amount of time to feel comfortable with technology. One of the other things the principals talked about was reading certain books with their staff such as *Crucial Conversations* and *Kids These Days* which generated conversations about how to connect with students and with each other. Principals were looking for ways to empower the teachers.

Collaborative. Communication and implementation were the sub-categories in the collaborative category. One of the most successful ways to collaborate was through communication. Successful implementation depended on collaboration.

Communication. The use of technology such as emails, SeeSaw, and texting was an "easier way and a good way to communicate with parents and stakeholders," according to Rayna.

The principal focus group commented on communication as an effective tool for open conversations. Teachers felt communication was easier through technology. Karen said that "parents would message me and say it was awesome and would thank me for the update when I would post a grade or something like that."

Implementation. There were comments about collaborative implementation. The principals recognized there were different levels of implementation and it had to be narrowed down. Dawn shared that the teachers could "learn about it one year, and use it the next year." The teachers mentioned in their focus group that they experienced this type of implementation support from the principals. Working in a collaborative space on a regular basis and making sure the teachers were well connected was viewed as important to the implementation of technology in their classrooms. The teachers were encouraged to use their own strategies particularly in terms of what mattered to them. Rayna pointed out that "it's important to find out who [teachers] are comfortable with to work tech; we need to trust and make sure they are comfortable where they are at and progressing."

Celebration. Another category within the theme of connection was celebration. It was noted by the principals and the teachers that taking time to celebrate successes when working with technology was important. As well as celebrating, finding a balance between learning using technology and learning without using technology was necessary.

Finding a balance. "We need to celebrate and share success stories," according to Dawn. The enthusiasm with which the principals and teachers talked about helping one another was echoed numerous times not only to move technological use forward but also to celebrate technological achievements. Nicole commented that it was "good to spread around the knowledge." The principals and teachers talked about the importance of finding a balance when

using technology. And to Sarah that was very important as she stated we "need to help our kids find a balance."

Challenges. Daily life for a principal involved dealing with challenges. Principals used their relationships skills to deal with the challenges. The categories that emerged from the challenges theme were frustration, software and hardware, as well as students and parents.

Frustration. One of the challenges both the principals and the teachers identified was the frustration that they experienced when dealing with technology. These frustrations that they experienced were students not using technology respectfully, not being in the know, and technology not working. Finding the time to learn and work with the new technologies was another frustration.

Not using technology respectfully. One of the teachers stated parents were concerned their children started to develop behavioral problems when their children were using technology too long at home. Sarah commented that the parents were "concerned that the kids were using too much tech at school." Adam spoke about an experience an administrator had with students using technology in a disrespectful way.

> I think the only hesitation and it wasn't for me but a story that I heard from a former administrator is that they were using a new piece of technology and the students were allowed to use pseudonyms. Of course, some of the answers that the students were giving were inappropriate so he was having to question them all afterwards about their behavior with that program. I guess it is to do your best to understand the ins and outs of what the capabilities of the technology is, how to track student responses, and to make sure that they are using it respectfully.

Not in the know. Another frustration shared by the participants was the feeling of not knowing how something works, or how to use it, or even just not knowing what was available for them. During the teacher focus group, all participants commented on not feeling totally comfortable with technology at some point and not feeling as prepared as they should have felt. Maddie commented that she understands the frustration of some teachers who have "never even heard of this stuff." Heather shared very openly about not feeling totally secure with using technology:

> This year I went to one about coding that was really interesting. We came back with our dashes and dots. I found I got these dashes and I kind of hoarded them for the first six months because I didn't know how to use them and I didn't bring them out because I didn't want not knowing how to use them. And then I got, "This is stupid, I don't have time." And I just let the kids break them out and we figured it out together.

Technology not working. Another frustration was the fear of planning to use technology in a class and when one began to use it, it does not work. Heather talked about confronting that fear:

> Well, I think there is enough people around here to help out. You just have to ask. You know, there is nothing more fearful than when you put the Smart Board on and it doesn't work and the kids are all staring at you. It's very intimidating. Um, I think that is probably my biggest fear that it won't work. But I've, just found with kids, I'll say, "How do I do this?" and they will push some buttons, and I'm okay with that. Maybe, that's my thought and shift. Instead of being freaked out, I just ask for help.

Finding time. By far the biggest frustration for principals and teachers was finding time to work with and learn technology. Dawn remarked that she was struggling with the

management of time to put things together especially when it came time to learn new technology in order to teach the teachers about the new technology. Evan commented on the 50 other things that needed to be done in a day. He remarked, "I'll go back to do it the old way if I don't have time." The teacher focus group talked about how teachers were not feeling very comfortable with how quickly the changes in technology were happening. Fear of doing it wrong, of not always wanting to ask for help, and needing support faster were comments during the teacher focus group. In order to feel more comfortable with using technology, teachers needed to deal with the big learning curve they sometimes faced, the feeling of resistance they had to overcome, and the time that it took to learn the technology.

The principals spoke about the steep learning curve teachers faced with new technologies and the pressure of needing to keep up with the fast pace of new technologies. Dawn talked about "the huge, huge time commitment for teachers who haven't used technology and how it is not comfortable for teachers to learn these new technologies." Evan talked about "the time frame that needs to accommodate the schedules and that teacher choice can be a limitation and that technology needs to be put on the back burner because report cards come first." Evan also stated that teaching sometimes needed to be "put on the back burner so new technologies can be learned." Maddie talked about not having access to technology PD when PD days are scheduled. The principal focus group talked about the lack of working knowledge among the teachers and how that might be contributing to the steep learning curve.

Finding time to purposefully plan technology use so it was not a distraction was also a frustration. Dawn mentioned that "if not done purposefully, it can be a distraction." The teachers focus group talked about the need to have time to plan. The teacher focus group discussed how critical it was to have a backup plan in the event technology was not working that

day especially in the more remote rural communities. "If it is more work, if it is not efficient, why would I do it? At one time, it was burdensome for a teacher to take home 17 iPads to check the assignments," according to Dawn. The principal focus group commented on the need to strategically plan because there are "7,000 other things to do and sometimes it is too much." Nicole talked about how new teachers still need to take the time to learn the curriculum and that technology may not be a priority for them when they first start teaching.

Finally, both the principals and the teachers talked about the mental health aspect of working with and learning new technologies. With all of the social media and communications that are available, some parents expect teachers to be available 24/7 and some do not. It was stated that principals and teachers just need some quiet time to catch their breath and keep technology in perspective.

Software and hardware. Another category discovered was the challenges with software and hardware. One of the challenges of software and hardware was in the implementation stage of technology. Infrastructure and privacy were also software and hardware challenges.

Implementation. Teachers sometimes found it challenging to implement new technologies in their courses. Karen commented, "I was struggling at first to see how I could implement SeeSaw in high school." Sarah stated,

> I wish I could have just one more iPad . . . it is just not as user-friendly as it once was where I would be able to load an app and I'm also frustrated with because I don't have my own MasterCard to load apps and explore them as I have to go through the (school division). I'm disgruntled with the whole new policy.

The teachers commented on wishing for more access to technology. Karen did express her concern that she did not realize students could see their marks through the Parent Portal.

Evan talked about an implementation dip with new programs. This was echoed when other principals talked about the amount of software teachers needed to know. Dawn commented that there "are two and a half pages of software for teachers to know." Nicole commented on how challenges became evident when trying to "figure how the program can work for kids." The principal focus group talked about software compatibility and the challenges that brings. Nicole commented that "some programs are more successful for scribing and audio. With Speechify which is talk to text is not always working properly." The principals talked about the various learning management systems that either did not exist or were difficult to use. Laine stated, "We have four reporting systems—four types that need to talk with each other and it is cumbersome to work with." Looking for support through a helpdesk was "dismal, due to the detrimental performance of the tech person so it was difficult passing along tech difficulties," according to Evan.

The teacher focus group talked about how some programs were not user-friendly and how they felt rushed to learn how to use them. Sarah said that with a new marks program and needing time to learn how it works, report cards went to the parents "one month late. It was not a good look for us." The teachers felt that using Moodle was a challenge because it did not always work properly.

Infrastructure. Both the principal and the teacher focus group discussed the Wi-Fi problems that existed especially in remote rural schools where technology was not functioning properly. Therefore, planning to use technology for a lesson was always a gamble. Some of the principals talked about the fact that more technologies were needed such as iPads, laptops, and desktops. The principals also mentioned scheduling regular maintenance was a challenge. Getting things set up for the school was not always immediate. Nicole said, "There was a Smart

Board in one of the areas of the school that needed to be moved to another area. It took six months to get that Smart Board hooked up in the [new classroom]." Laine commented that "it was a struggle 10 years ago [to get things fixed] but now it is working properly." In working with damaged pieces, Evan commented he "had to piece meal a sound system together." Teachers talked about the need for more funding in order to get the types of hardware and software that was needed.

Privacy. Privacy was an area of concern for some of the principals. One principal reported, in the individual interview, that the school system stopped using SeeSaw to protect the privacy of the students and their families. The principal focus group talked about privacy and protection of the students. The principals questioned the legalities of using social media.

Students and parents. Another challenge that principals and teachers experienced appeared sometimes in the relationship with parents. They found some challenges in their relationship with students. Principals faced challenges within the confines of what they have to do in the area of administration.

Parents. There were real concerns expressed by the teachers that some parents, at home, had their eyes on the "screen" and not necessarily on their children. There were concerns parents were using technology as a babysitting tool so when their students came to school, the students expected to use technology as a play tool in the same way they were using technology at home. Teachers reported seeing a change in the students' behavior when they were using too much technology. Teachers reported parents had the same concern.

Another concern teachers had was the ineffectiveness of the multiple ways they were sending out communications to their families and the inability to reach all of their families. The teacher focus group talked about how "parents are not reading emails and not replying to emails

and how multiple reminders are sent out to parents about upcoming events, etc." The teacher felt there were too many ways to communicate. The principals in their focus group talked about the online etiquette that was lacking with some parents. In the principal focus group, Laine shared,

> I think parents have problems with boundaries too. For example, I had pneumonia two weeks ago and I was off all week and I had parents messaging me on Facebook saying this has happened at school and they don't understand that I'm not there. I have an AP, contact them, and because I'm accessible 24/7, they can just do that.

Another one of the challenges principals and teachers faced was the lack of knowing how to use technology on the part of some parents. The principals and teachers talked about how some families did not have computers. The lack of having access to technology and not knowing how to use it created another layer of how-to best support parents and their students.

Students. One of the concerns the principals had was the slow login times students sometime experienced due to lagging network connection. Delayed login times created behavioral situations in some cases. Principals talked about how supervision of students became an issue if there were not enough technology and electronic devices for each student. Teachers were concerned about having enough devices for students. Teachers worried about how technology was affecting students. "[Technology] is great, but what are the effects on our students? I don't quite know yet," pondered Maddie. Teachers commented on the lack of basic technology skills of some of the students which created a wide range of what students do and do not know. Maddie commented that "some students don't realize that they have to hit the next page." Heather commented on whether or not students knew how to properly use the keyboard instead of "just pecking away at the iPad. We used to take them down to the computer lab and teach them how to keyboard." Sarah reflected, "The keyboard concept was new too because we

make their passcodes so simple. My littles do not know how to use the mouse because everything is touch screen at home."

Administration. Some of the challenges of technology affected the administrative tasks of principals. With online and distance learning available to students in small rural schools, staffing and scheduling the timetable for the school year was a challenge. In the past, subject availability for senior students was limited, and it was easy to give each senior student a very common timetable. The availability of online courses, even though they give students more choices, was sometimes very challenging for principals to schedule the time and have enough equipment for students to use. The more choices and options for students can became a nightmare for principals to schedule. A principal was concerned with what having more online options and choices for students might do to a school staff as in reducing the full-time staff equivalency for that school. It was reported parents were concerned technology would replace teachers. The principals commented on the fact that sometimes there are just too many ways to do things and change occurred too quickly. And finally, one principal commented that when she needed to chase down students who did not get their work done, she would come to school "grumpy" and did not want to be that kind of principal.

Opportunities. One of the themes becoming evident as coding and categorizing occurred was the theme of opportunities. Even though there were challenges, principals and teachers saw opportunities. The categories were divided into students, teachers, and school opportunities.

Students. The participants never felt that using technology was a hard sell to the students. According to Nicole, "teachers are hardworking and invested in kids' best interests. Teachers are always looking for different ways to help students." Evan commented that "we're

looking to enhance the students' 21st century skills." The principals and teachers liked the fact through technology they could supplement the learning at each of the various level of learning for each student. To use online programs such as Mathletics, IXL Math, Prodigy, Epic, RAZ-Kids and the various other programs available for students, teachers could find extra learning opportunities for the student who finished their work early or for the student who struggled with basic concepts. These were just more tools on the tool belt of the teacher.

Students were very open to using technology and realized technology gave them many opportunities, especially for students in small remote schools. Sarah shared, "That is the way the world is going." Dawn noted, "Students were super ready" to use technology. Maddie commented, "I'm really grateful that kids nowadays have these opportunities to open doors. These opportunities did not exist when I was in high school." The learning that can take place now is far better than "drill and practice," according to Nicole. Exploring and expanding the learning was talked about as a positive technological experience for the students. Being able to learn in this expansive way was thought a benefit for the students. Rayna shared that "teachers were open to it." To support the enhancement of technological skills, some schools had a Student Tech Team who met at regular intervals to be trained and bring back knowledge and expertise to their respective schools.

Teachers. Personalizing learning was one area highlighted by both the principals and the teachers. Dawn mentioned that personalized learning was seen as "lots of potentialities." Nicole voiced that "tech may help that student so we need to know how." It was noted when the students have choices in how to learn, the teachers also have choices in how to teach. Two of the teachers spoke very specifically about programs they considered of tremendous benefit to the students.

Adam talked about online programming in which students would "program a robot to write or to draw and program a robotics scenario that students could do for fun." Adam highlighted such online programs as Workplace Hazardous Materials Information System (WHMIS), Young Worker Readiness Certificate Course, Mental Health Wellness Training, and OATS (Online Agriculture Training System), Heavy Construction: RSTS (Roadbuilders Safety Training System Online), Construction and Trades: SCOT (Safety Construction Orientation Training), Healthcare: WAVE (Workplace Assessment and Violence Education) which would be of benefit to students with an interest in trades as a career. Heather had taken an interest in coding and had attended a PD session on coding in which she came back with dots and dashes to be used with her students. Having experienced that, Heather's school had brought in Canada Learning Code – Code Mobile for the students to experience.

Even though principals and teachers talked about the challenge of finding time to learn and work with technology, they talked about the excitement of learning and working with technology. Teachers liked the opportunity to have access to new technologies, new software, new hardware. Rayna said, "Teachers like the time to play with it. They like the time to figure out how something works. They have free reign in their classrooms and they are free to use whatever software they want." According to Evan, "Some want to be the first group to test it out, these are the people who love tech, and will do it all day. The teachers have a high level of autonomy." Teachers talked about sitting in one room and learning from each other. The teachers talked about the trust that existed when they learn together and that it was an opportunity to share with one another what they knew and what they needed to learn. Dawn shared that "they felt as a staff they could learn more." Evan talked about how his school system "refreshed at the end of last year and that they were at a pretty spot in the implementation stage."

The principals and teachers talked very favorably about the PD available and how they wished there were more opportunities for PD. Nicole pointed out, "If we expect kids to learn, we should use our PD money to learn too." Dawn remarked what needed to happen was "PD needs to be more authentic." Teachers spoke highly of the tech coaches they have in their school division. Teachers talked about the desire to have their school divisions bring in technology professionals for in-servicing. Teacher associations who provide technology PD were mentioned. Principals sometimes started the conversation about a new technology at a staff meeting and then reintroduced it on a PD day. Some teachers found PD conferences in Boston and Florida in the USA, and Niagara Falls in Canada. Teachers appreciated the PD conventions and workshops hosted by their respective school divisions. Karen mentioned, "I can be 10 times more productive if I can sit behind my computer for my own PD [during school division PD]." Another form of PD was the type existing in the classroom just down the hall. "There are enough people around here to help out, you just need to go looking for it," according to Heather. Principals put together documents to help their teachers with technology. Dawn shared, "I would put together 'How-to' sheets for the teachers and test it on the secretary before I would send it to them."

School. Principals, because one of their responsibilities was to work with the budget, appreciated the Zoom or Skype meeting in place of face-to-face meetings. This saved in travel expense and time on the road traveling to the meeting. The teachers were very appreciative of Zoom or Skype meetings for the same reason. The principals were very open to encouraging their teachers to ask for technology and would provide it if the budget was there to support it and as long as it was not too expensive. This was very much appreciated by the teachers.

The principal reported that some of the teachers were very comfortable with using technology as they realized that technology can make their lives easier. Principals felt that teachers could reach their full potential as an educator. A couple of the teachers mentioned they felt very comfortable asking the senior students to help them with their younger students when using technology. Teachers, whose children were using technology in school, felt more comfortable using technology in their own classrooms. Rayna mentioned, "Teachers who have their own kids using tech are more involved."

From an overall school perspective, technology done well was a new foundation for learning. Choosing some aspect of tech as a school goal was important for the participants. For schools, tech goals were a way to do something better. Nicole stated, "There are many ways tech can help us." Dawn added, "Technology is of high importance if done well, thoughtfully, and strategically. There is a lot of ground work that needs to be done to make it meaningful and transformative. Tech can be innovative and educationally transformative."

Laine was looking forward to having a "new dashboard system." Rayna noted that "everything is on the Internet now," and for a small rural school that was very important. Evan commented on how there was more tech available at our fingertips now than ever before. Laine added there are all kinds of programs available. Evan offered the idea that it might be a good idea to have a "tech liaison teach as well." Some of the principals thought the school division should specifically hire well-trained support people.

Schools saw technological education for parents a possibility at student-parent-teacher conferences. Computer labs were set up so parents could learn how to use SeeSaw, the Parent Portal and the notifications on iPhones and/or Androids. This was viewed as essential so parents could be informed as to what was happening in their children's lives during the school day.

Tools. The one aspect of technology continuously talked about were the "tools." These tools were considered valuable and available for teachers to use with students. These tools were the actual electronic devices such as iPads, laptops, and desktop computers. The four sub-categories were useful, inquiry, freedom, and the tools that were the "must know" for teachers.

Useful. There was excitement during the interviews when the principals and teachers had a chance to share what was working well in their schools and the types of equipment, software, and online resources with which they could work. One kindergarten class was learning about Martin Luther King, Jr., and this is what Sarah shared:

> I always like to spend a week or a month looking at Black History Month and the Civil Rights Movement. So, we read several books about Martin Luther and slavery and Black History and the Civil Rights Movement. One of the assignments that I gave the kids was that we were going to create Kids from Around the World. So, what they were able to do was I showed them some books and I gave them some ideas and we looked at some different countries and kids from those countries or people. But then they said to me, "Can we look on our iPads?" And I said, for sure we can. So, I like to supervise what they put into Safari as I don't want them to have free access to type things incorrectly or access things that I don't think are good for them to see. So, I help them with what they need to type into Safari. We were looking at kids in traditional wear, kids in traditional outfits, and then the kids were creating an art array or assortment of kids from around the world and then we were putting some Martin Luther King words around the pictures.

Principals and teachers also talked about how grateful they were that different software can be purchased providing the budget can support it. They commented about how there was lots of tech software at their disposal. Even though there was a tremendous amount of software

at their disposal and they were overwhelmed sometimes, they still appreciated that they had access to software.

There were a number of technological devices such as computers, iPads, and laptops that were discussed. There were software programs, online programs, and subscriptions that were highlighted. Table 3 shows the number of times technology hardware appeared in the discussions of the principals and teachers.

Table 3

Frequency of Participants' Mentions of Technology Hardware

Types of Hardware	Mentioned by Principal	Mentioned by Teacher
iPads	15	3
Laptops	2	4
Laptop Carts	10	3
Smart Boards	6	0
Desktops	4	0
Chrome Books	0	1
Cell Phones	2	0
Printers	1	0
Sound Systems	3	0
Data Projectors	1	0
Green Screen	1	3
Total	**45**	**14**

The types of technology hardware and how it was used varied among the participants. In some schools, there were computer labs with desktop computers, and in two schools it was mentioned that the computer labs were eliminated in favor of putting more desktops in the classrooms. Sarah explained, "We have a computer lab which the kids absolutely love." In one of the schools where there is no computer lab, the teacher was missing the opportunity to take the

students there to learn how to keyboard. The majority of the types of technological devices these schools have were iPads, and in a couple of cases, the school was a one-to-one school in which all students had an iPad dedicated to their own use every day. The elementary students in the school tended to have the iPads and the older students tended to access the laptops on the laptop carts. Some senior students were allowed to take the laptops home. Dawn confirmed that "Grade 9 to 12 students have access to the laptop cart and with parent permission, can take the laptop home." Some schools were still using the Smart Board as an extra tool for the initial teaching of a concept.

Desktop computers were still used in some schools, and in one school, there were two desktops per classroom in addition to each student having an iPad or individual access to a laptop. Principals and teachers liked the desktops for the wide range of functions that a student and teacher were able to do on it. "Desktops have more robust capabilities and more RAM," according to Dawn.

Some participants talked about how cell phones were being used for educational purposes as cell phones have become more and more sophisticated and were capable of doing more things. Some schools talked about having printers to scan documents. Three principals talked about a sound system in the schools to enhance the learning of students who needed it for the purpose of hearing better. One school indicated there was a sound system in each room so all students could benefit from it. A principal and a teacher talked about using a Green Screen for student projects; in one case, once the activity was recorded, the students turned it into an iMovie. Heather commented, "One of our favorite projects was a novel study in which we used the green screen to do a follow-up." Evan talked about legacy equipment given to them when school division amalgamated, and he talked about how each classroom was set up differently.

Both principals and teachers spoke of the appreciation of having Moodle, the open online learning platform, as a resource. Teachers talked specifically about the opportunities for students and themselves to be able to do learning using Internet searches, videos, websites, WebQuests, and social media (Facebook and Snap Chat) for information. Maddie shared, "It's nice to pull up videos to search different ideas for projects that they want to do." Karen mentioned, "I like the Amoeba Sisters and the Crash Course. Students can also go through the Quest and figure things out on their own rather than that traditional lesson." Heather said that "Math Antics is their video 'Go to Teacher' so they use that whenever they have a new concept."

Principals and teachers spoke highly of the apps available to them but also cautioned about being overwhelmed with apps as there are so many. Karen stated, "There are a lot of educational programs and apps that are really helpful." Sarah talked about "slowly introducing apps." Dawn talked about "using apps, knowing how to push apps, and knowing how to update apps."

Principals and teachers talked about the programs school divisions purchased for them such as Star Fall for elementary ELA support, Speechify and Dragon for elementary students, Pearson e-texts for elementary and middle years students, and H5P and html5 for high school students. Two principals talked about the Lexia program that kept track of ELA progress in students. Principals and teachers talked about the online subscription schools purchased for their students such as IXL math, Mathletics, RAZ-Kids, Rosetta Stone, and Prodigy. Karen offered, "Mathletics was one that I used up to Grade 9 last year and the Grade 9s liked it and so did the Grade 4s. Those subscriptions are really handy to have especially when you have to get a substitute teacher in a pinch."

Various other programs were talked about such as Kahoot (an online video learning game), Blueprint (an online career portfolio for middle years students), Go Noodle (online fitness program for kids), and Tinker CAD (online 3D printing program). Other programs mentioned were AI glasses, Fit Stats, Smart Notebook, PowerPoint, and STEM challenges. One teacher talked about students having their own Blog.

Another tool used quite extensively and highly praised was SeeSaw. It was a communication tool allowing the user to take a picture or video of what a student was doing and sending the picture or video to the parents. Heather remarked, "SeeSaw is an online portfolio for parents." SeeSaw was quicker than sending an email and it was good for students who needed their parents to see how they were progressing on a more regular basis. SeeSaw was typically used in the younger grades but some high school teachers were starting to use it. Karen stated,

> I used it [SeeSaw] mostly for posting timelines and updates. I basically told the kids that we were going to be using this tool so download it onto your phone the first day of class. I set up QR codes on my bulletin board so when they walked into class, they would scan it and then be in. I would also take pictures of their tests and the grades they got and then post it to their student journal so again their parents could login and see what their kid got.

Dawn said it "gives parents a chance to reach out if they haven't before."

Inquiry. Inquiry was the reaching out by principals and teachers to other principals, teachers, and support persons when help was needed as it was felt that there was so much technology out there for everyone to use. Maddie shared that "many people in this building know what I don't know." Rayna added, "There are computer people in the building." Some

teachers liked the idea of bringing in professional support. Maddie liked to have "multiple people that you personally mesh with."

Some teachers thought it was a good idea when presenting something new in technology that the students could work right alongside the teacher to figure it out. Teaching them proper Internet searching techniques was important. Teachers were also very interested in knowing how to track student responses in the most efficient way. And if all else fails, Evan offered, "put in a helpdesk ticket."

Freedom. When asked how much freedom each teacher had, there was an overwhelming chorus there was lots of freedom to choose what they wanted to use for technology and how they wanted to use it. There were things mandated that provided the structure for the school and for the school division. Sarah mentioned that "the only requirements or the restraints that are there are the ones I put on myself," while Adam remarked, "I don't think there were any limitations." Heather commented, "There was a ton of freedom like if I find an app that I think the kids would want or could use, I would just ask Martha and she puts it on for us." There was freedom in choosing the type of technological school goals as well.

The freedoms the teachers spoke of were things like finding the right technology tools that would work for their teaching style and for student engagement, feeling supported, and needing to be brave just to try new things through trial and error. Looking for the software program that was just the right fit for each teacher and student was important. Heather talked about giving some of this freedom to the students:

> Just give the kids choice. Allow the kids to have access to the iPads to do research and everything that goes along with that. This makes them fairly engaged. They know what

they are doing. They are brave. If one doesn't get it, the next one will and they help each other.

In some of the schools, senior students had more freedom and more access to laptops and iPads. Karen suggested, "Give more freedom to high school students so they don't have to stay in the room." Dawn added, "As students get older, they have more freedom and access to use tech."

One of the most important types of freedoms was for the student who struggled with learning. Students who experience anxiety have more options to work with that will either curb their anxiety or eliminate it altogether by recording their presentations. Nicole stated, "We have a few students who to present in front of classes creates major anxiety for them so, there are a lot of other programs out there but on the Smart Board you can record very easily." According to Laine, "You can show a student how to do it" and then let them learn.

Must know. There were certain foundational programs important to know when using technology. Besides knowing how to run the hardware, which was a pre-requisite to working with the software, one of the most basic "must know" was working with Microsoft Office or Office 365 which involved email accounts, Word, PowerPoint, and Excel spreadsheets. Some school required their staff to work with communication software like Teams and Basecamp. Microsoft Dictation was also suggested as a must know.

A provincial student information system was a must know for all teachers K–12 whether they are urban or rural which included knowing how to set up the Parent Portal for parents to view their student's achievement level in real time. Most school divisions used a digital absence management system for their staff. Most schools had Smart Boards so understanding how to align it with an iPad and then basic troubleshooting Smart Board issues was fundamental. Some

schools used a program called Permission Click so students could register for fieldtrips. Some schools were using AirDrop to transfer files among computers.

One school was using OneNote to keep track of basic things as a data collection tool and personalizing the learning for students. It was used for general communication for the staff. This particular school used an electronic data wall to keep track of their data.

Finally, one of the teachers suggested she was looking forward to the day when there was a scope and sequence for the technology that was being used. Knowing which tools needed to be learned at each grade level was essential to this teacher.

Research Question Responses

The purpose of this bounded multi-site study was to understand how the technological practices of principals in small K–12 rural schools in western Canada foster the technological literacy of teachers. From this purpose, a central research question and three sub-questions were created. The data collected provided answers to these questions through document analysis, individual interviews, and the focus group interviews of principal and teacher participants. All the data that were collected were organized into five themes to express how principals foster technological literacy in their teachers in small rural K–12 schools in western Canada.

Central research question. The central research question asked, "How do principals in small K–12 rural schools in western Canada use their technological practices to foster technological literacy among their teachers?" The research showed principals fostered technological literacy among their teachers through their leadership skills. Principals also fostered technological literacy among their teachers through the relationships with the teachers they nurtured and the environment for learning they created.

Sub-question 1. The first sub-question asked, "How did principals in small K–12 rural schools in western Canada use their personal leadership practices to foster technological literacy of teachers?" This question dealt with the personal leadership practices key to a successful school community. Teachers wanted to feel support through the connection that principals had with them. Feeling supported and connected with their principals gave teachers the confidence to work with technology.

Using technology for learning was very important to the teachers. They wanted to get a sense of importance from their principals as well. Teachers understood the purpose of technology and principals supported that purpose. Technology gave students more opportunities to learn. Learning to use technology helped teachers with their own learning so that they could give students as many learning experiences as possible. It was noted that using technology made life easier as response times for research and communication were quicker.

The principal and teacher participants became very introspective when talking about technology in the questions that they asked. It appeared these introspective questions were a way for them to ensure technology was being used for the right reasons. Dawn posed a few questions:

> Is tech better than paper and pen? Is it most efficient? Where do I start? How do I support teachers? Do we use learning coaches? How can I help them as an instructional leader? Do I have the time to learn how to use new technologies? Where can we do better? What are the gains using technology? What is going well? Where do we want to go with technology?

There was some concern regarding students using technology responsibly. Teachers were uneasy with some of the technology being used by students and how they were using

technology. Principals cautioned about the misuse of technology by students and how the support sometimes had to manifest itself in patrolling what the students were doing with technology. Principals and teachers saw the need to work with students on establishing good digital citizenship practices.

Teachers talked about the encouragement they needed to work with technology. Being afforded the time to learn the technology in order to use it with the students was reassuring to them. Teachers did not feel pressured to meet technology proficiency deadlines. Teachers identified their need to be inspired to learn new technology, to be motivated to work with it, and to feel capable of having the students use it for learning.

Principals felt they had certain responsibilities in order to sustain the teachers as the teachers worked with technology. In each school division there were mandated technology policies and procedures to follow. Each principal felt they needed to move the teachers and the students toward the use of technology. There were various approaches the principals needed to take to support the use of technology in their schools.

When principals talked about the importance of connecting with their teachers when fostering technological literacy, using technology purposefully involved devising and recognizing the need for a common goal. This common technological goal would focus and sustain the staff and the school for the current year and help to avoid trying to work on every technological innovation that presented itself throughout the school year. Principals encouraged teachers to develop personal leadership skills in the area of technology. Having teachers develop within themselves a sense of personal leadership in the area of technology gave teachers the strength and confidence to work with technology. Heather offered a piece of advice to principals

which was to encourage the teachers to "be open to it, be accepting of it and encourage your teachers even if there is someone like me who are a little bit not so confident."

Collaborative relationships when working with technology was mentioned several times. Teachers and principals talked about relying on others when working with technology as a way to feel self-reliant and refreshed. Two-way communication especially with the implementation of technology was regarded as tremendously important.

Celebrating technological achievements in the schools and in the classrooms was a necessary element of learning to use technology. What was also essential was the ability to find the right balance between the use of technology and non-technology for learning because, as Evan pointed out, "not everything was a tech piece."

Sub-question 2. The second sub-question asked, "How did principals in small K–12 rural schools in western Canada use their relationships skills to foster technological literacy of teachers?" This question addressed the significance that relationship skills played in creating a healthy learning community. Among the many things that principals dealt with everyday were challenges and opportunities. The level to which principals were successful in dealing with challenges and providing opportunities was based on how authentic their relationships were with their teachers.

There was a certain level of frustration teachers and principals experienced with trying to use technology for learning. Although technology provided many possibilities for new ways of learning, ensuring that technology was being used respectfully by students took energy. In some cases, responsible students were allowed to work in various parts of the school and not be confined to the classroom. This took a particular level of trust on the part of the principals and the teachers.

Teachers talked about the frustration of not knowing how to do something. Phrases like feeling uncomfortable and feeling intimidated appeared in the conversations with teachers and principals. Feelings of abandoning technologies beneficial for students to use were concerns for teachers as well. Heather confessed, "I didn't bring the coding dots and dashes out because I didn't want not knowing how to use them." Teachers talked about the real fear of technology not working when they went to use it. Most of the fear centered around the Wi-Fi not being strong enough on any given day. Another fear was the program just not working or available when the teacher went to introduce the lesson.

Both the principals and teachers talked about the limited time they had when trying to learn new technologies and how to implement them successfully. Part of the leadership of principals that teachers were looking for was how to deal with issues involving software and hardware. Principals needed to ensure the infrastructure necessary for successful technology support was available for the school and the teachers. A schedule of implementation was to be carefully created by the principals to minimize any problems when new technologies were being introduced. Privacy issues needed to be considered when using software programs that might identify students other than the ones within families.

Working with students and parents were identified as challenges periodically when using technology for learning. Ensuring in the most diplomatic way parents understood the role of technology in learning and that the best use of technology was not as a babysitting tool was a challenge to both the teachers and the principals. Principals were tasked with helping parents understand the etiquette of using technology such as understanding the proper time to contact principals and teachers. Helping students to understand the proper etiquette of using technology independently was also a priority. Laine stated that "if access is an issue, so is supervision [of

students].” Principals had to learn how to support teachers in balancing technologically delivered learning with non-technologically delivered learning. Technology provided many opportunities for teachers and students when used appropriately.

Sub-question 3. The third sub-question asked, “How did principals in small K–12 rural schools in western Canada use their environmental surroundings to foster technological literacy of teachers?” This question addressed the environment created when it came to using technology in schools. The environment was defined here as the actual tools (hardware and software) that principals, teachers, and students used. The ability to inquiry, the freedom to work with the technology tools, and the various technological platforms influenced the technological environment.

iPads, laptops, Smart Boards, and desktop computers were just a few of the types of hardware that teachers and principals used. Mathletics, RAZ-Kids, and IXL Math were identified as some of the subscriptions used with students. SeeSaw, texting, emails, and FaceTime were some of the communication platforms teachers and principals used with their students and their parents.

Teachers and principals talked about helping students learn how to search the Internet responsibly. Giving the students the chance to just work with technology and explore for themselves was seen as critical for students to becoming technologically proficient. Technological PD for teachers and principals was looked upon favorably as a school and as a personal endeavor. What was really appreciated by the teachers was the freedom to pursue the type of learning that each teacher needed personally. Even though there were lists of platforms and programs that teachers were expected to know, there was still a sense of support and

freedom to learn the expected technologies on their own terms. Teachers felt inspired to learn these technological requirements and did not feel pressured to do so.

Summary

The purpose of this bounded multi-site study was to understand how the technological practices of principals in small K–12 rural schools in western Canada foster the technological literacy of teachers. This chapter described the data collected through documents submitted by principals and teachers, individual interviews with principals and teachers, a focus group with the principals, and a focus group with the teachers. This chapter included the data analyzed and how it supported the central research question and the three sub-questions.

There were five themes that emerged from the data collected. The five themes were support, connection, challenges, opportunities, and tools. The first sub-question asked, "How did principals in small K–12 rural schools in western Canada use their personal leadership practices to foster technological literacy of teachers?" The teachers wanted support and a feeling of connection with their principal which allowed them to feel confident in using technology. The second sub-question asked, "How did principals in small K–12 rural schools in western Canada use their relationships skills to foster technological literacy of teachers?" Teachers identified the challenges they faced with technology and the opportunities technology presented them in learning. The teachers looked to the principals to provide direction for these challenges and opportunities. The third sub-question asked, "How did principals in small K–12 rural schools in western Canada use their environmental surroundings to foster technological literacy of teachers?" The environment the principals created included the tools made available to the teachers which caused them excitement. Software programs and hardware such as the electronic devices in all forms were appreciated by the teachers.

CHAPTER FIVE: CONCLUSION

Overview

The purpose of this bounded multi-site study was to understand how the technological practices of principals in small K–12 rural schools in western Canada foster the technological literacy of teachers. This chapter examined the interpretations and the ideas of the data collected from the participants through documents obtained from the participants and individual interviews with five principals and five teachers. Data were also collected through a principal focus group and a teacher focus group. All principal and teacher quotes are verbatim. This chapter contains the overview of the chapter, a summary of the findings in light of the relevant literature and theory, an implication section that addresses the methodological and the practical, the delimitations and the limitations as well as recommendations for future research.

Summary of Findings

The central research question asked, "How do principals in small K–12 rural schools in western Canada use their technological practices to foster technological literacy among their teachers?" There were five very distinct areas that developed throughout the research in this study. The key ideas that emerged from this study regarding how principals can foster technological literacy among their teachers included supporting teachers and students, connecting with teachers and students, dealing with challenges associated with technology, providing opportunities for learning with the use of technology, and making available to the teachers and students the necessary technology tools. Each of these five very distinct areas was addressed within the sub-questions.

Sub-question 1 addressed the personal leadership practices of the principals. The first sub-question asked, "How did principals in small K–12 rural schools in western Canada use their

personal leadership practices to foster technological literacy of teachers?" The personal leadership practices principals and teachers identified as important to foster technological literacy for teachers were support and connection. Teachers respected the guidance and direction regarding using technology in education from their principals, but they also appreciated the support and the non-pressure from their principals. Teachers were further inspired to use technology for learning when they felt a connection to their principals, a connection that was authentic and presented itself in genuine trust and confidence of the teachers.

Sub-question 2 asked, "How did principals in small K–12 rural schools in western Canada use their relationship skills to foster technological literacy of teachers?" This question addressed the relationship skills of principals. Dealing with challenges that technology created was a daily occurrence in the schools. Having a principal who understood the challenges and was there to support and help in any way was important to the teachers. Presenting opportunities that technology provided and encouraging teachers to take these technological opportunities was another very essential part of the support that principals gave to the teachers.

Sub-question 3 asked, "How did principals in small K–12 rural schools in western Canada use their environmental surroundings to foster technological literacy of teachers?" This question dealt with the technological environment in which teachers and student work in every day. The technological environment included the technological devices that were available for use and how teachers implemented them in the learning. It included the need to learn how to use technology properly, search the Internet effectively, have the freedom to learn technology at one's own pace, and become a part of a team that shares the common bond with a basic understanding of technology in general.

Discussion

Discussing the findings in relationship to the empirical and theoretical literature is the purpose of this section. While I did extensive research on how principals fostered technological literacy among teachers in small rural schools in western Canada, I discovered a gap in the literature. This research may help to fill in this gap as it explored the experiences of principals and teachers in small rural schools in western Canada. Following are empirical and theoretical discussions on the findings of this research.

Empirical Discussion

Empirically, this research indicated what teachers needed to becoming more technologically literate. Moore (1997) talked about how in the education of students it is essential to take students from where they are to where they need to go. Being able to do this was best achieved through a healthy teacher-student relationship. The teachers in the study often talked about how they could personalize and individualize learning more effectively and efficiently when they had access to the software programs that were available to them. Teachers needed to create a healthy and trusting relationship based on mutual respect with the students when using technology for learning. There was a vulnerability that teachers contended with when they used technology to help students learn as either the technology did not work properly or the teachers were unsure how to use it. Teachers said that the students knew more about using technology than they did. Teachers talked about enlisting older students to help the teachers understand how to use technology and to guide younger students in using technology. A trusting and healthy relationship between the teachers and students needed to be present in order to work through any technological difficulties. The teacher-student relationship became a partnership in using and working with technology.

Another aspect of a healthy teacher-student relationship was the ability for the teacher to motivate the student to learn. Choice that was deliberate and that involved interaction on the part of the student typically was what motivated the student (Deed, Cox, et al., 2014; Deed, Lesko, & Lovejoy, 2014; Maulana et al., 2014). Teachers in this study indicated the engagement level of the students for learning had increased with the opportunity to have choice and interaction with their learning.

According to Unrau et al. (2015) and Hiralaal (2018), the quality of emotional support was necessary for students to learn. The teachers in this study spoke of the importance of giving emotional support at the level needed for each student. Masko (2018) talked about emotional support as a way to pave the way for resiliency in students. The principals in the focus group supported the idea that the social and emotional needs of the students need to be considered when trying to cover the curriculum.

Learning in small rural schools presented both challenges and opportunities. Small rural communities are unique and differ in their viewpoints, activities, and outcomes (Mette, 2014; Koziol et al., 2015). Cuervo (2014) talked about how small rural schools need to be supported differently by the government and by society in order to maintain a responsible economic stewardship. Barrett et al. (2015) talked about how principals' working in small rural schools was very different from how principals worked in large urban centers. As individuals and as a focus group, the principals talked about the uniqueness of working in small rural schools and the need to support the students in innovative ways. Having the opportunity to have students take online courses in the high school was important as not every small rural school would have the complement of teachers to offer the numerous courses that high school students might want to take.

One of the thoughts often shared by the teachers and the principals in the study was the need to have adequate PD available. Some teachers felt very intimidated by technology and felt that they did not know enough to properly support the students. Teachers were very willing to find what they needed to know in order to become more comfortable with using technology for learning. Unal and Unal (2017) indicated that there were challenges with infusing technologies into learning to give each student every learning possibility. In order to do this, a new learning process had to be created (Li et al., 2015; Thota & Negreiros, 2015). The type of PD or support teachers and principals were looking for needed to be relevant and timely. Safitry et al. (2015) found reluctance on the part of teachers who felt they did not have the knowledge to use technology; these findings were echoed by the principals in this study. Principals in this study said that the teachers were reluctant but not resistant to the idea of using technology with students in the learning as they recognized technology was the future and the ability to use technology for student learning and for future students pursuing careers was essential. Effective use and integration of technology in the classrooms can become a barrier if the teacher does not know how to use technology for learning (Delgado et al., 2015). Delgado et al. (2015) stated technology had limited use in the classroom if teachers lacked technological skills, the time to learn how to use technology, and limited resources to use when trying to learning how to use technology. The principals and the teachers in this study realized they would be limited if they did not pursue a better understanding of how to use technology. The teachers and principals realized through PD and collaboration the feeling of intimidation with technology can be overcome. This was stated in other similar studies (Baran, 2014; Demiraslan Cevik et al., 2015; Lehiste, 2015).

Teachers and principals were very open to finding the specific type of PD they felt was necessary to become more comfortable with understanding and using technology. Teachers and principals talked about the freedom they had to become more technologically literate. Sharifzyanova et al. (2015) stated teachers can develop a sense of technological self-efficacy through development and determination. Delgado et al. (2015) found that attending a technology workshop significantly helped 80% of the teachers improve their abilities to use technology for learning. Gökoğlu and Çakıroğlu (2017) said teachers' abilities to use technology as an effective pedagogy started with the teachers believing they could do it. Teachers in this study commented they felt more comfortable using technology when they had an opportunity to work with technology and felt they were able to use technology successfully. In order to learn about technology, PD in technology needs to be continuous (Dlamini & Mbatha, 2018; Melki et al., 2017; Uslu, 2017). The teachers in this study realized there was so much available in how technology can be such an important learning tool, they talked about always finding ways to learn more. One principal remarked if students are expected to learn, then so should the teachers. Technological literacy grows as teachers are open to technology and pursued more PD (Melki et al., 2017).

Adapting to using technology for some teachers was a major change. According to Tse et al. (2017) teachers experienced vulnerability when starting to use technology. Teachers talked about feeling inadequate sometimes and how the pressures of change occurred too quickly. One teacher talked about how she just got to understand how to work with something and then it got changed. She commented she wished things could just slow down so people could understand how to use technology before it changed again. Teachers had to change their instructional mindset to include an innovative pedagogy that included technology (Weston et al., 2017).

Teachers talked about how they changed their way of doing things in the classroom because technology had provided more chances to students to learn differently. Ikpa (2016) remarked funding needs to be adequate to the change in pedagogical delivery that involves technology. Two teachers in the focus group commented on the need for more funding.

One of the tasks of principals was to ensure the climate and culture of the school community were healthy. This was accomplished with trustworthiness and fairness in the leadership of the principal (Arslan & Yildiz, 2015). Achievement by students was higher when the school community was healthy (McCluskey, 2017). Students and teachers felt empowered when they were satisfied with the work they were doing and they felt the relationship they had with each other was strong. It was felt that empowerment existed when the climate and culture of the community were healthy (Balkar, 2015).

Setting and monitoring of school goals are the primary responsibilities of the principal (Banjarnahor et al., 2018), and principals in this study commented on the necessity to have well-defined technology goals to avoid being overwhelmed by the enormity of technology. Successful implementation of technology in the school is led by the principal (Claro et al., 2017; Pollock, 2016), and the principals in this study projected this attitude and included in that thought the need to empower the teachers to take the lead as well. Ozgenel and Gokce (2019) did a study in which one of the participants remarked principals made happy teachers who created happy students who created other happy students which created happy learning environments. That same sentiment was reiterated in this study. Experienced teachers need principals who give them trust, independence, and responsibilities to be mentors to the novice teachers (Munir & Khalil, 2016). The teachers and principals in this study not only talked about teacher mentors but student mentors as well.

Theoretical Discussion

The theoretical framework for this study was the social cognitive theory (Bandura, 2001) which involved people interacting with and learning from each other through personal, behavioral, and environmental experiences. Theoretically, this research supports the principals personally, behaviorally, and environmentally in their quest to foster technological literacy in teachers in small rural K–12 schools. Relationships in school communities and among staff members are built on personal, behavioral, and environmental experiences. Principals have the responsibility to ensure these experiences are positive and progressive. Bandura (2001) explained it as a triadic reciprocal determinism which included people learning through either direct instruction, self-regulation, or observation. Triadic reciprocal determinism also involved three types of agency: autonomous (acting independently), mechanical reactiveness (responding), and emergent interactiveness (when two people influence each other by their actions).

This study supported Bandura's (2001) thought of triadic reciprocal determinism as teachers acted independently, were responsive to using technology for learning, and relied on and were influenced by their colleagues. The data collected in this study supported the theory of social cognitive theory (Bandura, 2001) when the teachers acknowledged that personal leadership skills, relationship skills, and the right environment were necessary to become more technologically literate. The teachers and principals talked about direct instruction through PD, self-regulation by putting their PD experiences into practice, and observation by collaborating with colleagues on technological issues and sharing what they had come to know through experience. Teachers acted independently, responded to the changes, and worked together to better understand how to use technology for learning. Bandura (2001) stated people need to be

immersed in the experience to truly benefit from it. These teachers and principals were fully immersed in what they were doing with technology, sometimes to the point of being overwhelmed and having to take a step back to avoid being totally consumed by it in a detrimental way. Bandura (2001) called this agency which involved being intentional, having forethought, being able to react, and being able to reflect on their experiences. What people see and experience influences what they become and in turn they influence others. The reciprocal deterministic approach to learning in the social cognitive theory was advanced by the findings in this study regarding what principals do and how they work. During the document analysis, the individual interviews, and the focus group interviews it was evident that working with technology was truly a group effort, one that no one did alone. The teachers relied heavily on each other primarily from a pedagogical point. The principals relied heavily on each other primarily from a leadership point.

The novel contribution that this study adds to the field is that it occurred in small rural K–12 schools in western Canada. Small rural schools have come to rely heavily on technology to give their students every opportunity to learn. Needing support, needing a sense of connection, dealing with challenges, providing opportunities, and having the necessary technology tools to advance learning are not just unique to any particular school setting. All school settings need this type of experience. The results from this research study among small rural K–12 schools in western Canada fills in the gap in the literature affirming that principals need to foster technological literacy in teachers in the way that advances learning with the use of technology.

Implications

This section will explain the implications from the findings of the research. The theoretical implications examine how the findings in the study support the social cognitive

theory. The empirical implications examine the benefits to the students by the teachers who were empowered in technological literacy. The practical implications have suggestions on how to foster technological literacy for other principals in small rural school or principals in any schools in any rural or urban schools.

Theoretical

The social cognitive theory (Bandura, 2001) was a key way to explain how principals helped teachers to become more technologically literate. Through personal, behavioral, and environmental experience principals provided teachers with the experience to grow in the area of technological literacy. Teachers, through personal, behavioral, and environmental experiences, helped the students to learn.

In conversation with the teachers it became very apparent teachers acted independently with technology through their own means of understanding what their students needed with regards to using technology as a learning tool. Leading a group of students for 10 months of the year to a deeper understanding of life and learning through knowledge and experience is the responsibility of the teachers. Teachers are held responsible to find ways so their students can learn what they need to learn for a particular grade or year. They will use instruction, self-regulation, and observation to help student accomplish what they need to in a year of learning. The phrase “assist the students” was basic because teachers need to help student learn how to learn through instruction, self-regulation, and observation. These are key elements of the work of Bandura (2001).

In this study, teachers acted in response to technology through seeking personal PD. Response to technology through personal PD was accomplished by attending school division conventions offering PD sessions. Teachers accessed school division learning coaches or

technology consultants. Teachers attended PD sessions outside of their school divisions in Boston, Florida, and Niagara Falls. Principals provided PD to the teachers through "how to" documents that provided explanations in step by step terms. A recommendation would be for school divisions to provide more funding so teachers are able to pursue PD opportunities outside of the school division where teachers can discover what is new and innovative in technology.

Teachers acted in response to each other through collaboration with colleagues, and in some cases, they collaborated with students. Teachers were not afraid to ask for help from other teachers. One teacher said that if she had technological questions, she would just walk down the hall and find another teacher who could answer her question. Principals were very open to helping teachers design professional growth plans. Principals were a wealth of technological information when teachers asked for help. Principals said if they did not know the answer, they would find someone who could answer the question. A teacher and a principal remarked they were not opposed to asking students for help. Some schools created student mentor teams who met with learning coaches regularly so students could take this knowledge of using technology back to the schools to help the students and teachers. A recommendation would be for all schools to set up student technology mentor teams.

Empirical

The empirical implications of this study have the potential to help principals in small rural schools or schools of any size in rural or urban centers to foster technological literacy in their teachers. Understanding fully how support for and connection with the teachers when using technology and how that affect students is vital. Being able to avoid the challenges of using technology and opening up opportunities for using technology are critical. Finding the right

technology tools, providing the freedom to use them, and identifying the essential technological approaches to use are necessary.

Becoming technologically literate through support could be taking the time to know the purpose of using technology for learning and ensuring the school community, and especially the parents, understand the purpose. Asking the right questions to determine that technology is the best avenue to take for learning is important. Realizing technology must be kept in perspective and should be used responsibly is key. Support is also giving the appropriate amount of time for teachers and students to learning how to use technology effective. Support is knowing how to motivate when learning about technology can be overwhelming. School divisions have certain technological expectations mandated. Principals will need to work at balancing moving toward technology with technologies mandated as well as knowing how to support teachers and students.

Technological literacy through connection might look like deciding on a common technological school goal for that school year. It might also give principals opportunities to encourage teachers and students to develop technological leadership skills. Technology can also open up communication avenues between teachers, students, and parents. Implementation of technology might best be accomplished by working with each other. Finding a work-life balance when using technology is important. Sometimes too much screen is not good.

Challenges in technological literacy could be handled by eliminating the frustration of working with technology by helping students understand how to use it respectfully. Frustration can be eliminated by ensuring teachers have a sense they do know what they are doing, and if they do not, providing them with the support they need so they do. Support includes eliminating technological breakdowns when teachers go to use it, providing them with a tech person who can

fix it quickly, or providing teachers the opportunities to learn how to fix technology problems. Reduce frustrations by allowing teachers time to figure out how technology can work for them and give them time to learn how to use technology efficiently. Other challenges come in the form of lack of hardware, hardware not working, lack of software, and software not working. Provide for teachers the knowledge to implement technology in the classrooms. Provide for teachers the infrastructure available and working. Deal with privacy issues associated with using various software programs so teachers do not have to worry about those issues. Help parents and students know their responsibilities when it comes to using technologies. Make the school scheduling tasks easier for the principal.

Opportunities in technological literacy for teachers would open doors for students by giving them more avenues in which to explore and expand their learning. Technology gives students a chance to participate in personalizing and individualizing their learning. Technology gives students the prospect of becoming a contributing member of a school community if technological literacy is one of their strengths. Students can become well-versed in the 21st century skills needed for life after high school. Teachers have a chance to expand their knowledge base and their pedagogical delivery system. Through the various technological devices available, the schools can create the most up-to-date learning environment for the students and teachers.

Technological literacy would be enhanced through the various tools available to the teachers and the students. Laptops, iPads, desktop computers, and Smart Boards are just some of the electronic devices schools are using. Being able to connect the laptops, iPads, and desktop computers to the Smart Board and then be able to troubleshoot if something goes wrong would be advantageous to teachers. Subscriptions like Mathletics and RAZ-Kids, online programs like

Lexia, and online courses are just some of the other resources available for teachers and students to use. Giving students the chance to work with coding blocks which provided inquiry type experiences would be available. Giving the teachers and students the freedom to explore what technology works best for them would be welcomed. Using tools such as Office 365, OneNote, and all Cloud products would be foundational to all teachers and students.

Practical

This research allowed for a very practical approach to assisting principals and teachers in advancing technological literacy in their schools. This research also offers senior administrators, principals, teachers, and parents in all school divisions an understanding of the realities of using technologies in small rural schools. The findings in this research can be applied anywhere there is formal learning taking place.

In this study, principals and teachers had a chance to talk about their experiences, both good and bad, with technology. Principals and teachers had an opportunity to share their opinions about where technology in learning needs to go. The principal focus group gave the principals a chance to listen to the triumphs and the struggles of other principals. The principals were able to share innovative ideas as well. The teachers in the focus group had an opportunity to experience solidarity in the struggles and the triumphs they have had. The teachers also had an opportunity to plan for the future.

Delimitations and Limitations

The delimitations for this study included participation from teaching principals and teachers who worked in a small rural school with student populations of 50 to 200. The type of research selected was the bounded case study. The rationale for using a bounded case study at multiple schools was to gather the richness of the experiences of the principals and teachers. The

purpose of this bounded multi-site study was to understand how the technological practices of principals in small K–12 rural schools in western Canada foster the technological literacy of teachers. There was a gap in the literature for how technology was being used for learning in small rural K–12 schools with student populations of 50 to 200. The student population size of 50 to 200 was chosen in order to secure enough participants for the study. There were 128 schools in 13 school divisions in western Canada with populations of 50 to 200 students. There were very few schools with student populations in western Canada of less than 50 students so this pool of participants was very small. Rural schools of student populations greater than 200 created a different demographic which could be a basis for another study.

The limitations for this study included the limited response from these potential 128 schools to participate. Directors of education from four of the potential 13 rural school divisions granted permission to approach the principals and teachers for this study. From these four school divisions, two principals from two different schools within one school division accepted the invitation to participate in the study. Permission from the IRB was then granted to secure participants from the researcher's own school division. From the researcher's own school division, three principals and three teachers agreed to participate in the study. Permission was then granted by the IRB to include participants who had worked in a small rural K–12 school of 50 to 200 students within the last three years. Another two teachers agreed to participate in the study.

At this point, there were five principals and five teachers in the study which included one male principal, one male teacher, four female principals, and four female teachers. Using participants from the researcher's own school division was a limitation as biases could have affected the data collection. Opening the study to teachers who worked in a small rural school

within the last three years was a limitation as the participants were not directly involved in the use of technology for learning in the school year in which this study occurred. Their recollection of events or experiences was based on the past and not the present use of technology for learning. The researcher had to make the participant pool larger in order to get enough participants for the study. Having only two male participants of the 10 participants was a limitation in that the male perspective was minimally represented. Having an equal number of female and male participants would have given the study a more balanced perspective.

Recommendations for Future Research

The purpose of this bounded multi-site study was to understand how the technological practices of principals in small K–12 rural schools in western Canada foster the technological literacy of teachers. There was a gap in the literature to support and direct principals in small rural schools who were trying to foster technological literacy in teachers. The participants came from a very small population and sample size of principals and teachers. Additional research with a larger group of school divisions and schools could perhaps substantiate the findings in this study. Research on how to fund technologies within school divisions and schools for small rural communities could be accomplished through discussions with principals and business superintendents. Research on the feasibility of having learning coaches in each school division could be achieved through discussions and interviews with teachers, principals, and school division learning consultants. How quickly software programs and hardware can be made available to principals and teachers could be accomplished through discussions with directors of education and business superintendents.

Additional research should occur in the area of principal and teacher workload to determine how to manage all of the daily tasks needed to be accomplished each day so principals

and teachers can spend the time to learn how to effectively use technology in learning. The most efficient and effective way to teach principals and teachers how to troubleshoot technology glitches and damage could be another area of research. Additional research into helping parents and students understand proper online etiquette is essential. Equitable access to technologies in all schools for all students could be another area of research. Research into the continual purchasing and maintenance of individual iPads or laptops for students is importance to guarantee that learning via technology is not interrupted. What constitutes a successful online learner from kindergarten to Grade 12 would be valuable research. Exacting the types of PD that would be most beneficial for teachers is another potential area for research. Research into understanding how and why teachers do not feel prepared with using technologies would be useful as research.

Doing narrative research in the life of a particular principal or teacher who is fully immersed in using technology would be an interesting study. Following one principal or one teacher in their daily triumphs and trials using technology would be a rich look at the experiences in technology that they face every day. As a researcher being able to join this principal or teacher for a period of time and living their school day life would give valuable insights into their technological story. Conducting a phenomenological study on teacher experiences with using certain software programs like SeeSaw might give valuable insights for other teachers. A grounded theory study on the most effective way to be an instructional leader in the age of technological learning might develop additional theories. Ethnographic research on communities that do not use technology and how it affects or doesn't affect them would be an interesting study.

Summary

This bounded multi-site case study examined how principals in small rural schools in western Canada foster technological literacy among teachers. While there has been plenty of research on the benefits of technology in the lives of teachers and students everywhere, there was a gap in the literature regarding how teachers in small rural schools use technology to enhance the learning of students. Five principals and five teachers participated from two school divisions and five schools participated in this research.

Empirically, teacher-student relationships were key in developing what was needed to successfully advance the learning through technology. Learning in rural schools needed to be supported very differently than in larger centers because the availability of resources including technology was different even though technology is a global reality. PD for teachers, in order to be effective, needs to be what the teachers are asking for and what was the most practical. Using technology for learning in some cases was a large change, one that needed to be carefully supported by the principals. Organizational health, climate, culture, and commitment were some of the driving forces to supporting the use of technology for learning. Principal leadership and specific technological practices were the foundation of successful technological learning in the schools. The empirical implications indicated the importance of considering a number of factors that create the successful use of technology in learning as driven by the teachers and the principals in small rural schools.

The social cognitive theory (Bandura, 2001) was the theoretical foundation of this study, which provided principals the basis for supporting the teachers personally, behaviorally, and environmentally. The theoretical implications support the position that people's experiences of helping each other to learn are vital in making that learning purposeful and meaningful. From

Bandura's theory, the practical implications indicate that the experience of interaction between principals and teachers to support students in using technology to learn is vital. It is the responsibility of the principals to foster technological literacy in teachers to ensure that teachers are doing everything they can to give all students all opportunities to use technology as a learning tool.

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APPENDICES

Appendix A: Permission to Conduct Research

LIBERTY UNIVERSITY.
INSTITUTIONAL REVIEW BOARD

May 21, 2019

Kathleen M. Grad
IRB Approval 3809.052119: An Examination of How Principals in Rural K-12 Schools Foster Technological Literacy among Teachers: A Multi-Site Case Study

Dear Kathleen M. Grad,

We are pleased to inform you that your study has been approved by the Liberty University IRB. This approval is extended to you for one year from the date provided above with your protocol number. If data collection proceeds past one year or if you make changes in the methodology as it pertains to human subjects, you must submit an appropriate update form to the IRB. The forms for these cases were attached to your approval email.

Your study falls under the expedited review category (45 CFR 46.110), which is applicable to specific, minimal risk studies and minor changes to approved studies for the following reason(s):

> 7. Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies. (NOTE: Some research in this category may be exempt from the HHS regulations for the protection of human subjects. [redacted] and (b)(3). This listing refers only to research that is not exempt.)

Thank you for your cooperation with the IRB, and we wish you well with your research project.

Sincerely,

[redacted]

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

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Appendix B: Recruitment Letter to Principals and Teachers

Date

[Recipient]
[Title]
[Company]
[Address 1]

Dear [Recipient]:

As a graduate student in the School of Education at Liberty University, I am conducting research as part of the requirements for a Doctor of Education degree. The purpose of this bounded multi-site study was to understand how the technological practices of principals in small K-12 rural schools in Western Canada foster the technological literacy of teachers. I am conducting research with both principals and teachers. Your Director of Education or designate has given me permission to contact you about the possibility of participating in my research. I have included a Screening Survey with this letter which will help me to build a diverse participant pool. I am hoping that you will take the time to fill out the Screening Survey and return it to me within three days.

If you are selected to be part of this diverse participant pool, you will be asked to provide any documentation (School Improvement Plans, technology goals, budget, minutes of meetings, Professional Development experiences, etc.) that you would like to share that would indicate how teachers were and are supported in their increased technological literacy, participate in an individual interview of less than an hour in person or through VoIP (Voice over IP – multimedia and voice communication over the internet with Zoom), and participate in a focus group of less than two hours either in person or through VoIP. There will be a principal focus group and a teacher focus group. It should take approximately two to three hours for you to complete the procedures listed. Your name and/or other identifying information will be collected as part of your participation, but this information will remain confidential. Your responses will be audio or video recorded, transcribed, held securely for three years, and then destroyed either by shredding or electronic deletion. Once your responses have been transcribed, you will have the opportunity to check the transcription for accuracy.

To participate, fill out the Screening Survey and return it to me at _____. Within a day, I will be contacting you to let you know if you will be part of this diverse participant pool.

If you are selected to participate, I will send you a Consent Form to participate and will respectfully ask that you return it to me within three days.

Sincerely,

Kathleen M. Grad, MA
Doctoral Candidate

Acceptance Email into the Research Study

Hello _____,

Thank you for taking the time to complete the Screening Survey for my research study entitled, *An Examination of How Principals in Rural K-12 School Foster Technological Literacy Among Teachers: A Multi-Case Study*.

Based on the responses you have shared with me, you are well suited to participate in my research study.

Attached to this email is a Consent Form that I would like you to complete and return to me via email within three days. Once I have received your signed Consent Form, I will be contacting you to set up the individual interview.

At this time, you may also want to send to me via email, any documents (such as meeting minutes, professional development notes, and school improvement plans) that would indicate how technological literacy is fostered among teachers.

I thank you for completing the Consent Form and returning it to me within three days.

Sincerely,

Kathleen M. Grad

Rejection Email into the Research Study

Hello _____,

Thank you for taking the time to complete the Screening Survey for my research study entitled, *An Examination of How Principals in Rural K-12 School Foster Technological Literacy Among Teachers: A Multi-Case Study*.

Based on the responses you have shared with me, I do not feel that you fit the criteria that I am looking for and will not be able to include you as a participant in this study.

I wish you all the best.

Sincerely,

Kathleen M. Grad

Appendix C: Principal Screening Survey

AN EXAMINATION OF HOW PRINCIPALS IN RURAL K-12 SCHOOLS FOSTER TECHNOLOGICAL LITERACY AMONG TEACHERS: A MULTI-SITE CASE STUDY

Kathleen M. Grad

Principal Screening Survey

Name _____

School _____

Town _____ Province _____Postal Code _____

Phone (H) _____

(W) _____

(C) _____

Email_____

_____ (Director or designate name) has granted me permission to do research in the _____ School Division. _____ has given me permission to contact you as a possible participant in my study entitled, ***An Examination of How Principals in Rural K-12 Schools Foster Technological Literacy Among Teachers: A Multi-Site Case Study***.

Prior to the actual study, I am conducting a Screening Survey to ensure that participants are well suited for this study.

I will be asking participants of the study to share documents with me as well as participate in an individual interview (one hour in length) and a focus group interview (two hours in length) regarding technological literacy. The interviews will be audio or video recorded, transcribed, held securely and then destroyed after three years.

I will be inviting both teachers and principals to participate in this study.

Thank you for taking the time to respond to these screening questions. Once I have received the screening surveys, I will contact the appropriate participants with a consent form.

Please send your responses to this Screening Survey to _____.

1. Gender
    a. Male _____
    b. Female _____
2. Educational Degree:
    a. BEd ____
    b. Masters ____
    c. Doctorate ____
    d. Other ____ Please Explain: _____
3. Years in education:
    a. 1 to 5 years ____
    b. 6 to 10 years ____
    c. 11 to 15 years _____
    d. 16 to 20 years _____
    e. 21 to 25 years _____
    f. 26 years and beyond _____
4. Length of principalship
    a. 1 to 5 years _____
    b. 6 to 10 years _____
    c. 11 to 15 years _____
    d. 16 to 20 years _____
    e. 21 to 25 years _____
    f. 26 years and beyond _____
5. Length working in a small rural school
    a. 1 to 5 years _____
    b. 6 to 10 years _____
    c. 11 to 15 years _____
    d. 16 to 20 years _____
    e. 21 to 25 years _____
    f. 26 years and beyond _____
6. Level of comfort and skill working with technology
    a. Very comfortable _____
    b. Moderately comfortable _____
    c. Not at all comfortable _____
7. Types of technologies available in your school
    a. Laptops _____
    b. Desktop computers _____

c. Mobile devices _____
d. Internet _____
e. Various software programs _____
f. Video Conferencing opportunities such as
    i. Skype _____
    ii. Google Hangouts _____
    iii. Zoom _____
    iv. Other _____ Explain:
    _____
g. Other
    _____

8. Level of comfort implementing new technologies in your school
    a. Very comfortable _____
    b. Moderately comfortable _____
    c. Not at all comfortable _____

Thanks again.

I appreciate your time,

Kathleen M. Grad

Appendix D: Consent Form for Principals

The Liberty University Institutional Review Board has approved this document for use from 5/21/2019 to 5/20/2020 Protocol # 3809.052119

CONSENT FORM

An Examination of How Principals in Rural K-12 Schools Foster Technological Literacy among Teachers: A Multi-Site Case Study

Kathleen M. Grad
Liberty University
School of Education

You are invited to be in a research study on how principals in small rural K-12 schools foster the technological literacy of teachers. Your director of education has given me permission to invite you to participate in the study. You were selected as a possible participant because you are presently a principal in a rural K-12 school or you have worked as a principal in a small K-12 rural school within the last three years and are comfortable using and implementing technology into the classroom. Please read this form and ask any questions you may have before agreeing to be in the study.

Kathleen M. Grad, a doctoral candidate in the School of Education at Liberty University, is conducting this study.

Background Information: The purpose of this study is to examine how the technological practice of principals in small K-12 rural schools in Western Canada fosters the technological literacy of teachers.

Procedures: If you agree to be in this study, I would ask you to do the following things:

1. Provide for me any documentation that you would like to share that would indicate how you supported teachers in their increased technological literacy. This could be meeting notes, professional development documents, and any other activities. These could be shared electronically.
2. Participate in an individual interview that will take no longer than one hour of your time. I would like to audio or video record this interview. This could take place in person or through VoIP (Voice over IP – multimedia and voice communication over the internet such as Zoom).
3. Participate in a focus group meeting with the other participants in person or through VoIP which will take no longer than two hours.
4. Review the transcript of your individual interview and your contributions in the focus group to ensure their accuracy. This should take about 15 minutes.

Risks: The risks involved in this study are minimal, which means they are equal to the risks you would encounter in everyday life.

Benefits: Participants should not expect to receive a direct benefit from taking part in this study. However, you may benefit from the collaborative conversation that will take place in the focus group by hearing how other principals have fostered technology in their schools.

Benefits to Society: The final research results from this study may benefit society by the thoughts and experiences shared that will foster technological literacy among teachers.

Compensation: Participants will not be compensated for participating in this study

The Liberty University Institutional
Review Board has approved
this document for use from
5/21/2019 to 5/20/2020
Protocol # 3809.052119

Confidentiality: The records of this study will be kept private. In any sort of report, I might publish, I will not include any information that will make it possible to identify a subject. Research records will be stored securely, and only the researcher will have access to the records. I will also be using a pseudonym for each participant to protect his/her confidentiality. I will conduct the interviews in a location where others will not easily overhear the conversation. Interviews and focus groups will be recorded and transcribed by me. Paper copies of the interviews will be locked in a cabinet for three years and then destroyed by shredding. Recordings will be stored on a password locked computer for three years and then deleted. Only the researcher will have access to these recordings. I cannot assure participants that other members of the focus group will not share what was discussed with persons outside of the group.

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

How to Withdraw from the Study: If you choose to withdraw from the study, please contact the researcher at the email address/phone number included in the next paragraph. Should you choose to withdraw, data collected from you, apart from focus group data, will be destroyed immediately and will not be included in this study. Focus group data will not be destroyed, but your contributions to the focus group will not be included in the study if you choose to withdraw.

Contacts and Questions: The researcher conducting this study is Kathleen M. Grad. You may ask any questions you have now. If you have questions later, **you are encouraged** to contact her at [redacted] or [redacted]. You may also contact the researcher's faculty chair, Dr. Gail Collins, at [redacted].

If you have any questions or concerns regarding this study and would like to talk to someone other than the researcher, **you are encouraged** to contact the Institutional Review Board, 1971 University Blvd., Green Hall Ste. 2845, Lynchburg, VA 24515 or email at [redacted].

Please notify the researcher if you would like a copy of this information for your records.

Statement of Consent: I have read and understood the above information. I have asked questions and have received answers. I consent to participate in the study.

☐ The researcher has my permission to audio-record/video-record me as part of my participation in this study.

Signature of Participant Date

Signature of Investigator Date

Appendix E: Teacher Screening Survey

AN EXAMINATION OF HOW PRINCIPALS IN RURAL K-12 SCHOOLS FOSTER TECHNOLOGICAL LITERACY AMONG TEACHERS: A MULTI-SITE CASE STUDY

Kathleen M. Grad

Teacher Screening Survey

Name _____

School _____

Town _____ Province _____Postal Code _____

Phone (H) _____

(W) _____

(C) _____

Email_____

_____ (Director or designate name) has granted me permission to do research in the _____ School Division. _____ has given me permission to contact you as a possible participant in my study entitled, ***An Examination of How Principals in Rural K-12 Schools Foster Technological Literacy Among Teachers: A Multi-Site Case Study***.

Prior to the actual study, I am conducting a Screening Survey to ensure that participants are well suited for this study.

I will be asking participants of the study to share documents with me as well as participate in an individual interview (one hour in length) and a focus group interview (two hours in length) regarding technological literacy. The interviews will be audio or video recorded, transcribed, held securely and then destroyed after three years.

I will be inviting both teachers and principals to participate in this study.

Thank you for taking the time to respond to these screening questions. Once I have received the screening surveys, I will contact the appropriate participants with a consent form.

Please send your responses to this Screening Survey to _____.

1. Gender
    a. Male ____
    b. Female ____
2. Educational Degree:
    a. BEd ____
    b. Masters ____
    c. Doctorate ____
    d. Other ____ Please Explain: _____
3. Years as a teacher in education:
    a. 1 to 5 years ____
    b. 6 to 10 years ____
    c. 11 to 15 years _____
    d. 16 to 20 years _____
    e. 21 to 25 years _____
    f. 26 years and beyond _____
4. Length working in a small rural school
    a. 1 to 5 years _____
    b. 6 to 10 years _____
    c. 11 to 15 years _____
    d. 16 to 20 years _____
    e. 21 to 25 years _____
    f. 26 years and beyond _____
5. Level of comfort and skill working with technology
    a. Very comfortable _____
    b. Moderately comfortable _____
    c. Not at all comfortable _____
6. Types of technologies available in your school
    a. Laptops _____
    b. Desktop computers _____
    c. Mobile devices _____
    d. Internet _____
    e. Various software programs _____
    f. Video Conferencing opportunities such as
        i. Skype _____
        ii. Google Hangouts _____
        iii. Zoom _____

iv. Other _____ Explain:
_____

g. Other
_____

7. Level of comfort implementing new technologies in your school
    a. Very comfortable _____
    b. Moderately comfortable _____
    c. Not at all comfortable _____

Thanks again.

I appreciate your time,

Kathleen M. Grad

Appendix F: Consent Form for Teachers

CONSENT FORM

An Examination of How Principals in Rural K-12 Schools Foster Technological Literacy among Teachers: A Multi-Site Case Study

Kathleen M. Grad
Liberty University
School of Education

You are invited to be in a research study on how principals in small rural K-12 schools foster the technological literacy of teachers from the perspective of a teacher. Your director of education or designate has given me permission to invite you to participate in the study. You were selected as a possible participant because you are presently a teacher in a rural K-12 school or you have worked as a teacher in a small K-12 rural school within the last three years and are comfortable using and implementing technology into the classroom. Please read this form and ask any questions you may have before agreeing to be in the study.

Kathleen M. Grad, a doctoral candidate in the School of Education at Liberty University, is conducting this study.

Background Information: The purpose of this study is to examine how the technological practice of principals in small K-12 rural schools in Western Canada fosters the technological literacy of teachers.

Procedures: If you agree to be in this study, I would ask you to do the following things:

1. Provide for me any documentation that you would like to share that would indicate how you were supported as teachers in your increased technological literacy. This could be meeting notes, professional development documents, and any other activities. These could be shared electronically.
2. Participate in an individual interview that will take no longer than one hour of your time. I would like to audio or video record this interview. This could take place in person or through VoIP (Voice over IP – multimedia and voice communication over the internet such as Zoom).
3. Participate in a focus group meeting with the other participants in person or through VoIP which will take no longer than two hours.
4. Review the transcript of your individual interview and your contributions in the focus group to ensure their accuracy. This should take about 15 minutes.

Risks: The risks involved in this study are minimal, which means they are equal to the risks you would encounter in everyday life.

Benefits: Participants should not expect to receive a direct benefit from taking part in this study. However, you may benefit from the collaborative conversation that will take place in the focus group by hearing how other teachers have used technology in their schools.

Benefits to Society: The final research results from this study may benefit society by the thoughts and experiences shared that will foster technological literacy among teachers.

Compensation: Participants will not be compensated for participating in this study

The Liberty University Institutional Review Board has approved this document for use from 5/21/2019 to 5/20/2020 Protocol # 3809.052119

Confidentiality: The records of this study will be kept private. In any sort of report, I might publish, I will not include any information that will make it possible to identify a subject. Research records will be stored securely, and only the researcher will have access to the records. I will also be using a pseudonym for each participant. I will conduct the interviews in a location where others will not easily overhear the conversation. Interviews and focus groups will be recorded and transcribed by me. Paper copies of the interviews will be locked in a cabinet for three years and then destroyed by shredding. Recordings will be stored on a password locked computer for three years and then deleted. Only the researcher will have access to these recordings. I cannot assure participants that other members of the focus group will not share what was discussed with persons outside of the group.

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

How to Withdraw from the Study: If you choose to withdraw from the study, please contact the researcher at the email address/phone number included in the next paragraph. Should you choose to withdraw, data collected from you, apart from focus group data, will be destroyed immediately and will not be included in this study. Focus group data will not be destroyed, but your contributions to the focus group will not be included in the study if you choose to withdraw.

Contacts and Questions: The researcher conducting this study is Kathleen M. Grad. You may ask any questions you have now. If you have questions later, **you are encouraged** to contact her at [redacted] or [redacted]. You may also contact the researcher's faculty chair, Dr. Gail Collins, at [redacted].

If you have any questions or concerns regarding this study and would like to talk to someone other than the researcher, **you are encouraged** to contact the Institutional Review Board, 1971 University Blvd., Green Hall Ste. 2845, Lynchburg, VA 24515 or email at [redacted].

Please notify the researcher if you would like a copy of this information for your records.

Statement of Consent: I have read and understood the above information. I have asked questions and have received answers. I consent to participate in the study.

☐ The researcher has my permission to audio-record/video-record me as part of my participation in this study.

Signature of Participant Date

Signature of Investigator Date

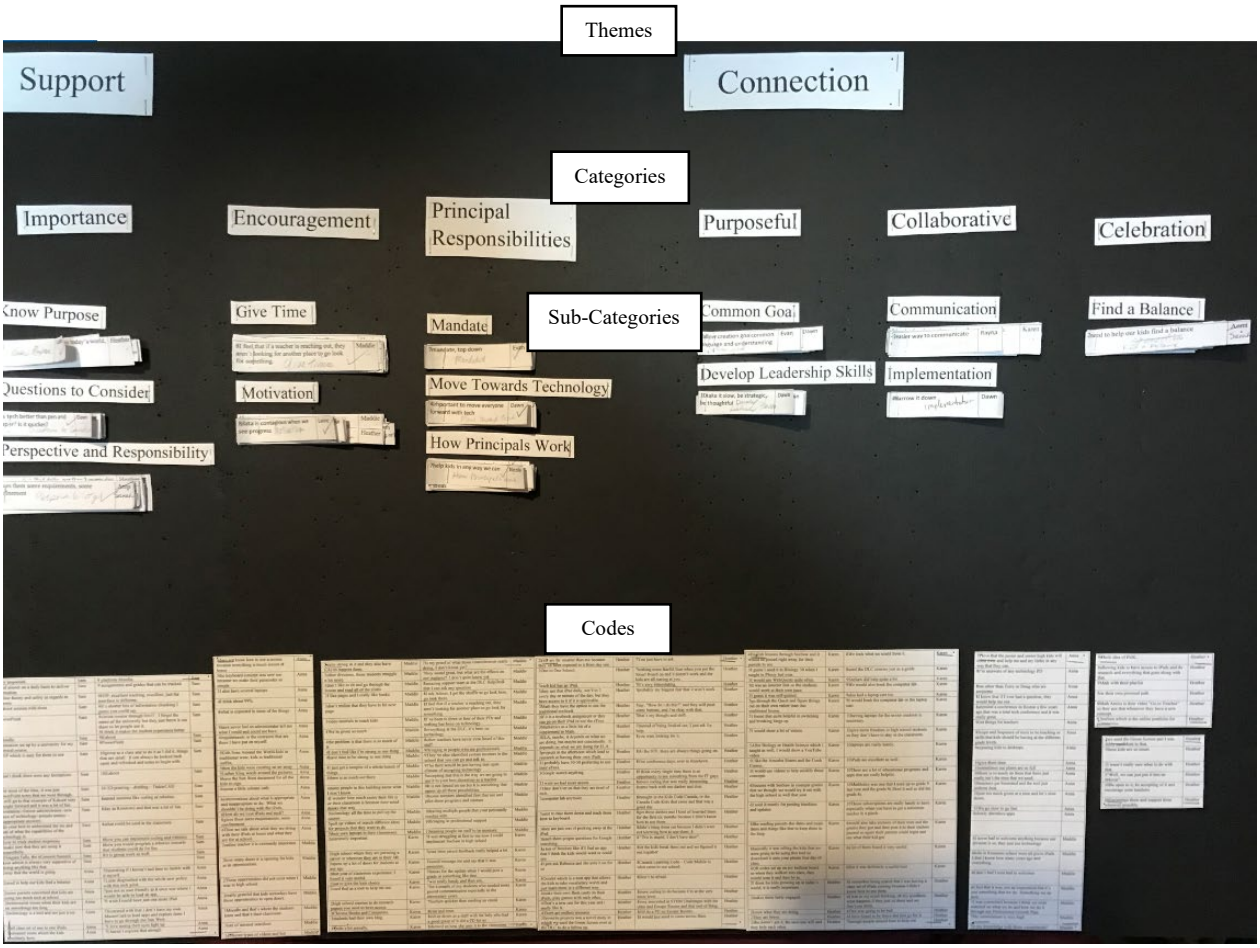
Appendix G: Reflexive Journal—Potential Biases

Date	Potential Biases
180829	I have been a principal so I know the reality. I will need to be mindful of the possibility that I may influence their responses by how I may lead them with the question. I will need to try to not think like a principal. No easy task.
180910	As I'm working through my revisions in the data analysis area of my manuscript, it occurred to me the challenge interviewing could be as I have a tendency to want to help by prompting people and setting them up with leading questions. That is the nature of the type of work that I do. I always try to give people every opportunity to discover their best and sometimes I lead them to their best.
181110	I believe that more biases will surface as I start the data collection and data analysis.
181231	As I work through my manuscript, I am looking forward to the actual interviewing process. I have sought the advice of two experts (University professors in the College of Education) in regards to my interview questions and my focus group questions and both suggested the types of questions that would solicit in-depth responses from my participants. Both encouraged me to use the questions as prompts and to inquiry further based on the participants' responses.
190216	The deeper I work with my manuscript the more I feel intimidated and yet exhilarated with the work that I will eventually do. It reminds me of a thought…when you work on your Bachelor's degree, you learn things. When you work on your masters, you think you know everything but when you work on your doctorate, you realize you have lots to learn. 😊 It's a humbling experience.
190422	I submitted my IRB application.
190423	IRB acknowledged by application.
190521	I'm excited as I have IRB approval. I will make the necessary changes.
190531	I did attempt to invite one administrator to participate in my pilot study but she declined as it is too close to the end of the school year. That is what I feared would happen. I will wait until the end of September 2019 to ask for participants for the pilot study and then hopefully in October 2019 I can invite participation for my data collection. When I asked each of the school divisions to extend my opportunity to do research in their school division one of the superintendents cautioned me about approaching their principals and teachers at this time of year because it is so busy. I assured her that I would honor the time of the year by not approaching anyone at this time. The four-school division honored my request to do data collection from now to December 31, 2019. If I need to extend it further, I'm sure they will honor that as well.
190531 to 191112	This was a long wait. June to September inclusive is not a good time to ask for participants as it is the end of the school year, the summer break, and then the start up of a new school year. There was a new Student Information System that was introduced throughout the province which had everyone from teachers

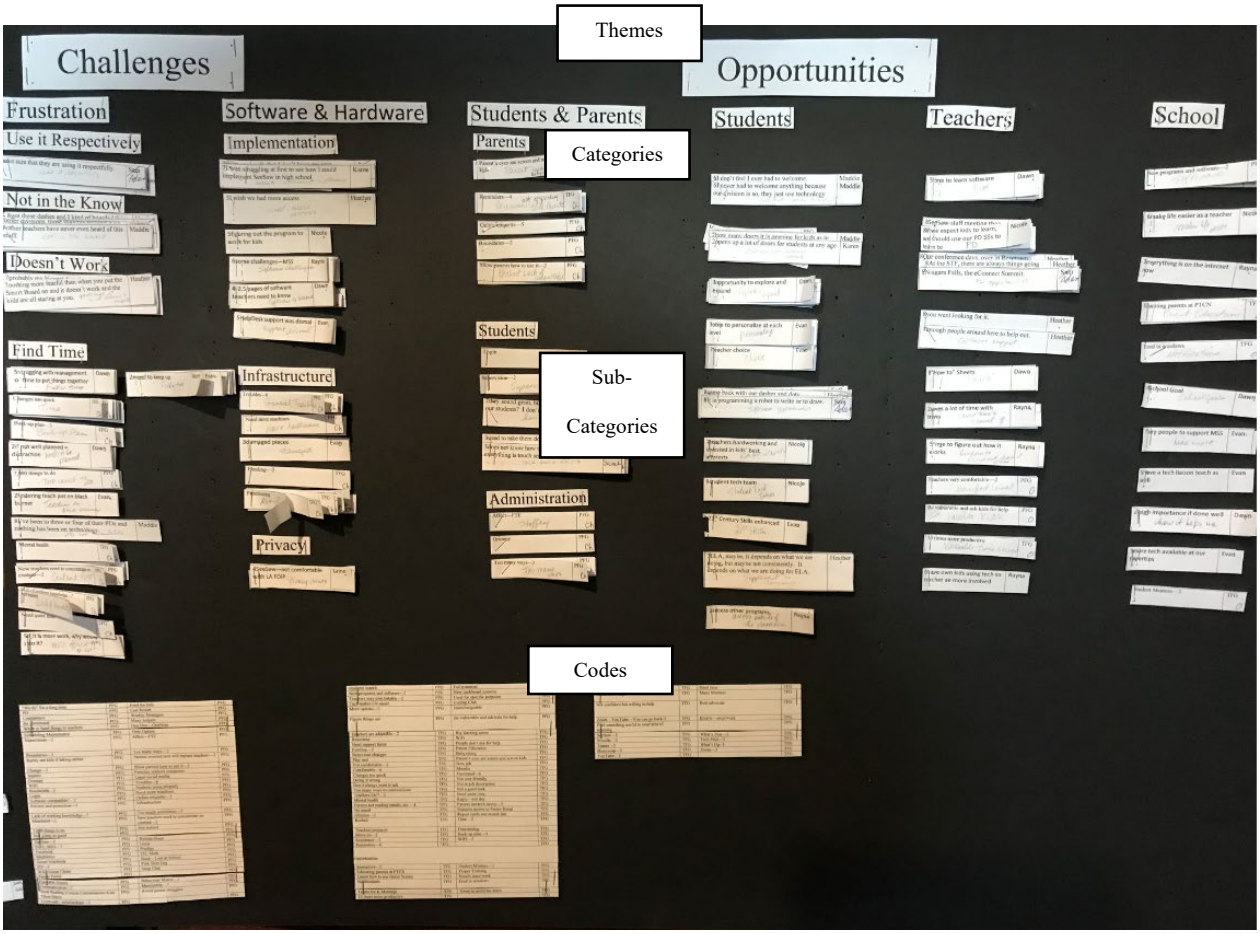
	to principals to secretaries concentrating on getting this new system up and working. There was also report card time where no teacher was interested in participating. Finally, on November 12, 2019 I started to send out Recruitment Letters and Screening Surveys to principals first and then teachers in four different school divisions. I contacted 36 school principals. I got a "no" from two principals and a "yes" from three principals of which I had actual involvement from two principals. I had contacted the third principal a second time but that never materialized. I contacted the teachers in all of these school but no one accepted my invitation to participate
191113	I received my first two Screening Survey from two principals.
191114	I sent the Consent Forms as both would be good participants based on the criteria. Both Consent Forms were returned by 191118.
191125	Interviewed first **two principals** followed by member checking.
191208	I got permission from my chairperson to seek permission from the IRB to seek participants in my own school division.
191211	I contacted my Director of Education at 7:51 a.m. to seek permission to contact research in our school division. By 10:42 a.m., my Director of Education granted me permission to contact research in our school division by supplying me with a letter that I sent to the IRB.
191212	Within a day, I received permission from the IRB to approach potential participants in my school division. I also got permission from the IRB to use a reputable transcription service if I needed to use an outside agency to transcribe my interviews.
191231	Because I had gotten permission to find participants in my own school system during the pre-Christmas season, it would have been futile to send out the Screening Surveys and the Recruitment Letters. I sent them out on December 31, 2019 as I knew that some principals would look at their emails before returning to school after the Christmas break. I emailed eleven principals inviting them to participate and asking their permission to contact their teachers (a courteous thing to do.)
200105 to 200109	I received from three principals and three teachers in my school division, the returned Screening Surveys.
200115 to 200128	Interviews with **three principals** and **three teachers** occurred followed by member checking.
200105	Another teacher expressed their interest in participating but will be away for a week. I contacted her again when she returned.
200107	Another teacher expressed their interest in participating and was sent the Screening Survey and Recruitment Letter.
200130	I scheduled the Principal Focus Group interview for Wednesday, February 26, 2020 from 4:00 to 6:00 p.m. It will be a Zoom conference. (This was the second attempt to do this.)
200206	Received my fourth teacher Screening Survey.
200207	Interviewed my **fourth teacher** followed by transcription & member checking.
200214	Interviewed my **fifth teacher** followed by transcription & member checking.
200217-21	Coding—Individual interviews & documents—Principals & Teachers—creation of data analysis boards (3)

200226	Principal Focus Group using Zoom—four of the five principals participated
200301-02	Transcription of Principal Focus Group followed by member checking.
200304	Teacher Focus Group face- to face- and zoom
200307	Transcription of Teacher Focus Group followed by member checking.
200308-19	Data analysis—coding, sub-categorizing, categorizing, and theming.
200320-28	Writing Chapter Four and Five
200328	At 11:17 a.m., I wrote my last sentence in my 228-page dissertation. It will grow to over 228 pages once new Appendices are added. Now to read, revise, add the Appendices, tables, and a revision of the Table of Contents. It feels good. 😊
200329	Submitted my Chapter Four and Five for review.
200407	Manuscript returned with revisions to do.
200401	Submitted my Chapter Four and Five for review.
200401-0503	Three sets of revisions
200506	Permission to send my manuscript to my APA editor.
200518	Final edits were received from my APA editor. Manuscript was revised. Manuscript was sent to chairperson.
200616	Successful dissertation defense.

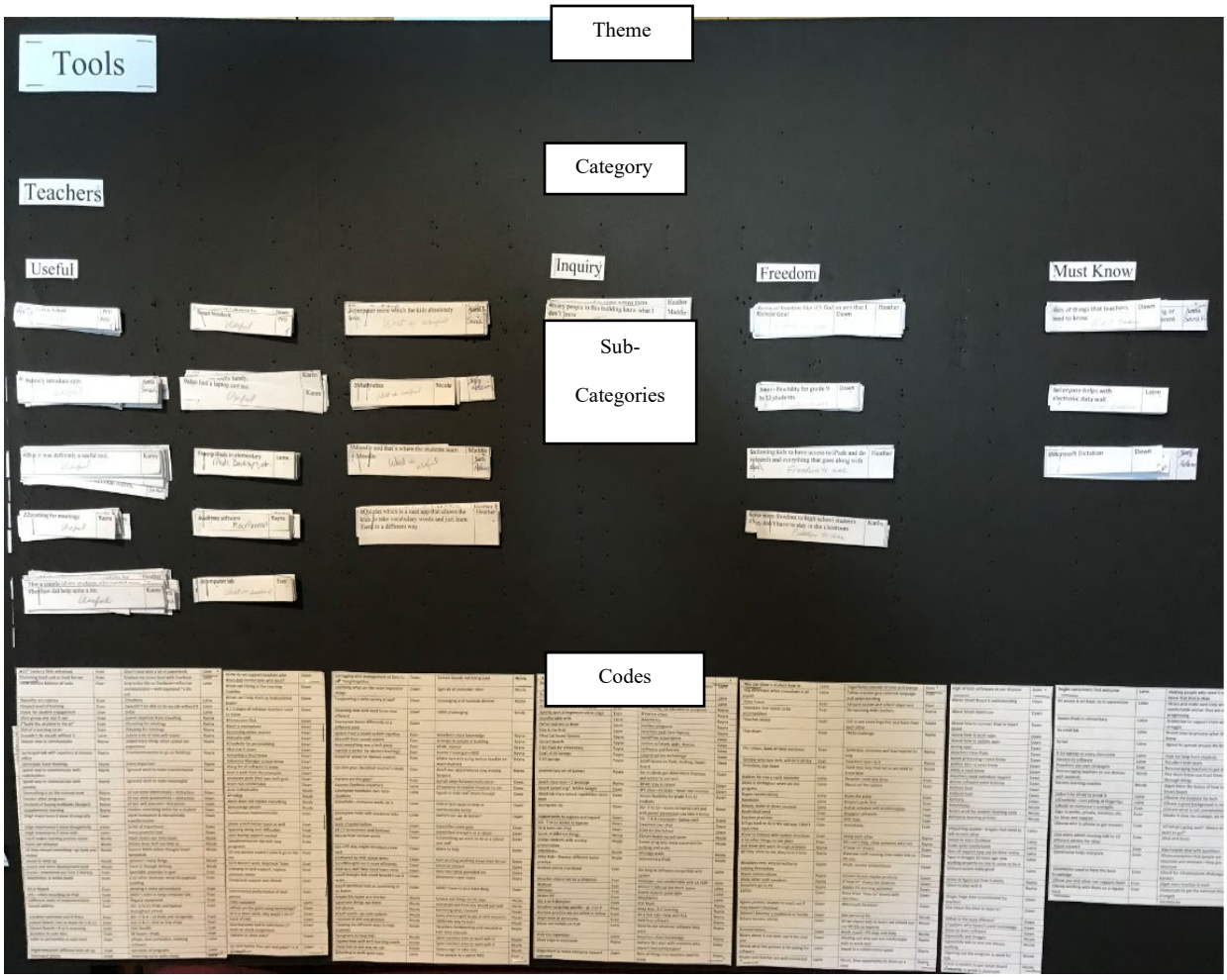
Appendix H: Support & Connection Board



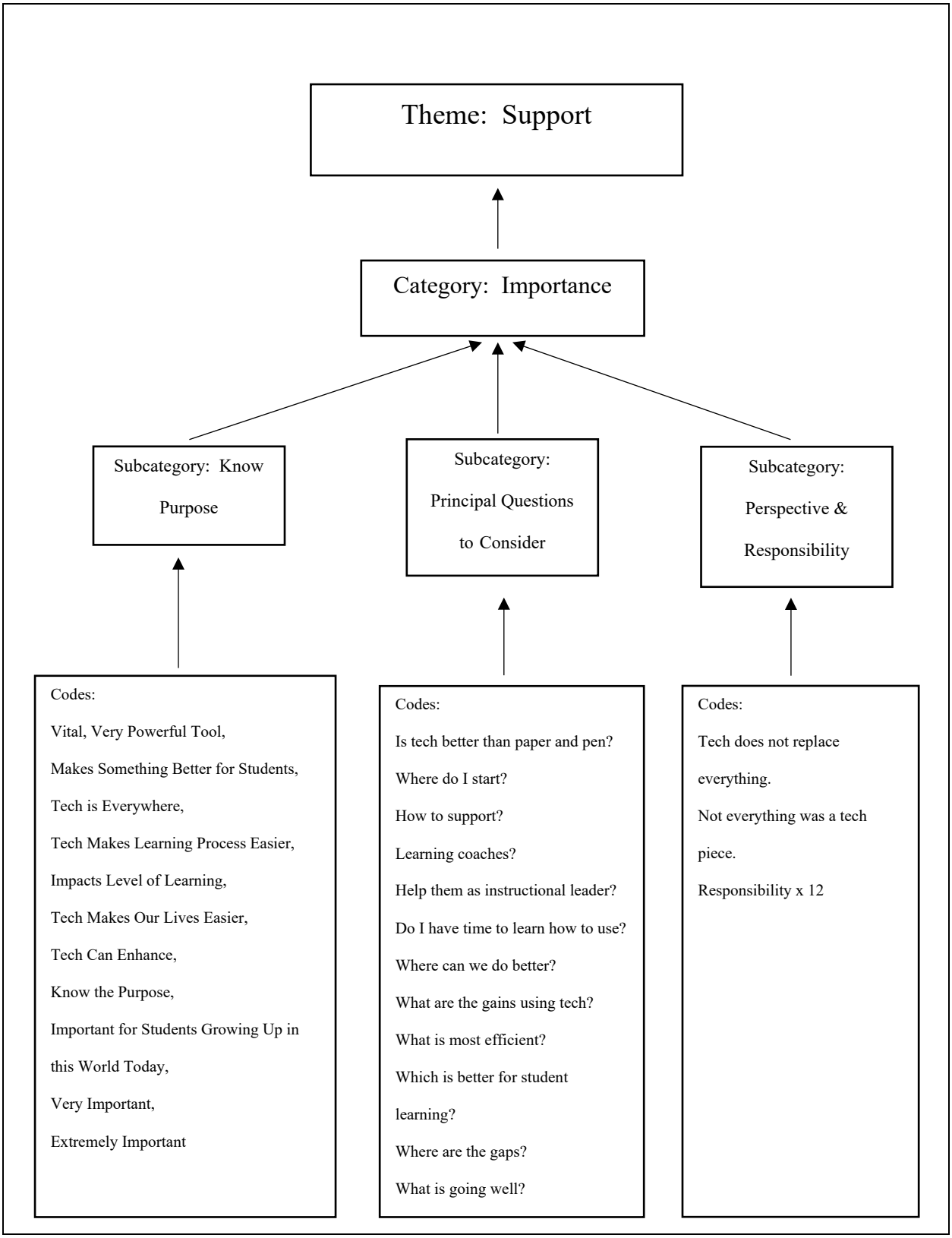
Appendix I: Challenges & Opportunities Board



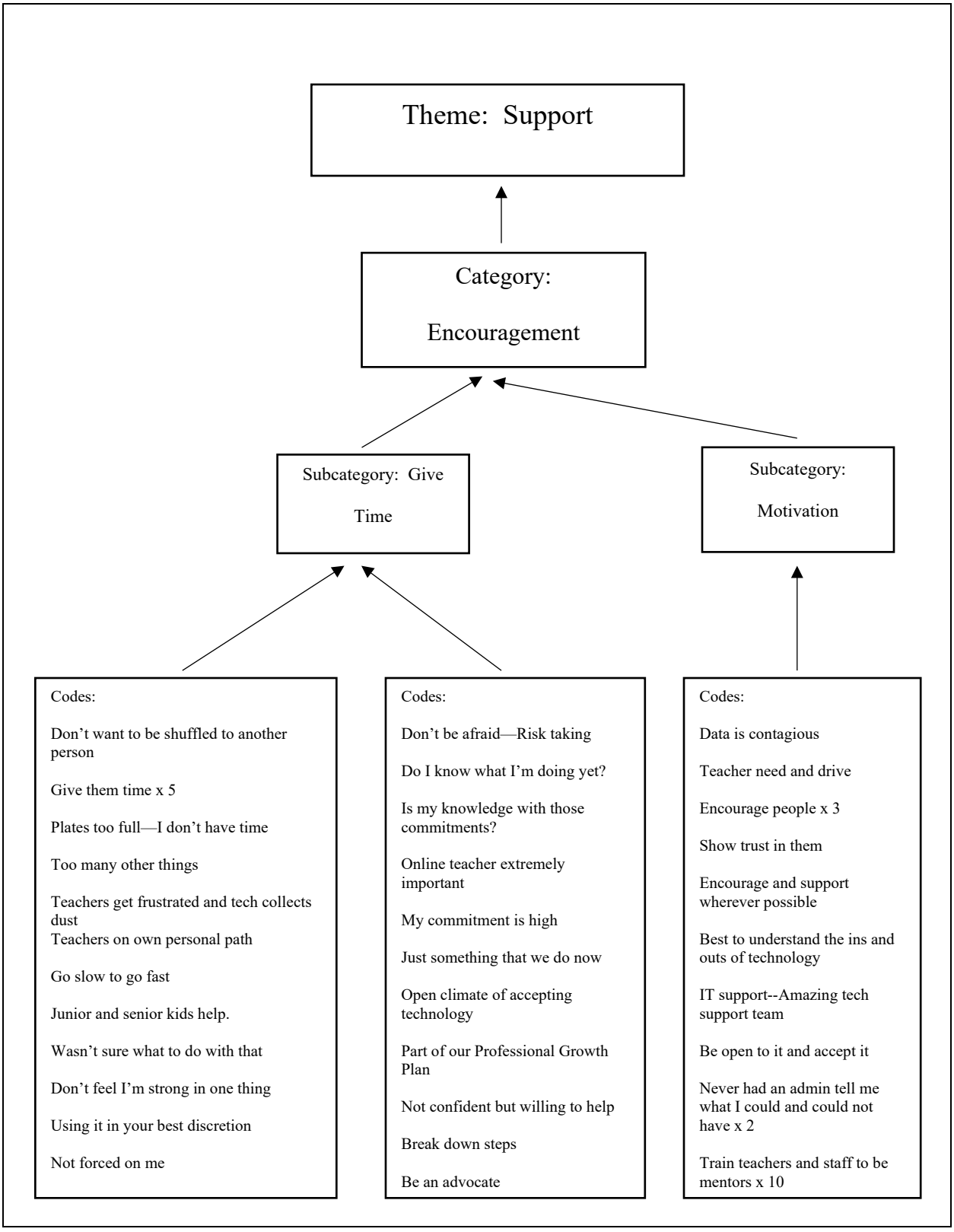
Appendix J: Tools Board



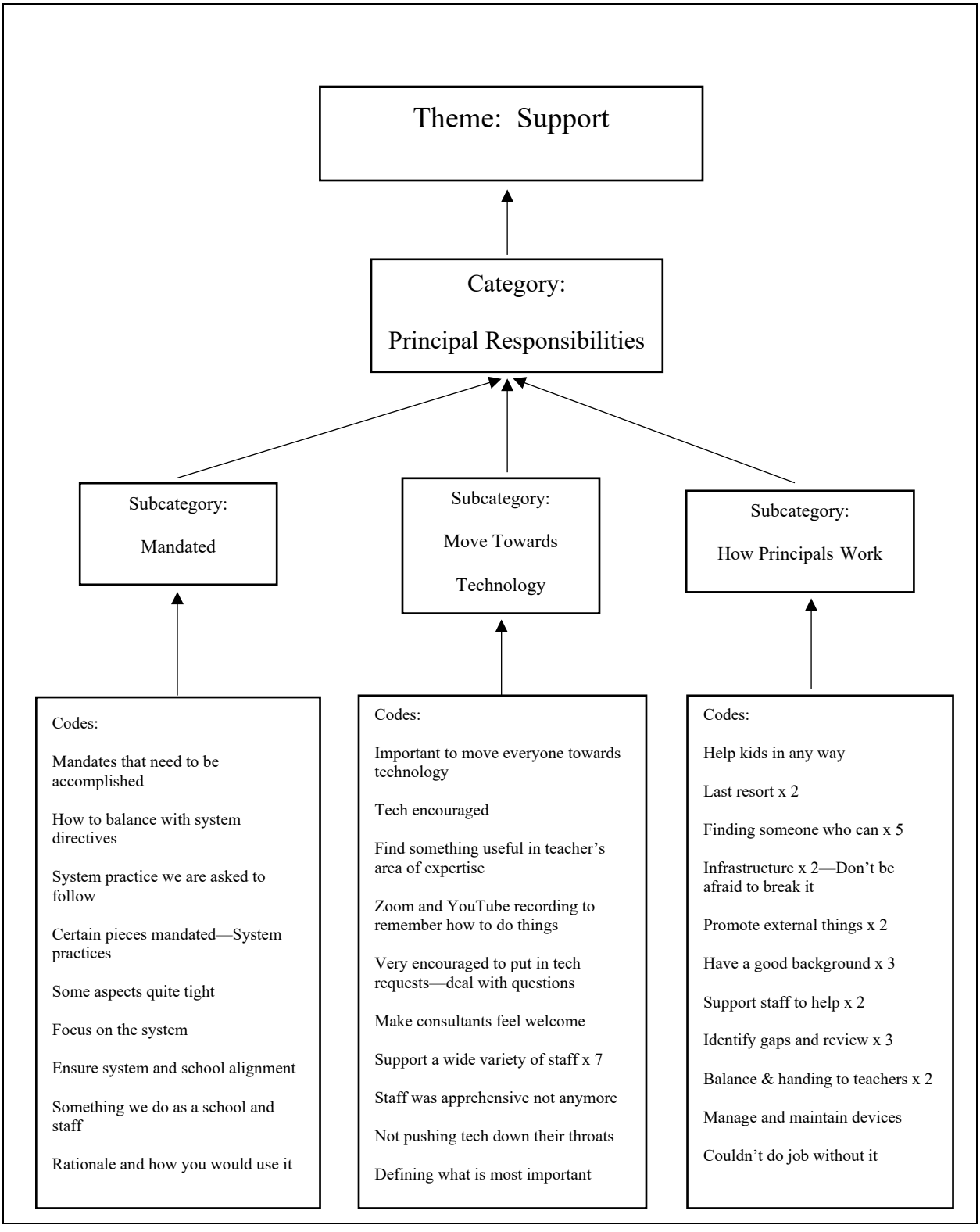
Appendix K: Support—Importance



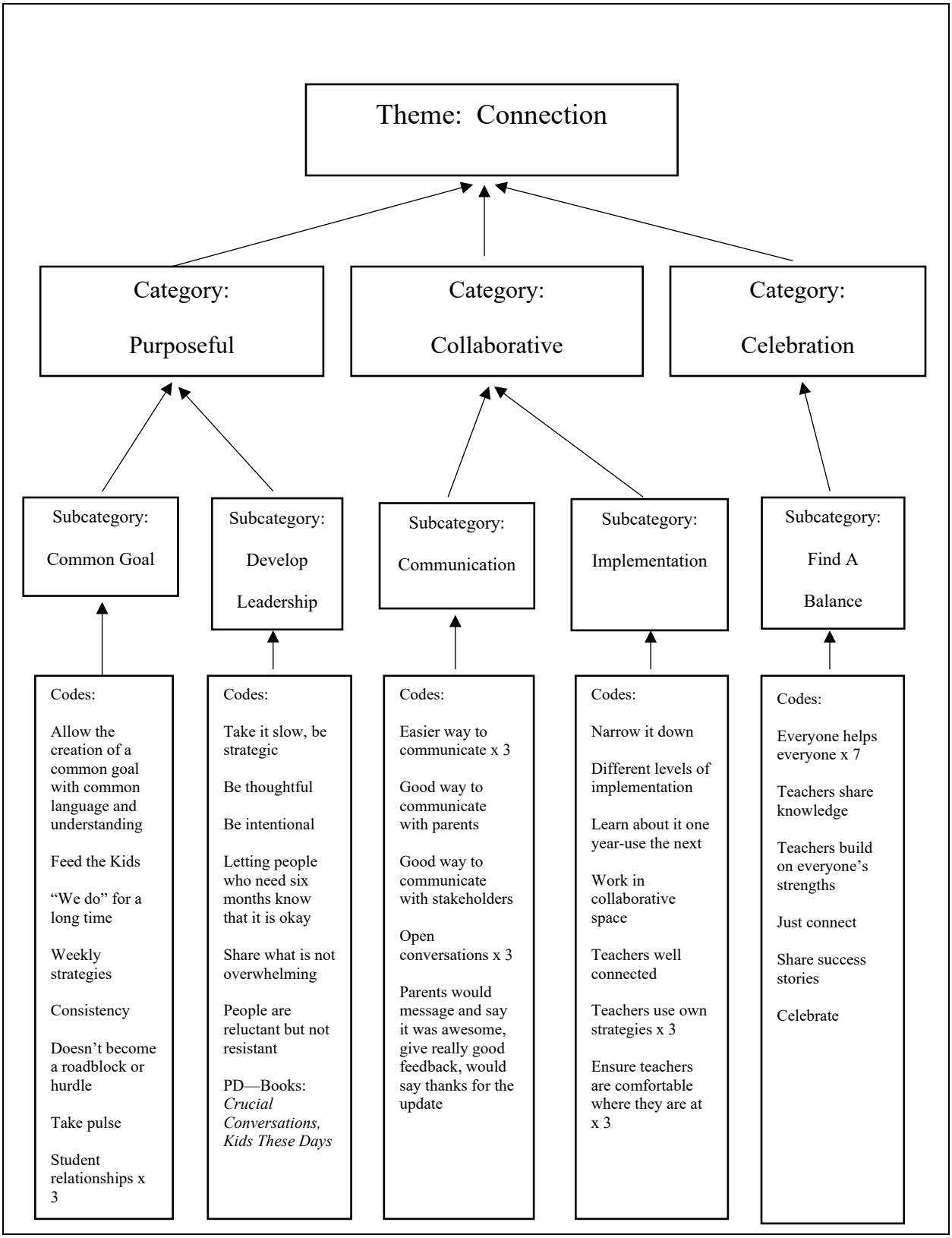
Appendix L: Support—Encouragement



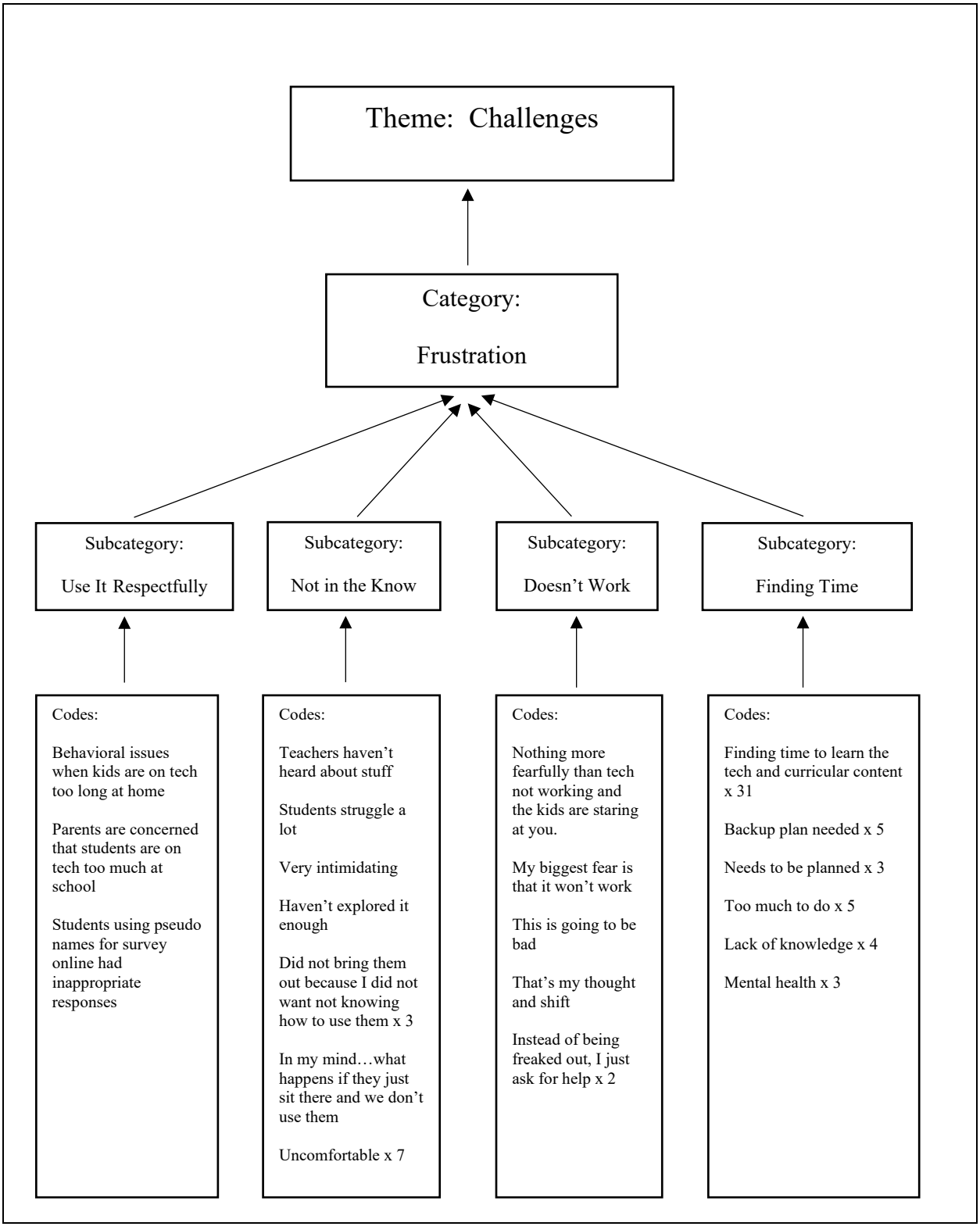
Appendix M: Support—Principal Responsibilities



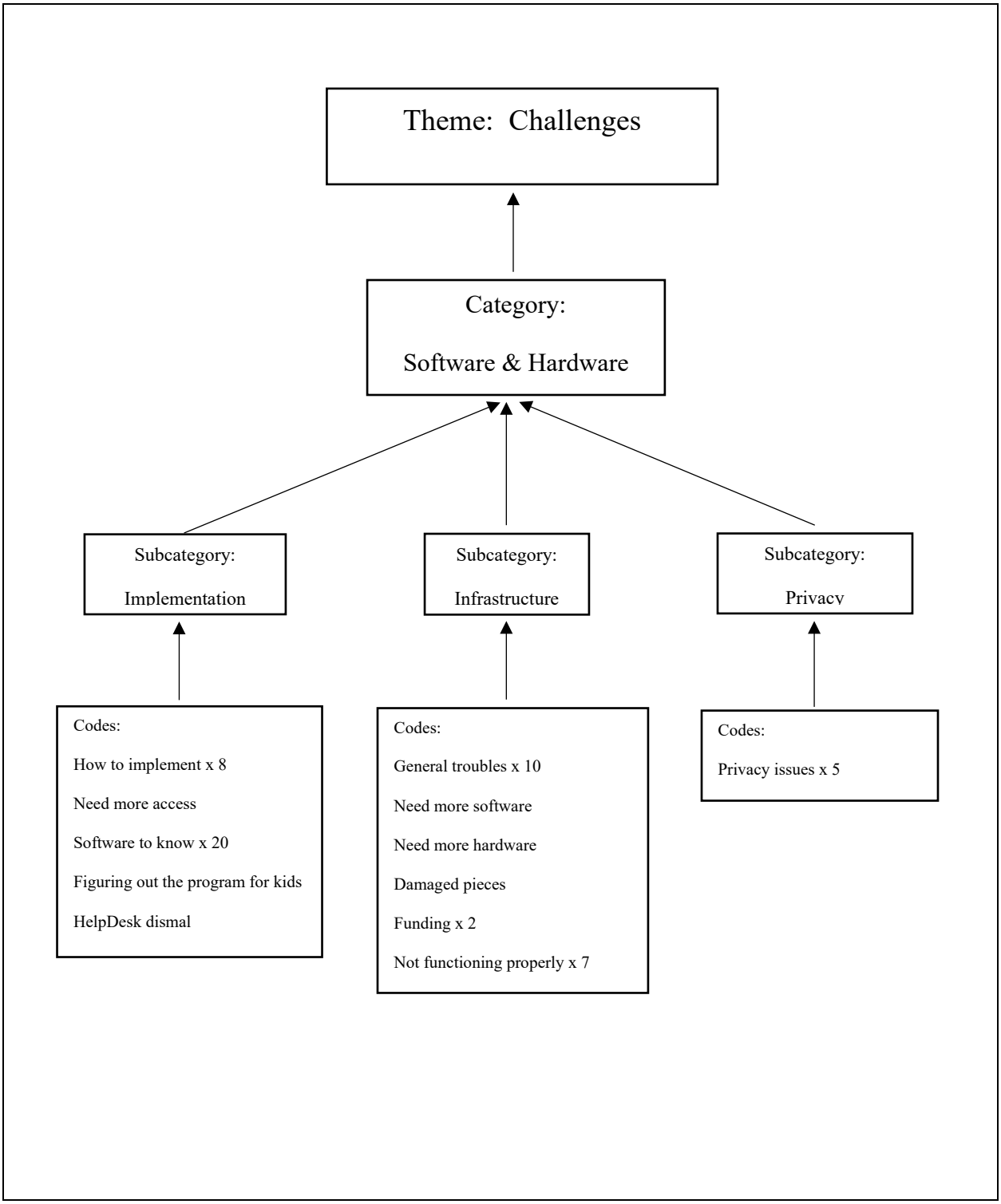
Appendix N: Connection



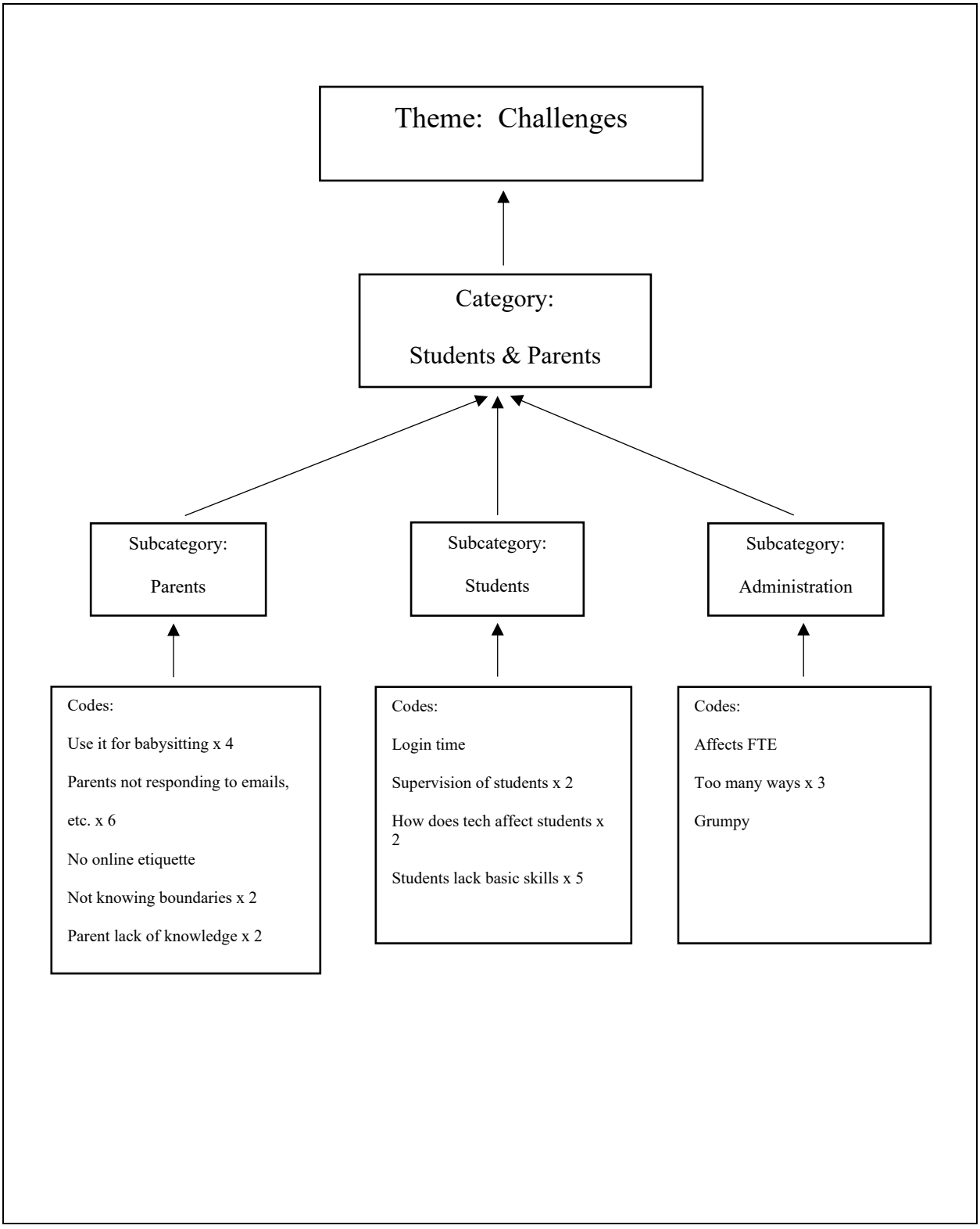
Appendix O: Challenges—Frustration



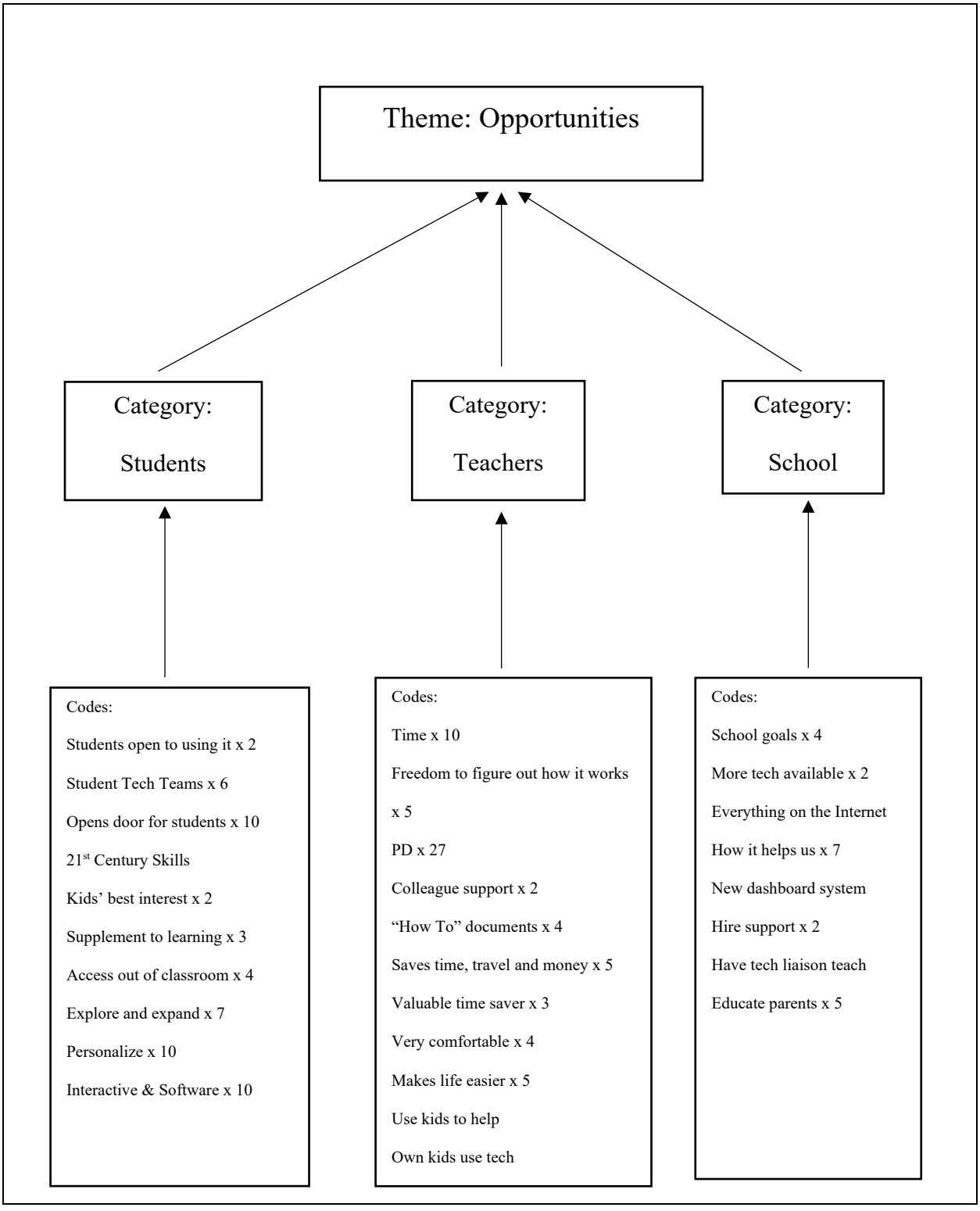
Appendix P: Challenges—Software & Hardware



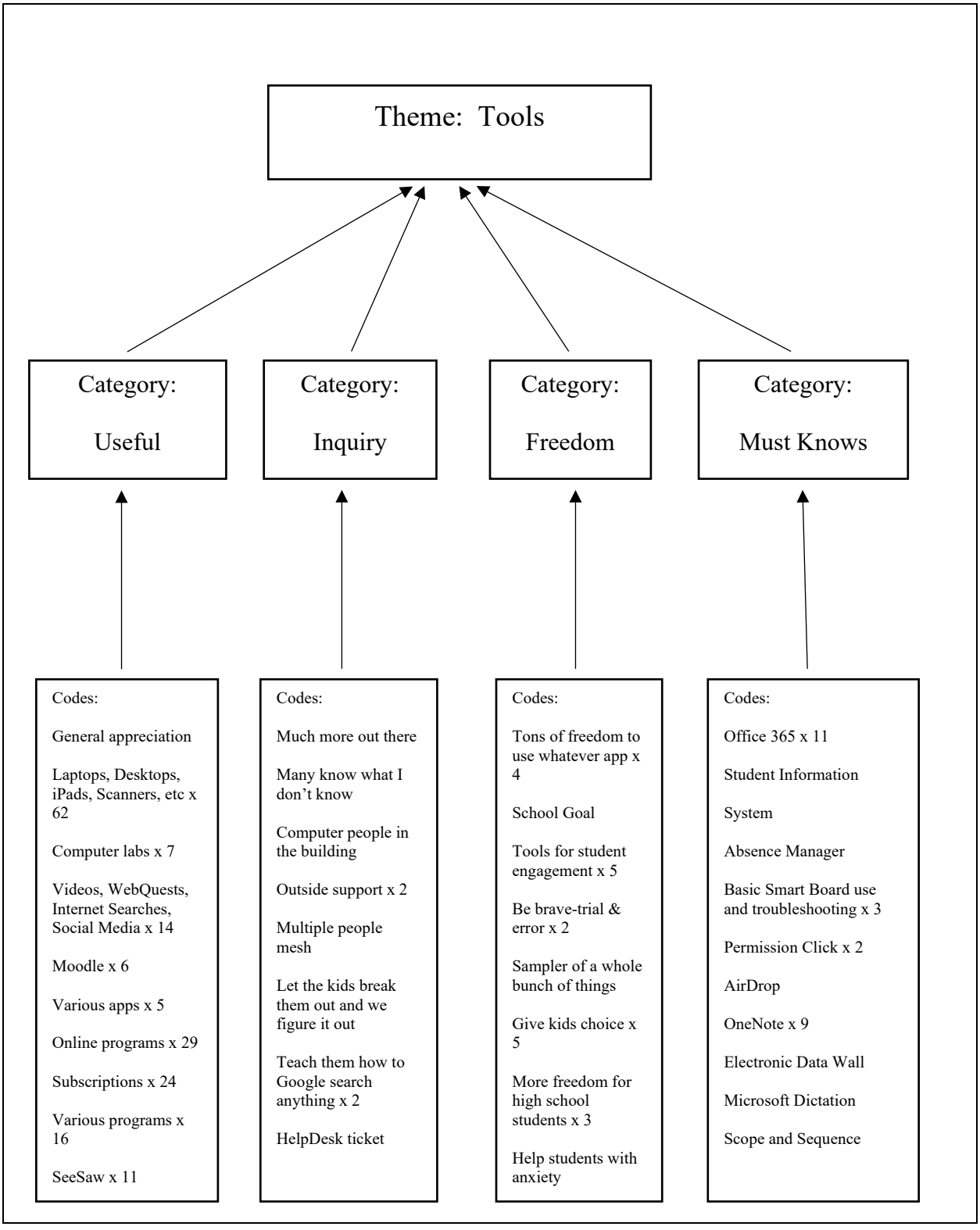
Appendix Q: Challenges—Students & Parents



Appendix R: Opportunities



Appendix S: Tools



Appendix T: Audit Trail

	Date
Permission from Directors	December 7, 2018 to January 10, 2019
Experts Review of Research Questions	November 15, 2018 December 7, 2018
Successful Proposal Defense	April 16, 2019
IRB Approval	May 21, 2019
Collection of Consent Forms from Principals	January-February 2020
Collection of Consent Forms from Teachers	January-February 2020
Document Analysis—Principals	January-February 2020
Document Analysis—Teachers	January-February 2020
Individual Interviews—Principals	January-February 2020
Individual Interviews—Teachers	January-February 2020
Focus Group—Principals	February 26, 2020
Focus Group—Teachers	March 4, 2020
Data Analysis	March 2020
Report Findings	March 27, 2020
Successful Dissertation Defense	June 16, 2020