2020

THE EFFECTS OF SCHOOL LEADERS' SUPPORT ON TEACHERS' INTEGRATION OF TECHNOLOGY IN CATHOLIC SCHOOLS

Donna Reeves Brown
University of Kentucky, precalmom@twc.com
Author ORCID Identifier:
https://orcid.org/0000-0002-8440-3231
Digital Object Identifier: https://doi.org/10.13023/etd.2020.398

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Donna Reeves Brown, Student

Dr. Justin Bathon, Major Professor

Dr. Margaret Bausch, Director of Graduate Studies

THE EFFECTS OF SCHOOL LEADERS' SUPPORT ON TEACHERS' INTEGRATION OF TECHNOLOGY IN CATHOLIC SCHOOLS

DISSERTATION

A dissertation submitted in partial fulfillment of the
requirements for the degree of Doctor of Philosophy in the
College of Education
at the University of Kentucky

By

Donna Reeves-Brown

Lexington, Kentucky

Co- Directors: Dr. Justin Bathon, Associate Professor of Educational Leadership Studies
and Dr. Jayson W. Richardson, Professor of Educational Leadership Studies
Lexington, Kentucky

https://orcid.org/0000-0002-8440-3231

ABSTRACT OF DISSERTATION

THE EFFECTS OF SCHOOL LEADERS' SUPPORT ON TEACHERS' INTEGRATION OF TECHNOLOGY IN CATHOLIC SCHOOLS

This mixed methods study examined the effect of school leaders' support of teachers' personal and professional technology use, support of teachers' technology integration, and support of teachers' current instructional practice on teachers' technology integration. In 2018, over six hundred teachers and sixty-five leaders from a Catholic diocese in the southeastern United States participated in the *LoTi Digital Survey for Teachers* and *the LoTi Digital Survey for Leaders*. In this two-phase study, data from these surveys were used in phase one to examine the degree to which each of the school leaders' measures of support affected teachers' technology integration. Using correlation and regression to analyze the data, the results were small but significant, indicating school leaders' support was important but there were unknown factors that accounted for most of the change in teachers' technology integration.

In phase two of the study, six school leaders were interviewed using questions based on the *Unified Model for Effective Leader Practices* (Hitt & Tucker, 2016) as applied to instructional technology (Dexter, Richardson & Nash, 2016). Each school leader explained their support of technology use and the effect of their support on their teachers' integration of technology. Answers from the school leaders from all six schools were similar across four of the five Dexter, et al. (2016) domains. However, the use of technology to connect to the local and global community was different, with only three schools actually implementing connected activities with the community at large. Evidence from both the quantitative and qualitative portions of the study indicates that the support of school leaders matters in the integration of technology in Catholic schools.

KEYWORDS: Catholic schools, schools, technology, school leadership, technology integration, Catholic school leadership

Donna Reeves- Brown

(Name of Student)

06/24/2020

Date

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By
Donna Reeves-Brown

Dr. Justin M. Bathon
Co-Director of Dissertation

Dr. Jayson W. Richardson
Co-Director of Dissertation

Dr. Margaret Bausch
Director of Graduate Studies

06/24/2020
Date

DEDICATION

To my support system – my husband and family

ACKNOWLEDGMENTS

This dissertation is the culmination of a long-time dream. I have chosen to do something difficult and somewhat unusual at this time in my life. Many people helped me along the way. My first and greatest supporter in this project has been my husband, Steve. From “the check” through the encouragement to read and study rather than clean and cook, you have always been my greatest cheerleader! My other family supporters: Michael, Deica, Gavin, Grayson, Patrick, Julie, Maxwell, Charlotte, Timothy, Sean, Emily, Mich, Lincoln, and Leon - my children and grandchildren, who have inspired me, encouraged me and even tutored me in the dissertation process. Your understanding and help have been invaluable in my efforts.

Thanks to my dissertation co-chairs, Dr. Jayson Richardson and Dr. Justin Bathon. You have always been supportive of my project and helpful in your guidance to proceed. Sometimes your support was the only difference between continuing and quitting. Thanks to the rest of my dissertation committee, Dr. John Nash and Dr. R. Joseph Waddington. Your generous gift of time and expertise in reviewing my work and making suggestions to make the work more meaningful was something I truly appreciated.

To those who have sacrificed my presence at Pink Duck dinners, Butler bridge, Fourth Tuesday book club, and Waggener dinners, thank you for your interest in my progress and your understanding at my absences. As promised at the outset of this journey, I’ll be back. To my work buddy Terry who was willing to read my work and check on my progress, your input was vital, thank you.

Finally, to my University of Kentucky family- Upgrade 4.0. Your encouragement and support have been invaluable since day one as we all experienced the ecstasy of success and the agonies of defeat – together.

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Chapter 1

Introduction

Some teachers in Catholic schools integrate digital technology seamlessly while others struggle to make the first in-roads into technology use for instruction, as evidenced in school accreditation reports. In those same reports, Catholic school leaders indicate it is important for teachers to integrate technology into the teaching and learning environment, yet there is an inequity of integration from classroom to classroom and school to school. Some school leaders do not make their high expectations for technology integration clear enough (Hooker, 2016). It appears the effect of school leaders' support on teachers' technology integration in Catholic schools is uneven. However, little research has been done in Catholic schools regarding school technology with few exceptions (see Cho, 2017; Gibbs, Dosen, & Guerrero, 2008; Swallow, 2017; Swallow & Olofson, 2017) and little research has been done on school technology leadership in any schools (McLeod & Richardson, 2011).

Nevertheless, classroom teaching is the only factor that influences student learning more than school leadership (Leithwood, Harris, & Hopkins, 2008). This underscores how important leader influence is in schools. The only person who is more important in student learning than the school leader is the teacher. And, the school leader affects teachers' practice. Hitt and Tucker (2016) created the *Unified Model for Effective Leader Practices* (*Unified Framework*) that connects leader behaviors with student achievement. Later, researchers successfully applied the *Unified Framework* to the specific area of school technology leadership (Dexter, Richardson, & Nash, 2016). The *Unified Framework* applied to technology suggests that school leaders should "create,

articulate and steward a shared vision" where technology is used in innovative ways to optimize teaching and learning (Dexter et al., 2016, p. 205). Effective technology leadership is important in schools.

When school leaders implement a shared vision for the planning, implementation, and evaluation of technology (Dexter et al., 2016; ISTE, 2018), they call on teachers to help them "shape, advance, and accelerate a shared vision" (ISTE, 2017, 2a). The acceptance by both the school leaders and the teachers, of the beliefs, values, and assumptions that make up the vision, constitute the way the vision is validated in the shared experiences of the group (Schein, 1991). The support of the leader, based on this vision, influences teachers' appropriate uses of technology for learning (Dexter et al., 2016).

Contrary to the effects of digital technologies in other fields, digital technologies have failed to transform the work of teachers and the learning of students in schools (Collins & Halverson, 2009; Stallard & Cocker, 2015), even though digital technology began appearing in classrooms as early as the 1980s (Aldunate & Nussbaum, 2013; Barbaro, Wilson, Gallucci, Cassell, Mann, Jakuborwski, & Beidelman, 2016; Blanding, 2014). In addition, costs from infrastructure to devices are ballooning (Skorup & Russell, 2017) as schools move from computer labs to 1:1 deployment, but effects on student achievement have not been realized (Cuban, 2013). In a recent report, the Organization for Economic Cooperation and Development (2015) asserted that school computers and classroom technology do not correlate with improvements in pupils' performance on the PISA examination. Yet the U. S. Department of Education's (2017) national technology plan asserts certain educational opportunities can only be realized through the use of

technology. These seemingly different viewpoints require school leaders to analyze the use of technology in their schools and support teachers in the integration of technology (Schrum, Galizio, & Ledesma, 2011) in order to improve student learning.

Good school leadership is important in the use of technology within a school (Gibbs et al., 2008). One early study found principals as essential motivators of teachers in integrating technology in the classroom (Stegall, 1998). However, research on technology leadership remains limited (McLeod & Richardson, 2011; Richardson & McLeod, 2011), and research on technology leadership in Catholic schools is very limited (Cho, 2017). The purpose of this study is to examine the effect of school leaders' support on teachers' technology integration in Catholic schools.

Problem Statement

Some teachers excel in the use of technology for learning while others do not, even though teachers may have equivalent training in the use of the same technologies (Barbaro et al., 2016). It has been hypothesized that teachers do not act individually to integrate technology into their classrooms; rather, teachers collectively construct norms and practices where the use of technology is acceptable (Windchitl & Sahl, 2002). In addition, principals and other school leaders affect what technology is available through space allocation, budgeting, providing training, and providing other support (Collins & Halverson, 2018). Technology leadership exercised by the building principal defines the predominant level of technology implementation modeled school-wide (Moersch, 2002).

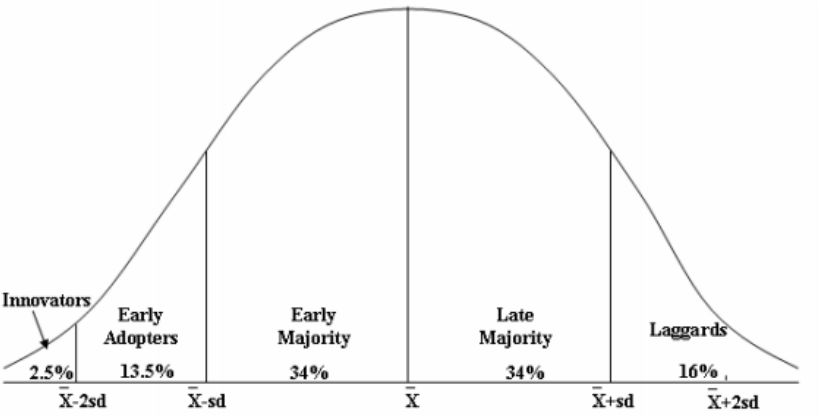
Other researchers claimed that teachers follow predictable paths in their adoption of technology with a small number of early adopters forging through tough times to adopt, while later adopters find ways to abandon adoption at regular intervals (Aldunate

& Nussbaum, 2013). Furthermore, early adopters subsequently put in the time and effort to master more complex technologies while later adopters do not (Aldunate & Nussbaum, 2013). The more time teachers spend in integrating technology into their work, the more success they have in the integration (Moser, 2007).

There is a predictable pattern in innovation adoptions (Rogers, 2003), of which teacher adoption of technology can be considered one. The diffusion of innovations (Rogers, 2003), is applicable in the implementation of any innovation, and very similar to the conditions just described for technology integration by teachers. This predictable cycle starts with innovators who make up a very small percentage of the social network in which the innovation is occurring. The innovation spreads to the early adopters, then the early majority, the late majority and the laggards. The laggards are those who will work at the innovation without committing time and resources. When the innovation fails for them, as it invariably does, they have an excuse to abandon the project (Rogers, 2003). This theory suggests the spread of any innovation is predictable, with innovators and early adopters making the decision to fully adopt the innovation, while some will completely reject adoption (Rogers, 2003).

When Rogers' theory is placed on a normal curve (Figure 1.1), Innovators account for only 2.5% of the population and Early Adopters account for 13.5%, both groups lying outside one standard deviation of the mean. At the other end of the curve, 16% are the Laggards who may never adopt the innovation (Rogers, 2003). This theory applied to technology integration suggests that teachers, without an intervention to improve will follow the predictable pattern in Figure 1.1.

Figure 1.1 *Adopter categorization on the basis of innovativeness.*



Note: Graphic from "Diffusion of Innovations (5th ed)", by E. M. Rogers. Copyright 2003 by Free Press.

One researcher in the area of technology integration divided the barriers to technology integration into external or first-order barriers, and internal or second-order barriers (Ertmer, 1999). Ertmer (1999) defined first-order barriers as the resources necessary to use technology: (a) equipment, (b) time, (c) training, and (d) support. While this research is over two decades old, recent research has produced similar results with teachers articulating that technology integration is too time consuming and claiming limited access to tools (Regan, Evmenova, Sacco, Schwartzer, Chirinos, & Hughes, 2019). In addition to Ertmer's (1999) barriers, some teachers perceived access to technology as a competition in which they were not willing to participate (Regan et al., 2019).

School leadership is not only what the leader does, but what is noticed and interpreted as important by others (Peterson & Deal, 1998; Stolp, 1994). The ways in which leaders apply specific leadership practices in context demonstrate their success in building vision and setting direction as well as redesigning the organization (Leithwood, Harris & Hopkins, 2008). Teaching and learning are most powerfully affected through

school leaders' "influence on staff motivation, commitment and working conditions" (Leithwood, Harris, & Hopkins, 2008, p. 32). The school culture created and nurtured by the school leader affects the expectations of teachers and other school stakeholders (Fullan, 2011; Stolp, 1994). One of these expectations is technology integration (Department of Education, 2017; ISTE, 2017; ISTE, 2018; National Policy Board for Educational Administration, 2015).

The integration of technology and the effect school leaders have on it, has been extensively studied in a variety of settings including public schools, international schools, and vocational schools (Hadjioannou, 2011; Hew & Brush, 2007; Moersch, 2016; Summak & Samancioglu, 2011). However, very little research has been conducted on the relationship of school leaders' support and teachers' technology integration in Catholic schools in the United States (Cho, 2017). While Swallow (2017) and Swallow and Cho (2017) address integration of technology in Catholic schools, they do not discuss the effects of school leaders' support on technology integration. The current research study will begin to fill the gap in the literature.

Conceptual Framework

The *Unified Model of Effective Leader Practices* (*Unified Framework*) (Hitt & Tucker, 2016) will serve as the conceptual framework for this study. This framework, developed as a model of school leader practices that contribute to student achievement (Hitt & Tucker, 2016) consolidates the *Ontario Leadership Framework* (*OLF*) (Leithwood, 2012), the *Learning-Centered Leadership Framework* (*LCL*) (Murphy, Elliot, Goldring, & Porter, 2006), and the *Essential Supports Framework* (*ES*) (Sebring, Allensworth, Bryk, Easton, & Luppescu, 2006). The *OLF*, *LCL* and *ES* were specifically

chosen by the *Unified Framework* developers for their rich research-based domains and dimensions (Hitt & Tucker, 2016).

The component frameworks used in creating the *Unified Framework* describe effective leader behaviors connected to student achievement (Leithwood, 2012; Murphy et al., 2006; Sebring et al., 2006). While the *OLF* (Leithwood, 2012) and *LCL* (Murphy et al., 2006) are have broader based participation, the *ES* centered on surveys in Chicago public schools and is considered to be more applicable to urban areas (Hitt & Tucker, 2016; Sebring et al., 2006). Each of the component frameworks of the *Unified Framework* consists of domains, identifying in detail the overall practices of school leaders. In addition to the domains, an explanation of the behaviors of leaders is given in more detail through the dimensions of practice (Hitt & Tucker, 2016; Leithwood, 2012; Murphy, et al., 2006; Sebring et al., 2006).

In comparing the three component frameworks which comprised the *Unified Framework*, Hitt and Tucker (2016) noted parallels in their domains and dimensions. Their assumption was that if each of the three frameworks captured effective practices, yet were different, then there should be a framework independent of those three that captured all effective practices (Hitt & Tucker, 2016). Ultimately school leader practices were distilled to a set of five domains and twenty-eight dimensions. The five domains that emerged were: (a) establishing and conveying the vision; (b) building professional capacity; (c) creating a supportive organization for learning; (d) facilitating a high-quality learning experience for students; and (e) connecting with external partners (Hitt & Tucker, 2016). Together these five domains created a new *Unified Framework* that

respected and included the work of the other three frameworks but consolidated and renamed practices when necessary, without changing meaning.

The *Unified Framework* (Hitt & Tucker, 2016) organizes the work of school leaders in all areas of school life. Dexter et al. (2016), categorized school technology leadership literature within the domains and dimensions of the *Unified Framework*. Later Dexter and Richardson (2020) continued to categorize school technology leadership literature within the *Unified Framework*. The researcher for this study will apply the *Unified Framework* using alternate phrasing developed by Dexter et al. These five domains using phrasing appropriate for technology are: (a) establishing and conveying the vision, (b) facilitating technology use as part of a high-quality learning experience, (c) building professional capacity for technology integration, (d) creating a supportive organization for technology integration, and (e) connecting with external partners (Dexter et al., 2016).

Purpose of the Study

This study is designed to show the effect of school leaders' support on the technology integration of teachers in Catholic schools. As mentioned earlier, the effects of school leaders on teachers' integration of technology has been studied in a variety of settings, but very little study has been done in Catholic schools. The following research questions will be used to frame the current study.

Research Questions

1. To what degree does school leaders' overall support affect teachers' digital technology integration in Catholic schools?

a. To what degree is leader support of teachers' personal and professional use of technology predictive of teacher technology integration?
b. To what degree is leader support of teachers' technology integration predictive of teacher technology integration?
c. To what degree is leader support of teachers' current instructional practice predictive of teacher technology integration?
d. To what degree is leader support of teachers' personal and professional use of technology, support of teachers' technology integration, and support of current instructional practice together predictive of teachers' technology integration?

2. How do school leaders support teachers' integration of digital technology in Catholic schools?

Research question one addresses whether school leaders have a statistical effect on teachers' technology integration in Catholic schools. Research question two addresses how school leaders who exhibit high levels of support for technology integration support their teachers' integration of instructional technology. The next section defines key terms used in this research.

Definitions of Terms

Technology

For this research study, the term *technology* specifically refers to digital hardware, software, and the use of the Internet that teachers and students use in the classroom (Levin & Schrum, 2013) that are connected directly to curriculum and instruction (Harris, 2008).

Technology Integration

Technology integration can be defined as the extent to which technology is used to facilitate teaching and learning (Ertmer, 1999). This integration of technology requires a dynamic interaction of systems in order to be successful (Levin & Schrum, 2013).

School Leader

A *school leader* is one who (a) establishes and conveys the vision; (b) builds professional capacity among the staff; (c) creates a supportive organization for learning; (d) facilitates a high-quality learning experience for students; and (e) connects with external partners (Hitt & Tucker, 2016).

Catholic Schools

Catholic schools are those parish, regional, diocesan or private schools sponsored by a Catholic organization and recognized as a Catholic school by the (arch)bishop of the (arch)diocese in which the school is located (Sheehan, 1990).

Summary

Digital technology integration has been studied from the perspective of teacher barriers (Ertmer, 1999; Regan et al., 2019), contextualizing the diffusion of innovations theory (Regan et al., 2019; Rogers, 2003), and return on investment (Aldunate & Nussbaum, 2013; Barbaro et al., 2016; Blanding, 2014; Collins & Halverson, 2009; Stallard & Cocker, 2015). However, few studies focused on school technology leadership in any schools (McLeod & Richardson, 2011), and even fewer in Catholic schools (Cho, 2017).

This chapter provided an overview of the purpose of this research study. The link between school leaders' support and teachers' technology integration has been

understudied, particularly in Catholic schools. This provides an opportunity for this research study to fill part of the current gap that exists in the literature.

This study's findings will contribute to the literature since there has been little research regarding technology integration in Catholic schools in the United States. The quantitative results as well as the interviews with school leaders may lead to patterns of practice that could be instrumental in modifying practices in other schools. A review of pertinent literature that supports this study is provided in the next chapter.

Chapter 2

Literature Review

The purpose of this study is to determine the effect of school leaders' support on teachers' integration of technology in Catholic schools. "School leadership has a significant effect on features of the school organization which positively influences the quality of teaching and learning" (Leithwood, Harris, & Hopkins, 2019, p. 2). In this chapter, Catholic schools and Catholic school leadership will be discussed and a comparison of current leadership guidelines being used in Catholic schools will be compared to the *Unified Framework*. The *Unified Framework* (Hitt & Tucker, 2016) will be discussed and the connection between general school leadership and school technology leadership will be made both in public and in Catholic schools. Finally, studies of school technology leadership in general and studies of Catholic school technology leadership, in particular, will connect the available literature with the research questions.

While school technology leadership and technology integration has been studied extensively in public schools in the United States as well as schools outside the United States, very little research has been done in Catholic schools in the United States. Findings from this literature review demonstrate that there is a gap in the literature regarding Catholic school technology leadership. The current study will add to the existing body of work by discussing the effects of school leaders' support on teachers' integration of technology in Catholic schools.

Catholic Schools and Catholic School Leadership

Catholic schools and public schools differ in some ways. The first difference is in structure (Miller, 2006). Most Catholic schools are associated with a parish church or sponsoring religious organization under the direct auspices of the bishop of the diocese (Can. 806 §1). Those schools associated with a parish church are governed by the pastor of the local parish to whom the principal reports. The parish contributes to the school to keep costs down for those families paying tuition. Those associated with a school sponsored by a religious order are responsible to the order. Financing for all materials is made from the collection of tuition, grants, and endowments to the school (Smarick & Robson, 2015). The religious orders do not typically contribute to the financial well-being of the school. School size may range from as few as twenty students to several thousand depending on the grade ranges and the mission of the school (NCEA, 2018).

The first Catholic school in the United States was founded by Franciscan friars in the early seventeenth century in St. Augustine, Florida, well before the founding of the nation (Smarick & Robson, 2015). Catholic schools did not become widespread until the early nineteenth century when large numbers Catholic immigrants arrived from Europe and Catholic schools began to appear associated with parish churches (Walch, 2016). The typical immigrants of this time were poor and uneducated in sharp contrast to the early settlers in Maryland a century before (Walch, 2016). By the mid-nineteenth century, American Catholic bishops committed to an expansion of parochial schools primarily staffed by vowed religious women. By 1891, more than one out of eight Americans were Catholics living in poverty. By 1900, nearly 3500 Catholic schools existed in the United

States (Smarick & Robson, 2015). These schools typically took on the character of their communities, emphasizing ethnic culture and native-language instruction (Walch, 2016).

Catholic schools were not the only schools that had a growing presence in the early 1900s. The number of common schools was growing as well. Though government-run, common schools were not secular and their Protestant teachings were sometimes disparaging of Catholics. Materials such as the King James version of the Bible, not sanctioned by the Catholic Church, was used for required devotional readings at the common school (Smarick & Robson, 2015). However, by 1875, as Catholic students left common schools and migrated to Catholic schools, Blaine Amendments to prohibit any sectarian school from receiving public funding had been passed in 14 states and by 1890, Blaine Amendments had been added to 29 state constitutions. In 1884 the United States Catholic bishops required every Catholic parish to establish a school and required parents to send their children to the parish school.

Fast forward to present day, in the 2017-2018 school year PreK-12 Catholic school enrollment nationwide in the United States was 1.8 million students in 6,352 schools (NCEA, 2018). In the southeastern United States, 309,168 students were enrolled in 927 schools which represented 14.6% of all Catholic school enrollment in the United States (NCEA, 2018). Of the five states that make up the southeastern region of the National Catholic Education Association, Alabama, Kentucky, and Mississippi, all have some form of Blaine Amendment to their state constitution prohibiting the flow of state funding to religious schools (Institute for Justice, 2017). This exclusion includes initiatives such as technology infrastructure for schools (Institute for Justice, 2017). The diocese chosen for this study is in a state with a Blaine Amendment to its state

constitution. Catholic school leadership, in particular the impact on technology leadership, will be discussed further after the *Unified Framework* has been introduced and various other frameworks that make up the *Unified Framework* have been discussed.

Effective School Leadership

In an overview of school leadership examining effective practices, there are three key studies that together virtually exhaust the research from the late 1990s through 2012 (Hitt & Tucker, 2016). Those studies are the *Essential Supports Framework* (Sebring, Allensworth, Bryk, Easton, & Luppescu, 2006), the *Learning-Centered Leadership Framework* (Murphy, Elliot, Goldring, & Porter, 2006), and the *Ontario Leadership Framework* (Leithwood, 2012). After reflecting on the research, in each case the authors developed a framework that serves as a model of exemplary practice for school leaders. However, the three frameworks are based on different research and the authors have developed slightly different overarching leadership domains and dimensions defining school leadership that results in successful student outcomes.

The *Essential Supports Framework* (ES) was developed by researchers from the Consortium on Chicago School Research, along with Chicago educators from the Chicago Public Schools, and others, in the mid-1990s (Sebring et al., 2006). To develop the *ES*, researchers surveyed principals, teachers and students from the Chicago Public Schools from the early and mid-1990s. The *ES* is comprised of five domains or chief beliefs. The domains are: (a) *leadership*, (b) *parent-community ties*, (c) *professional capacity*, (d) *professional community*, and (e) *ambitious instruction* (Sebring et al., 2006). Each of these domains is further subdivided into dimensions. While the domains and dimensions of this framework are aligned with other thought leaders and researchers'

findings, the tenets are primarily applicable to schools in urban settings (Sebring & Montgomery, 2014). The *Essential Supports Framework* can be used with other research to result in a more complete framework that supports effective leadership regardless of school location (Hitt & Tucker, 2016).

Another framework that was developed about the same time as *ES* was the *Learning-Centered Framework* (*LCL*). The *LCL* examines a broader base of research regarding school leadership (Murphy et al., 2006). In developing this framework, leadership was defined as an influence relationship focused on the achievement of mutually agreed upon goals for the organization (Murphy et al., 2006). Leadership was considered a process rather than a personal characteristic or trait. The influence leaders have involves interactions and relationships that focus on a common purpose (Murphy et al., 2006).

The original purpose of the analysis was to describe the research base that undergirds the concept of learning-centered leadership. The framework was developed to inform a new evaluation system for school leaders and school leadership teams, the Vanderbilt Assessment of Leadership in Education (VAL-Ed) (Murphy et al., 2006). The core findings of this study were: "(a) leadership matters; (b) in difficult times leadership matters more; (c) in times of significant organizational transition, leadership is the major controllable factor in explaining organizational performance; (d) instructionally focused and change-oriented leadership are especially effective frames for education, what Knapp, Copland, and Talbert (2003) referred to as 'leadership for learning'; and (e) team leadership offers promise for improved organizational performance" (Murphy et al., 2006, p. 1). These five core findings serve as the underpinnings for the *LCL*. The

framework itself is made up of eight domains and thirty-one dimensions. The *LCL*'s eight domains are: (a) *vision for learning*, (b) *instructional program*, (c) *curricular program*, (d) *assessment program*, (e) *communities of learning*, (f) *resource acquisition and use*, (g) *organizational culture*, and (h) *social advocacy* (Murphy et al., 2006). The *LCL* describes leadership as a collaborative endeavor encompassing the school leader and teachers to provide an environment where students are the focus of decision-making (Hitt & Tucker, 2016). The oldest of the three frameworks, the 157 research studies from the early 1970s to 2006, give the *LCL* a solid foundation (Hitt & Tucker, 2016). Still, other leadership frameworks emerged.

Another leadership framework is the *Ontario Leadership Framework* (*OLF*) (Leithwood, 2012). The *OLF* is made up of the five domains and twenty-one dimensions. This framework, an update of earlier work, outlines best practices for the school and the school systems as well as leadership domains and dimensions of leader practices that contribute to effective schools (Leithwood, 2012). Leadership is defined in the *OLF* as "the exercise of influence on organizational members and other stakeholders" (Leithwood, 2012, p. 5). The leader is viewed as a support to the school community and a facilitator of the development and realization of vision and goals.

The *OLF* was developed based on research from 47 empirical works, over half published after 2007 (Hitt & Tucker, 2016). The framework is comprised of five domains: (a) setting directions, (b) building relationships and developing people, (c) developing the organization to support desired practices, (d) improving the instructional program, and (e) securing accountability (Leithwood, 2012). A total of 21 dimensions

further explain the domains and give school leaders research-based guidelines for effective school leadership (Leithwood, 2012).

While each of the three frameworks, *ES* (Sebring et al., 2006), *LCL* (Murphy, 2006), and the *OLF* (Leithwood, 2012) were all research-based, the domains and dimensions of each varied. The research base used was also slightly different in each case with *ES* relying on survey data of Chicago Public Schools (Sebring et al.,2006), the *LCL* relying on research done in public schools prior to 2006 (Murphy, 2006), and the *OLF* based on research that primarily occurred after 2007 (Leithwood, 2012).

Hitt and Tucker (2016) took on the task of "unifying the findings in the field through analysis and synthesis" (p. 542). When the frameworks were combined, 28 dimensions in 5 domains emerge. While phrasing has sometimes been altered, the meaning of the domains and dimensions maintain their original integrity. Following is an examination of each of the five domains in the *Unified Framework* that Hitt and Tucker (2016) developed.

Unified Framework

Domain I: Establishing and conveying the vision. The first domain of the *Unified Framework* is *establishing and conveying vision* (Hitt & Tucker, 2016). *OLF* called this *setting directions* (Leithwood, 2012), while *LCL* referred to it as *vision for learning* (Murphy et al., 2006), and *ES* labeled it *leadership* (Sebring et al., 2006). Within this domain, several dimensions pertain to the establishment and conveying of the vision. The *Unified Framework* calls the first dimension *creating, articulating, and stewarding shared mission and vision* (Hitt & Tucker, 2016). This dimension combines the *OLF* dimension of *building a shared vision* (Leithwood, 2012), and the *LCL* dimension of

developing vision; stewarding vision; and articulating vision (Murphy et al., 2006). Hitt and Tucker's (2016) dimension captures both the *OLF* and the *LCL* dimensions, making the first vision dimension stronger than the *OLF* statement was at the outset.

Effective leadership begins with *building a shared vision* within the school community (Day & Sammons, 2013; Ishimaru & Galloway, 2014; Leithwood, Harris, & Hopkins, 2008; Leithwood, Harris, & Hopkins, 2019). Every stakeholder in the school community, staff, students and other stakeholders, must be strongly committed to the overall sense and purpose of the work (Leithwood, 2012). The vision is key to the work that will be shared in the school (Murphy et al., 2006). This vision influences all the strategies used within the school (Krüger, Witziers, & Sleegers, 2007). The school leader must be able to *articulate the vision* and garner support from the staff to *implement the vision* (Ishimaru & Galloway, 2014).

The second mission and vision dimension in the *Unified Framework* is, *implementing the vision by setting goals and performance expectations* (Hitt & Tucker, 2016). Leithwood (2012) states the *OLF* dimension as, *identifying specific, shared short-term goals*, while Murphy et al. (2006) state the *LCL* dimension as, *implementing vision; expectations, standards*. It should be noted that in this dimension was assigned to a different domain in the *LCL* framework. By moving the *LCL* dimension to this domain, where it clearly fits, Hitt and Tucker (2016) were able again to combine the intent of the dimensions in each of the two frameworks and strengthen the overall resulting dimension.

The collective work of the entire school community allows for buy-in from all stakeholder groups and makes the work of *identifying specific, shared short-term goals*

by the stakeholder groups consistent with the vision (Crum & Sherman, 2008; Leithwood, 2012). These leaders "do whatever is necessary to make the goals clear to all stakeholders" (Leithwood, 2012, p. 15). Not only are staff responsible for overall goals but they are responsible for aligning their personal professional goals with that of the school (Leithwood, 2012). School leaders constantly build consensus among all stakeholder groups regarding the school goals and priorities and communicate the vision and goals to all stakeholders (Ishimaru & Galloway, 2014; Leithwood, 2012). This shared vision strengthens the school culture and requires all stakeholders to *implement the vision* (Murphy et al., 2006). However, the school leader must *steward the vision* through careful monitoring of the values and beliefs upon which the vision is based to make sure that it meets the needs of the school and serves the intended outcomes (Gurley, Peters, Collins, & Fifolt, 2015; Murphy et al., 2006).

The third dimension of Domain I of the *Unified Framework* is, *modeling aspirational and ethical practices* (Hitt & Tucker, 2016). This is expressed as *modeling the school's values and practices* (Leithwood, 2012) by *OLF* and *ethics (specifically discussed within multiple dimensions)* (Murphy et al., 2006) by *LCL*. *Ethics* was included in multiple dimensions by *LCL* but fit here in an overarching domain of vision where it would affect the other domains.

The leader must be willing to articulate the values and practices that the school community holds important in order to create a culture in which the school community recognizes everyone from the leader to the most tangentially related stakeholder values the same things and holds certain practices as sacrosanct (Leithwood, 2012). This dimension requires the leader to articulate the most valued practices and to hold high

expectations for the school community at large regarding these practices (Ishimaru & Galloway, 2014). Social advocacy makes it incumbent on the leader to control the environment for students and their families, as well as for teachers to provide a learning environment that mirrors the local stakeholders and their values (Louis & Wahlstrom, 2011). This should be done ethically with student-learning at the forefront of every decision. As this permeates the environment, stakeholders become involved in the process and "students flourish" (Murphy et al., 2006, p. 27).

Communicating broadly the state of the vision (Hitt & Tucker, 2016) is the fourth dimension in this first domain that addresses *establishing and conveying the mission and vision*. Both *OLF* and *ES* address this particular dimension. *OLF* states the dimension as, *communicating the vision and goals*, (Leithwood, 2012), while *ES* states the dimension as *inclusive leadership focused on instruction*, (Sebring et al., 2006). The *Unified Framework* stresses the communication aspect of vision rather than focusing exclusively on instruction as the *ES* framework has done (Sebring et al., 2006). This honors the broader task of leading schools, including instruction but recognizing that there are other aspects of vision and mission that leaders need to focus on. *Communicating the vision and goals* is an imperative for the school leader (Leithwood, 2012). The school leader should take every opportunity, both formal and informal to explain to stakeholders how the vision and goals are borne out in practice at the school. The *ES* dimension of *inclusive leadership focused on instruction*, (Sebring et al., 2006) encourages principals to reach out to all stakeholders inviting them to participate in the work of the school by assuming leadership roles. This distributed leadership gives stakeholders greater buy-in and forwards the vision of improved quality of student learning.

The fifth dimension of Domain I of the *Unified Framework* is, *promoting use of data for continual improvement* (Hitt & Tucker, 2016). The only other framework that mentions data is *LCL* when it states, *communication and use of data* (Murphy et al., 2006). *LCL* places this dimension in a different domain. However, Hitt and Tucker (2016) make the case that investigation of data is a component of a school's mission and vision and belongs within this domain.

The assessment programs of successful leaders are characterized with distinguishing elements. As an outgrowth of their participation in curriculum decisions, leaders support *assessment procedures* that foster student success. Once the alignment of curriculum, instruction, and assessment has been determined, it is the responsibility of the school leader to communicate the data to the teachers and other stakeholders and use the data to make informed decisions (Marsh & Farrell, 2014; Murphy et. al., 2006). One researcher suggests that there be an alignment index that compares curriculum standards, instruction, and assessment so that leaders can make good decisions regarding each of these areas (Fullmer, 2011).

The sixth and final dimension of Domain I of the *Unified Framework* is *tending to accountability*, (Hitt & Tucker, 2016). All three of the other frameworks included accountability. *OLF* stated, *meeting the demands for external accountability*; *establishing productive relationships with teacher federation representatives* (Leithwood, 2012). *LCL* used, *environmental context*, (Murphy et al., 2006). Finally, *ES* used *strategic orientation*, (Sebring et al., 2006).

School leaders help meet the demands for external accountability by aligning school targets with external targets (Leithwood, 2012). In this way, measuring local

accountability is also measuring accountability from external sources. Leaders should "provide an accurate and transparent account of the school's performance to all school stakeholders" (Leithwood, 2012, p. 31). Leaders should ensure all school policies and procedures meet legal requirements (Leithwood, 2012). School leaders increase the likelihood of shared commitment to advancing learning and the overall well-being of students, solving inevitable problems that arise, and hold all members of the school community with respect, when they keep teacher federation representatives well-informed, include them in the processes of establishing goals, and solicit help in determining how to implement change without violation of labor contracts (Leithwood, 2012). Overall this building of relationships and developing people is crucial to the favorable interactions of school community members with the leader and with each other (Goodall, 2018; Leithwood, 2012). It also serves to set the influence of the leader as they begin to develop the staff. As was stated earlier, when the leader controls the environment for students and their families, as well as for teachers, the learning environment mirrors the local stakeholders and their values (Louis & Wahlstrom, 2011).

Finally, the *ES* recommends *strategic orientation* to communicate what is working and what is not in order to improve student learning. As such, school leaders should make sure that accountability is an integral part of the mission and vision of the school and that regular communication with stakeholders is built into the program (Sebring et al., 2006).

Domain II: Facilitating a high-quality learning experience for students. This second domain of the *Unified Framework* has five supporting dimensions (Hitt & Tucker, 2016). The first dimension in this domain is *maintaining safety and orderliness* (Hitt &

Tucker, 2016). All three earlier frameworks support the *Unified Framework* dimension. The *OLF* framework uses the phrasing *maintaining a safe and healthy school environment* (Leithwood, 2012) while the *LCL* framework simply mentions the *learning environment* (Murphy et al., 2006) and the ES framework has *safety and order* (Sebring et al., 2006). In each case, the focus is on the environment in which learning will take place.

Safety is an important issue. Without a feeling of safety, students cannot focus on learning (National School Climate Council, 2007). Safety is a good indicator of the school climate (Kutsyuruba, Klinger, and Hussain, 2015). In 2007, the National School Climate Council identified five elements of school climate. The first two were safety and teaching and learning, similar to the dimensions of *ES*. *Maintaining a safe and healthy school environment* is essential for the school so that students can thrive in an environment where they feel secure and well taken care of by the staff (Goodall, 2018; Leithwood, 2012; Thapa, Cohen, Guffey, & Higgins-D'Alessandro, 2013). Maslow (1943) identified feeling safe as a fundamental human need. "A safe, orderly, healthy, and accepting environment is necessary for student success; it is an environment in which bullying and other forms of violent, aggressive or biased behavior are not tolerated" (Leithwood, 2012, p. 24). The focus of school leaders is the *learning environment*, an environment that is as *personalized* (Klem & Connell, 2004) as possible with a focus on *continuous improvement* (Murphy et al., 2006).

The second dimension is *facilitating a high-quality learning experience for students* is *personalizing the environment to reflect students' backgrounds* (Hitt & Tucker, 2016). Similar dimensions can be found in both the *LCL* framework *personalized*

environment (Murphy et al., 2006) and the *ES* framework *teachers learn about student culture and local community* (Sebring et al., 2006). This *Unified Framework* dimension suggests that students learn better in a friendly environment, which manifests an awareness of the cultural heritages of all students in the school. This multicultural awareness is also beneficial in bringing the community into the school to understand better the challenges that individual students face due to cultural boundaries (Mahatmya, Lohman, Brown, & Conway-Turner, 2016).

Trust and collaboration are at the heart of parent-community ties (Combs, Harris, & Edmonson, 2015). However, often communication with parents, lack of cultural awareness on the part of school staff, and school initiatives excluding parents as partners in the work cause mistrust and lack of collaboration on the part of school personnel, parents, and the community at large (Adams, Forsyth, & Mitchell, 2009). Sebring et al. (2006), asserted that when teachers develop an understanding of the race, culture and community from which their students come, the teachers develop empathy (Leithwood & Sun, 2018). This assists teachers in creating new relationships with students, parents and community members. Once these new relationships are established, teachers are more comfortable in requesting parents and community members to partner with them in supporting student learning (Murray & Mereoiu, 2016). Teachers also have more perspective on how certain learning might be accepted by parents and community members based on race and ethnic customs (Goodall, 2018; Sebring et. al, 2006).

In the *Unified Framework* Domain II, the third dimension is *developing and monitoring the curricular program* (Hitt & Tucker, 2016). This dimension was supported by all three earlier frameworks. Leithwood (2012) puts forth *providing instructional*

support (supervising and evaluating teaching and coordinating the curriculum) in the *OLF* framework. Murphy et al. (2006) uses *knowledge and involvement; opportunity to learn; and curriculum alignment* in the *LCL* framework and Sebring et al. (2006) discusses *curricular alignment* in the *ES* framework.

School leaders focus on the mission and vision of the school as well as local, state and national standards in each curricular area to keep the curriculum relevant and aligned with current best practice. Addressing the curriculum, partnered with the instructional program and the assessment program are the core functions of the school that is student-focused and learning-focused. In *providing instructional support*, school leaders provide both curricular support in the form of an aligned curriculum and resources and materials sufficient to support the instructional program (Ladd, 2011). This support in turn encourages teachers to retain their positions in the school where they receive this support from the school leader (Ladd, 2011). The school leader actively oversees the instructional program through observation in classrooms and providing constructive feedback to teachers centered on the instructional program (Leithwood, 2012).

Highly effective school leaders maintain a strong instructional program through direct involvement with teachers and how teachers teach (Marzano, Waters, & McNulty, 2005). These school leaders are present in classrooms in both formal and informal ways (Murphy et al., 2006). This allows leaders to see potential barriers to good teaching and learning and to proactively remove these barriers to support staff and to protect instructional time (Murphy et al., 2006). Being present in classrooms also allows the leaders to have an intimate knowledge of the needs of the overall teaching staff so that the leaders may provide valuable feedback to teachers regarding their pedagogy and

content (Louis, Dretzke, & Wahlstrom, 2010). This presence also allows leaders to make informed decisions in hiring and allocating staff based on those needs (Murphy et al., 2006). Louis, et al. (2010) assert that this leadership counts in a profound way, being surpassed only by instruction.

The leader has knowledge and involvement in the curricular decisions that are made within the school (Marzano et al., 2005), taking care that student learning is at the center of those curricular decisions, and that high expectations and quality standards are considered and met throughout the curriculum (Copeland & Blum, 2007; Murphy et. al, 2006). This domain keeps learning at the forefront of curriculum rather than as a nebulous outcome.

"Instruction is the single most direct factor that affects student learning" (Sebring et al., 2006, p. 14). As teachers work in professional learning communities to determine the problems of practice in a particular school, they must necessarily align the curriculum to determine gaps (Boudett, City, & Murnane, 2013). Once these gaps have been identified then an instructional plan of action should be put into place in order to fill the gaps and provide students with rigorous work that creates an intellectual challenge for the students, the second dimension of this domain. This intellectual challenge should prepare students beyond basic skills. The work needs to be based on authentic problems that engage students at a variety of levels (Dietrich & Balli, 2014; Schlechty, 2011).

The fourth dimension in Domain II is *developing and monitoring the instructional program*. This *Unified Framework* dimension is supported by all three of the earlier frameworks. The *OLF* framework dimension is *monitoring student learning and school improvement practice* (Leithwood, 2012). The *LCL* framework dimension is *knowledge*

and involvement and instructional time (Murphy et al., 2006). The *ES* framework dimension is *intellectual challenge* (Sebring et al., 2006). These dimensions focus on pedagogy and also in protecting the instructional program for teaching and learning. As part of the instructional program it is necessary to support the curriculum with methods of teaching that engage learners and guide them to success in all areas of the curriculum. The final dimensions of the *improving the instructional program* domain of the *OLF* framework *are monitoring student learning and school improvement practice* and *buffering staff from distractions to their work*. Systematic collection and analysis of data allows school leaders and teachers to monitor student learning and any school improvement practices that are being implemented to make changes. This data is in addition to the internal data collected routinely throughout the school year in classrooms and school-wide. The *LCL* framework asserts that the leader has knowledge and involvement in the curricular decisions that are made within the school (Marzano et al., 2005), taking care that student learning is at the center of those curricular decisions, and that high expectations and quality standards are considered and met throughout the curriculum (Copeland & Blum, 2007; Murphy et. al, 2006). These high expectations are based on current best practice and standards. School leaders control the environment of "time, funding, and materials" to support the assessment program (Murphy et al., 2006, p.15). In addition to being knowledgeable about the curriculum, school leaders need to know what assessments are being used by teachers and how well students are performing on the assessments, whether class assessments or standardized assessments (Murphy et al., 2006). Once these gaps have been identified then an instructional plan of action

should be put into place in order to fill the gaps and provide students with rigorous work that creates an *intellectual challenge* for the students, a dimension in the *ES* framework.

The fifth and final dimension in Domain II is *developing and monitoring the assessment program*. This *Unified Framework* dimension is supported by all three of the other frameworks. The *OLF* framework dimension is *monitoring student learning and school improvement practice* (Leithwood, 2012). The *LCL* framework dimension is *knowledge and involvement, assessment procedures, expectations, standards and monitoring instruction and curriculum* (Murphy et al., 2006). The *ES* framework dimension is *intellectual challenge, press toward academic achievement coupled with personal concern for students* (Sebring et al., 2006).

Monitoring student learning and school improvement practice again suggests systematic collection and analysis of data which allows school leaders and teachers to monitor student learning and any school improvement practices that are being implemented to make changes (Leithwood, 2012). This data is in addition to the internal data collected routinely throughout the school year in classrooms and school-wide. This dimension is similar to Domain II dimension three, in the need for analysis of data to guide change.

The third domain of the *LCL* is the *curricular program*. The leader has *knowledge and involvement* in the curricular decisions that are made within the school (Marzano et al., 2005), taking care that student learning is at the center of those curricular decisions, and that high *expectations* and quality standards are considered and met throughout the curriculum (Copeland & Blum, 2007; Murphy et. al, 2006). These high expectations are based on current best practice and standards published by professional organizations such

as the National Council of Teachers of Mathematics, the National Council of Teachers of English, and the National Science Teachers Association (Louis et al., 2010; Murphy et al., 2006).

The *assessment program* is the fourth domain in the *LCL.* It is important for school leaders to be *knowledgeable regarding the assessment* systems in both the classroom and in the school (Marzano, Waters, & McNulty, 2005). Similar to the Unified Framework Domain II, dimension four, school leaders need to know what assessments are being used by teachers and how well students are performing on the assessments, whether class assessments or standardized assessments (Murphy et al., 2006).

The domain of the *ES* framework that supports this *Unified Framework* dimension is a *student-centered learning environment*. There are two dimensions for *student-centered learning environment*: (a) *safety and order*, and (b) *press toward academic achievement coupled with personal concerns for students*. In 2007, the National School Climate Council identified five elements of school climate. The first two were safety and teaching and learning, similar to the dimensions of the *ES* domain. The second *ES* framework dimension that supports this *Unified Framework* dimension is *intellectual challenge*, preparing students beyond basic skills. The work needs to be based on authentic problems that engage students at a variety of levels (Dietrich & Balli, 2014; Schlechty, 2011).

Domain III: Building professional capacity. This third domain of the *Unified Framework* is made up of seven dimensions. The first *Unified Framework* dimension is *selecting the right fit* (Hitt & Tucker, 2016). This dimension is a combination of the *OLF* dimension *staffing the instructional program* (Leithwood, 2012), the *LCL* dimension

hiring and allocating staff (Murphy et al., 2006), and the *ES* dimension *quality of human resources* (Sebring et al., 2006). As Collins (2001) asserts, people are the most important focus in transforming an organization. "But I know this much: If we get the right people on the bus, the right people in the right seats, and the wrong people off the bus, then we'll figure out how to take it someplace great" (Collins, 2001, p. 41). Finding the right people is critical to fulfilling the mission and vision of the school. If teachers do not share the vision, the school leader opens themselves to the possibility of teachers undermining projects because there is not buy-in. A good leader maximizes the possibility of success by finding people who share the vision and relying on their expertise through shared leadership.

The school leader must make careful assessment of personnel quality since teacher quality is positively related to student achievement levels, particularly in reading and mathematics, and to the gaps in learning rates between social classes and race/ethnicity (Heck, 2007). When school leaders have the opportunity to bring in teachers who share the same beliefs about student learning as the current staff and have demonstrated ability in providing quality instruction, student achievement is improved (Johnson, 2012; Leithwood, 2012). "Retaining skilled teachers is as important as hiring them to begin with. Substantial evidence now indicates that the behavior of school leaders is the 'working condition' exercising the greatest influence over teachers' decisions to stay or leave a school" (Leithwood, 2012, p. 27).

Leaders also need to be present in classrooms (Murphy et al., 2006). Being present in classrooms allows the leaders to have an intimate knowledge of the needs of the overall teaching staff so that the leaders may provide valuable feedback to teachers

regarding their pedagogy and content (Louis et al., 2010). This presence also allows leaders to make informed decisions in hiring and allocating staff based on those needs (Murphy et al., 2006). If teachers and school leaders do not share common values and beliefs regarding change in schools, there cannot be innovation (Sebring et al., 2006). Theorists argue that it is through professional learning that this common set of norms and values is created and a climate of innovation emerges (Frost, 2012). Teachers need to believe that schools can improve and that improvement comes about because of their attitudes, beliefs, and work (Sebring & Montgomery, 2010). This teacher agency is essential for school improvement (Sebring et al., 2006).

The second dimension of Domain III of the *Unified Framework* is *providing individualized consideration* (Hitt & Tucker, 2016). Only the *OLF* framework had a similar dimension that was stated as *providing and demonstrating consideration for individual staff members* (Leithwood, 2012). In this case, the dimensions in the *Unified Framework* and the *OLF* framework are identical. This consideration of individuals is the first in-road to building a working relationship with teachers and moving toward collaboration (Leithwood, 2012). This domain deals with the human capital within the school community. Leithwood (2012) recommends recognizing staff members' accomplishments as the first in-road to cooperation and often to collaborative leadership. Teachers feel they are truly members of the school community and their professional ideas count.

The third dimension of Domain III of the *Unified Framework* is *building trusting relationships* (Hitt & Tucker, 2016). This particular dimension was derived without interpretation from the *OLF* framework. The *OLF* dimension is *building trusting*

relationships with and among staff, students, and parents (Leithwood, 2012). Much like the previous dimension, the relationship that the leader builds with staff is important to forward the shared vision and collaborative work (Murphy et al., 2006). If the staff believes the school leader does not care about them and their welfare, relationships deteriorate and trust is lost. Leithwood (2012) expands the idea beyond the school staff to the entire school community. If a school leader does not have good rapport and genuine concern for the welfare of the entire school community including students, teachers, and parents, there will be no trust and little collaboration (Leithwood, 2012).

The fourth dimension of the *building professional capacity* domain is *providing opportunities to learn for whole faculty to include leaders* (Hitt & Tucker, 2016). Each of the earlier frameworks contributed to this dimension. The *OLF* framework states *stimulating growth in the professional capacities of staff* (Leithwood, 2012). The *LCL* framework is more succinct with *professional development* (Murphy et al., 2006). The *ES* framework states *quality of professional development* (Sebring et al., 2006). Hitt and Tucker (2016) address all members of the school as a community of learners in their interpretation of this dimension. When teachers and administrators learn side-by-side, the teachers feel better about the professional development and are willing to attempt to use the learning in the context of their classrooms (Dawson & Rakes, 2003; Ganser, 2000; Moore, 2018). Effective leaders also *stimulate growth in the professional capacities of the staff* through professional development and inner-school training on particular teaching practices held as goals for the school (Hallinger, 2018; Leithwood, 2012). In this way teachers are aware of what they are expected to know and should be able to do.

The *LCL* framework indicates that work should begin with a commitment to lifelong learning, centered on school improvement (Murphy et al., 2006). After focusing on their own professional development, the school leader focuses on planning, implementing, and assessing professional development for their teachers and other staff members. This works best when based on the principles of good professional development and facilitated by the targeted learners (Learning Forward, 2017). Once talented teachers have been recruited and hired, the school leader needs to collaborate with teachers to provide quality professional development in order to continually improve both content and pedagogy (Frost, 2011; Sebring et al., 2006).

The fifth dimension in Domain III is *supporting, buffering, and recognizing staff* (Hitt & Tucker, 2016). This dimension is a combination of dimensions from *OLF* framework, *buffering staff from distractions to their work* (Leithwood, 2012) and *supporting staff* from the *LCL* framework (Murphy et al., 2006). The implication of the *Unified Framework* dimension is that the school leader needs to protect instructional time and prevent distractions that "detract from mission, vision, and goal attainment" (Hitt & Tucker, 2016).

Buffering staff from distractions to their work first requires that the school leader be aware of the pressure placed on teachers from multiple community stakeholders including "parents, media, special interest groups, and the government" (Leithwood, 2012, p. 29). School leaders can proactively minimize interruptions to daily instructional time, create procedures for participating in initiatives beyond the school, and collaboratively determining a fair amount of time that teachers should spend on non-instructional activities (Leithwood, 2012). Teachers respond to this process through their

retention in the school where the leader protects the instructional program above other school priorities (Ladd, 2011).

Highly effective school leaders maintain a strong instructional program through direct involvement with teachers and how teachers teach (Marzano, Waters, & McNulty, 2005). These school leaders are present in classrooms in both formal and informal ways (Murphy et al., 2006). This allows them to see potential barriers to good teaching and learning and to proactively remove these barriers to *support staff* and to *protect instructional time* (Murphy et al., 2006). Being present in classrooms also allows the leaders to have an intimate knowledge of the needs of the overall teaching staff so that the leaders may provide valuable feedback to teachers regarding their pedagogy and content (Louis et al., 2010). This presence also allows leaders to make informed decisions in hiring and allocating staff based on those needs (Murphy et al., 2006). By protecting instructional time, the school leader provides support for teachers, respect for their planning and execution of lessons, and provides students with uninterrupted access to learning.

The sixth dimension in Domain III the *building professional capacity* domain is *creating communities of practice* (Hitt & Tucker, 2016). This dimension was mentioned in all three of the earlier frameworks. The *OLF* framework states *structuring the organization to facilitate collaboration* (Leithwood, 2012). The *LCL* framework combines two dimensions, *communities of professional practice* and *learning environment* (Murphy et al., 2006), while the ES framework uses *professional community* (Sebring et al., 2006). This *Unified Framework* dimension stresses the importance of collaboration among staff and the interaction of the staff with school leaders. DuFour and

Eaker (1998) stressed that in order to improve school performance, this collaboration was essential. It allows the entire school community to collectively focus on student work and how to improve it. It is incumbent on the school leader to *structure the organization to facilitate collaboration*. Leaders become "curators of talent who motivate" (Kramer & Crespy, 2011, p. 1025) their teachers and create opportunities for them to collaborate (Leithwood, 2012). In addition, leaders need to establish structures for staff to work together on instructional improvement and engage teachers in making decisions that directly affect their work (Leithwood, 2012; Sheppard & Dibbon, 2011).

Through their work together, teachers and school leaders form a community with common mission and vision to allocate resources and "forge new instructional skills (Murphy et al., 2006, p.18). Professional learning communities have been an integral part of school reform (DuFour & Eaker, 1998). The practice of "opening classrooms to other teachers and to collaboration among teachers allows teachers to engage in reflective dialogue about teaching and learning and through this practice deepen their understanding and expand their instructional repertoire" (Sebring et al., 2006, p. 13). This sharing allows teachers to become less self-conscious of their practice and allows them to trade roles of advisor/advisee as the circumstances warrant (Sebring et al., 2006).

The final dimension in Domain III of the *Unified Framework* is *engendering responsibility for promoting learning* (Hitt & Tucker, 2016). This dimension gains support from all three earlier frameworks. The *OLF* framework dimension *providing instructional support (supervising and evaluating teaching)* (Leithwood, 2012) coordinates well with the *LCL* framework dimension of *accountability* (Murphy et al., 2006). The *ES* framework takes a slightly different view with its dimension *values and*

beliefs about teacher responsibility for change (Sebring et al., 2006). Each of these dimensions focuses on the accountability of school leaders to provide support for the instructional staff in order to provide a quality program that is consistent with the values and beliefs expressed in the mission and vision. In *providing instructional support*, school leaders provide both curricular support in the form of an aligned curriculum and resources and materials sufficient to support the instructional program (Ladd, 2011). The school leader actively oversees the instructional program through observation in classrooms and providing constructive feedback to teachers centered on the instructional program (Leithwood, 2012).

Sustained progress is not possible unless the expectation of *accountability* is maintained at all levels of the school (Fullan, 2011). Change must be carried out with fidelity so that progress can continue. Decisions are more likely to garner this fidelity if the teachers and school leaders have been involved in planning and carrying out the change together (Hughes & Pickeral, 2013). "Principals shape the culture in positive ways when they share leadership and take responsibility for shaping classroom improvements" (Louis & Wahlstrom, 2011, p.1). Teachers and school leaders must share common values and beliefs about change in schools, otherwise little change will occur (Sebring et al., 2006). Teachers must "assume responsibility for meeting expectations" (Hitt & Tucker, 2016, p. 552).

Domain IV: Creating a supportive organization for learning. Domain IV of the *Unified Framework* is made up of seven dimensions. The first dimension is *acquiring and allocation materials and resources for mission and vision* (Hitt & Tucker, 2016). Hitt and Tucker (2016) used dimensions from all three of the other frameworks to craft this

dimension. The *OLF* framework dimensions used are first: *allocating resources in support of the school's vision and goals* and second: *staffing the instructional program* (Leithwood, 2012). The *LCL* framework dimensions used are *acquiring resources, allocating resources, and using resources* (Murphy et al., 2006). The *ES* framework dimension used to support the *Unified Framework* is *strategic orientation* (Sebring et al., 2006). This dimension is important in supporting the teaching and learning mission of the school. The school leader has influence on staff motivation and working conditions through their allocation of resources (Leithwood et al., 2018). This influence has a powerful impact on both teaching and learning (Leithwood et al., 2018). The school leader emphasizes the vision and goals of the school through judicious allocation of resources so that everyone in the school community realizes what is important and important goals are funded (Leithwood, 2012). When collaborating with other members of the school community on resource allocation the leader provides "effective oversight and accountability to support priorities" (Leithwood, 2012, p. 26). The school leader must make careful assessment of personnel quality in *staffing the instructional program* since teacher quality is positively related to student achievement levels, as was supported in an earlier domain.

The *LCL* dimensions, *acquiring resources*, *allocating resources* and *using resources* speak to the responsibility of the school leader to find ways to procure the resources needed by the school staff for improved instruction. Murphy et al. (2006) assert "high-performing school leaders are more successful than their peers in locating and securing additional resources for their schools (p. 21)". Once procured, it is the duty of the school leader to have the materials distributed and used in the best ways possible for

the improvement of student learning (DuFour & Marzano, 2011; Murphy, 2006). School leaders must provide the resources necessary for teachers to create quality, engaging lessons for students. Teachers must on their part be strategic in their use of resources and practice good stewardship in order to make those resources last. Principals need to be focused on *strategic orientation* (Davies & Davies, 2010; Quong & Walker, 2010). This dimension along with others creates a catalyst for change in schools (Sebring et al., 2006).

The second dimension of Domain IV of the Unified Framework is *considering context to maximize organization functioning* (Hitt & Tucker, 2016). This particular dimension was created from dimensions from all three of the earlier frameworks. The *OLF* framework states *providing support and demonstrating consideration for individual staff members* (Leithwood, 2012). The *LCL* framework dimension is *environmental context* (Murphy et al., 2006) and the *ES* framework dimension is *contextual resources* (Sebring et al., 2006). This *Unified Framework* dimension points to the necessity for school leaders to assess the context and provide those resources that would work best given the needs of students and the talents of teachers while maintaining a view of the mission and vision. This is a motivator for teachers (Leithwood et.al, 2019) and prevents school leaders from becoming too rigid in their responses. As was stated earlier, recognizing staff achievements can be the entry to collaboration (Leithwood, 2012). Effective leaders foster professional learning throughout the school community (Hallinger, 2018; Leithwood, 2012). Social advocacy makes it incumbent on the leader to control the environment for students and their families, as has been said earlier, this should be done with the local community in mind so that teachers become aware of the

community values and beliefs (Louis & Wahlstrom, 2011). While not a domain or dimension of the Essential Supports framework, Sebring et al. (2006) discuss contextual resources as the structural factors necessary for the organization to function well: "(a) climate of relational trust, (b) school organizational structure, and (c) resources of the local community" (p. 15).

The third dimension in this domain of the *Unified Framework* is *building collaborative processes for decision making* (Hitt & Tucker, 2016). Only two of the frameworks focused on collaboration. The *OLF* framework dimension is *building collaborative cultures and distributing leadership* (Leithwood, 2012). The *ES* framework dimension mentions *faculty/parent/community influence* (Sebring et al., 2006). This *Unified Framework* dimension calls for distributed leadership in decision-making. This collaboration between teachers and school leaders requires the school leader to have trust in the faculty, that the faculty espouse the mission and vision and that they are capable of assessing the present context in order to make good decisions. This allows multiple perspectives to be brought to problem solving and decision making which strengthens the culture and provides buy-in on the part of the teachers. Principals need to be focused on faculty/parent/community (Bryk & Schneider, 2002; Grissom, Loeb, & Master, 2013).

The fourth dimension of Domain IV of the Unified Framework is *sharing and distributing leadership* (Hitt & Tucker, 2016). This dimension is supported by the *OLF* dimension of *building collaborative cultures and distributing leadership* (Leithwood, 2012), and the *ES* framework dimension of *inclusive leadership focused on instruction* (Sebring et al., 2006). As with the third dimension in this domain, the call for sharing and distributing leadership requires leaders to build a collaborative culture that allows buy-in

from teachers. *Building collaborative cultures and distributing leadership*, is one way of fostering collaboration with others in the school to distribute leadership (Hallinger, 2018; Leithwood, 2012; Leithwood & Sun, 2018). It is incumbent on the school leader to *structure the organization to facilitate collaboration*. And as mentioned earlier, leaders need to establish structures for staff to make decisions that directly affect their work (Leithwood, 2012; Sheppard & Dibbon, 2011).

The fifth dimension of Domain IV is *tending to and building on diversity* (Hitt & Tucker, 2016). This dimension is made up of dimensions from the other three frameworks. The *OLF* framework dimension is *building productive relationships with families and communities* (Leithwood, 2012). The *LCL* framework dimension is *diversity* (Murphy et al., 2006). The *ES* framework dimension is *teachers learn about student culture and local community* (Sebring et al., 2006). As was mentioned in the discussion of Domain II dimension two, the school leader must help create an inclusive school culture, cognizant of the cultural and ethnic origins of the students and teachers. If this school culture is not created and maintained, there is a risk of students being marginalized (Mahatmya et al., 2016).

Strengthening and optimizing school culture (Hitt & Tucker, 2016) is the sixth dimension of Domain IV of the *Unified Framework*. It is built upon the *OLF* framework dimension of *building collaborative culture and distributing leadership* (Leithwood, 2012). The *Unified Framework* dimension is the logical progression of the last three dimensions in this domain. Hitt and Tucker (2016) maintain that through strengthening the school culture, school leaders "shape the norms and values of the school" (p. 555) and

promote a variety of positive characteristics in teachers that increase further buy-in from teachers.

The final dimension in Domain IV of the *Unified Framework* is *maintaining ambitious and high expectations and standards* (Hitt & Tucker, 2016). This dimension was drawn from each of the other three frameworks. The *OLF* framework states *creating high-performance expectations* (Leithwood, 2012). The *LCL* framework calls for *continuous improvement* (Murphy et al., 2006). The *ES* framework talks about *values and beliefs about teacher responsibility for change* (Sebring et al., 2006). Leaders are called to create a culture where teachers and students are held to high performance expectations. These expectations are well communicated. These expectations are revised over time as with a continuous improvement mindset, there is always an opportunity to improve regardless of where on the continuum student performance and other indicators lie. Teachers need to know what is expected of them in the teaching and learning environment. If the leader creates high-performance expectations, the standard is clear and teachers can meet or exceed the standard (Leithwood & Jantzi, 2002). If the standard is nebulous, it is difficult for teachers to determine what the school leader expects and how to arrive at that level of performance (Leithwood & Jantzi, 2002).

Decisions are more likely to garner teacher and community buy-in if the teachers and school leaders have been involved in planning and carrying out the change together (Hughes & Pickeral, 2013). “Principals shape the culture in positive ways when they share leadership and take responsibility for shaping classroom improvements” (Louis & Wahlstrom, 2011, p.1).

Domain V: Connecting with external partners. Domain V of the *Unified Framework* is *connecting with external partners* (Hitt & Tucker, 2016). This domain is made up of three dimensions. The first of these dimensions is *building productive relationships with families and community* (Hitt & Tucker, 2016). This dimension is reflective of dimensions from the *OLF* framework and the *LCL* framework. The *OLF* dimension is *building productive relationships with families and communities* (Leithwood, 2012). The *LCL* framework dimension is *stakeholder engagement* (Murphy et al., 2006). Addressed in an earlier domain, the relationships that leaders and teachers build with families and with the community allows them to build trust among the groups. It exposes cultural differences and it encourages members of the community who would not otherwise be involved in the school an entry to work with the school to further its mission. The school leader and teachers learn more about parents and other community members through interaction and by extension, more about the students the school serves (Leithwood, 2012). Parents and community members can be cultivated into a network of support for students, a network aware of the challenges and opportunities of the local environment (Leithwood, 2012). These contacts do not have to be formal in every case. The school leader and teachers can *connect with the wider community* through meetings, informal conversations, and email (Leithwood, 2012). Given the tools to connect school and home, profound changes in "outlook, belief, and practices" can occur (Goodall, 2018, p.222).

The second dimension of Domain V is *engaging families and community in collaborative processes to strengthen student learning* (Hitt & Tucker, 2016). This *Unified Framework* dimension was an aggregate of dimensions from the other three

frameworks. The *OLF* framework dimension states *building productive relationships with families and communities* (Leithwood, 2012). The *LCL* dimension is *community anchored schools* (Murphy et al., 2006). The *ES* framework dimension is *staff engages parents and community in strengthening student learning* (Sebring et al., 2006).

The community that Murphy et al. (2006) discussed in the *LCL* is slightly different from those discussed by Leithwood (2012) and Sebring et al. (2006). Teachers and school leaders form a community with common mission and vision; this community of practice is necessary for productive relationships to begin with families and communities.

This particular *OLF* dimension contributed to the previous dimension of the *Unified Framework* as well. As the school leader reaches out to families and communities and cultivates relationships, the more the school knows about the community, the more the community is invested in the school (Leithwood, 2012). Researchers assert that when teachers develop an understanding of the race, culture and community from which their students come, the teachers develop empathy (Leithwood & Sun, 2018; Sebring et al., 2006). This assists teachers in creating new relationships with students, parents and community members. Teachers also have more perspective on how certain learning might be accepted by parents and community members based on race and ethnic customs (Goodall, 2018; Sebring et. al, 2006).

This call for a more site-based decision-making leadership involving parents and community members is not an easy transition in some schools. In a study of the inclusion of teachers, parents and community members in student-based budgeting, researchers found that there were “narrow and shallow forms of actor engagement and democratic

decision making" (Sinclair & Malen, 2019, p. 1). However, the effort by leaders must be made if true collaborative leadership is desired.

The final dimension in Domain V of the *Unified Framework* is *anchoring schools in the community* (Hitt & Tucker, 2016). Dimensions from each of the three other frameworks support it. The *OLF* framework dimension is *connecting the school to its wider environment* (Leithwood, 2012). The *LCL* framework dimensions are *community-anchored schools* and *environmental context* (Murphy et al., 2006). The *ES* framework contribution is *resources of community* (Sebring et al., 2006). The school leader is in a unique position to connect the school with the community and with the assistance of technology with the world. It is important that the leader solicit assistance from the faculty and staff to make stronger connections with the community to help strengthen the school culture and to create a welcoming environment for all students.

Contact with the community can be either formal or informal. The school leader and teachers can *connect the school with the wider community* through meetings, informal conversations, and email (Leithwood, 2012). This allows the school leader to build relationships that bring community members into the school for a variety of purposes (Leithwood, 2012).

School leaders and teachers invite other stakeholders to become involved in the process of supporting student learning (Murphy et al., 2006). Connecting with the community allows teachers and school leaders to better understand the racial and ethnic beliefs and values of the students (Sebring et al., 2006). This also allows community members to find roles in the school to help their children learn and to contribute to the overall success of the school (Sebring et al., 2006).

All of the domains of the *Unified Framework* work together to improve student learning through effective school leadership. The domains are not sequential but in order to truly be effective, the school leader must master each of the domains.

In addition to the many research studies supporting the three earlier frameworks, the *Unified Framework* has been cited in a number of studies (Coccia, 2018; Dexter, & Richardson, 2020; Lochmiller, & Chesnut, 2016; Ryan, 2018; Tan, 2018; Van Gronigen, Meyers, & Hitt, 2017; Widenhofer, 2018). One notable study used the *Unified Framework* as the conceptual framework for a review of PK-12 school technology leadership research literature from 1998 – 2015 (Dexter, et al., 2016). This study began by considering the empirical literature reviewed in three previous literature reviews, combined with other research that met the criteria, either overlooked in earlier studies or occurring after the cut-off dates of the other reviews (Dexter et al., 2016). This netted 83 articles, which were reviewed against the domains of the *Unified Framework* (Hitt & Tucker, 2016). The findings of the Dexter et al. (2016) study demonstrated an uneven distribution of research across the five domains of the framework, with domain two, *facilitating technology use as a part of a high-quality learning experience* (23), and domain five, *connecting with external partners* (7), having the fewest studies.

Dexter et al. (2016) focused their research on technology. Wording of the *Unified Framework* was slightly modified to emphasize this focus. Table 2.1 shows the *Unified Framework* with a school technology leadership focus. This will be the form of the *Unified Framework* that will be used in this research study because of its practical applicability.

Table 2.1

The Unified Model of Effective Leader Practices Applied to Technology

Domain	Dimension
Establishing and conveying the vision	
	Creating, articulating, and stewarding shared mission and vision
	Implementing vision by setting goals and performance expectations
	Modeling aspirational and ethical practices
	Communicating broadly the state of the vision
	Promoting use of data for continual improvement
	Tending to external accountability
Facilitating technology use as part of a high-quality learning experience	
	Developing and monitoring curricular program
	Developing and monitoring instructional program
	Developing and monitoring assessment program
	Maintaining safety and orderliness
	Personalizing the environment to reflect students' backgrounds
Building professional capacity for technology integration	
	Providing opportunities to learn for whole faculty, including leader(s)
	Creating communities of practice
	Providing individualized consideration
	Selecting for the right fit
	Building trusting relationships
	Supporting, buffering, and recognizing staff
	Engendering responsibility for promoting learning
Creating a supportive organization for technology integration	
	Acquiring and allocating resources strategically for mission and vision
	Sharing and distributing leadership
	Strengthening and optimizing school culture
	Building collaborative processes for decision making
	Maintaining ambitious and high expectations and standards
	Tending to build on diversity
	Considering context to maximize organizational functioning
Connecting with external partners	
	Engaging families and community in collaborative processes to strengthen student learning
	Building productive relationships with families and external partners in the community
	Anchoring schools in the community

Note: Information from "Leadership for Technology Use, Integration and Innovation", by S. Dexter, J. W. Richardson, & J. B. Nash, 2016. In "Handbook of Research on the Education of School Leaders", M. D. Young & G. M. Crow (eds.). Copyright Taylor and Francis, 2016.

Catholic School Leadership and the Unified Framework

While Ciriello's (1998) work is considered to be the seminal work in conceptualizing how a layperson can succeed as a principal in a Catholic school (Uhl & Zelenka, 2018), it was clearly written prior to the widespread use of the Internet and one-to-one computing in schools. In the last few years, the *National Standards and Benchmarks for Effective Catholic Elementary and Secondary Schools* (NSBECS) (NSBECS, 2012) have modernized the view of leadership in Catholic schools. School leaders have a clearer direction of what school excellence is, including the use of technology (Uhl & Zelenka, 2018).

Catholic schools differ from public schools in governance, with the principal responsible to the governing pastor or religious congregation, and in funding with funds coming primarily from tuition, subsidy by the parish or religious order, and fundraising. However, regardless of the limitations of public funding, Catholic schools are required by Canon Law to take care that "the instruction which is given in them is at least as academically distinguished as that in the other schools in the area" (Can. 806 §2). In order to provide guidance to direct this excellence in academic education, the *National Standards and Benchmarks for Effective Catholic Elementary and Secondary Schools* were developed by the Center for Catholic School Effectiveness at Loyola University Chicago in partnership with Roche Center for Catholic Education at Boston College (NSBECS, 2012, p. 1). These standards are divided into four major areas: (a) mission and Catholic identity, (b) governance and leadership, (c) academic excellence, and (d) operational vitality. Of these four broad areas, the *governance and leadership* standard 6 addresses leaders and leadership (NSBECS, 2012) that affects this research study.

Standard 6 states, “An excellent Catholic school has a qualified leader/leadership team empowered by the governing body to realize and implement the school’s mission and vision” (NSBECS, 2012, p. 19). While similar to the *Unified Framework*, the NSBECS benchmarks were not research-based while the domains and dimensions of the *Unified Framework* were based on research (Hitt & Tucker, 2016).

In other words, according to the NSBECS (2012) the leader in a Catholic school should be: (a) well qualified, (b) able to articulate the mission and vision, similar to the *Unified Framework* Domain 1, (c) able to build professional capacity, similar to the *Unified Framework* Domain 3, (d) able to establish networks of collaboration, similar to the *Unified Framework* Domain 5, (e) working on continuous improvement of curriculum, instruction, and growth, similar to the *Unified Framework* Domain 2, (f) providing for the operational vitality of the school, similar to the *Unified Framework* Domain 4, and (g) communicating the school program to all constituents, similar to the *Unified Framework* Domain 5. Since these frameworks are so closely aligned and *Unified Framework* is research-based, it will serve as the lens for this study.

School Technology Leadership

Dexter et al. (2016) focused their work with *Unified Framework* specifically on technology and how the literature regarding school technology leadership applied to the framework. The Dexter et al. (2016) version of the *Unified Framework* will be used from this time forward in this research study.

The phrasing changes by Dexter et al. (2016) in both domains 2 and 3 insert the area of technology as the focus of the school leader. In fact, with these minor changes, the *Unified Framework* aligns with the *ISTE Standards for Education Leaders* (2018).

Again, while the *ISTE Standards* in their various forms have been used as frameworks for research over the last several decades, the *ISTE Standards* were not developed through research. A comparison of the *Unified Framework* and the *ISTE Standards for Education Leaders* can be seen in Table 2.2. As the table demonstrates, there is a good fit between these two sets of standards. This is an important distinction since the ISTE Standards have been used as the framework for many studies in school technology leadership.

This literature review will organize the studies by method and then by instrumentation when applicable. Researchers have collected data from school leaders, their teachers, and sometimes both groups in one study. The literature demonstrates that while there have been many studies on school technology leadership in the United States and in other countries, there are very few studies that have been done in Catholic schools. Throughout this section, research performed in Cathoilc schools will be noted.

Table 2.2

Unified Model of Effective Leader Practices & ISTE Standards for Education Leaders

Unified Framework	ISTE Standards for Education Leaders
Domain 1: Establishing and conveying the vision • Creating, articulating , and stewarding shared mission and vision • Implementing vision by setting goals and performance expectations • Modeling aspirational and ethical practices • Communicating broadly the state of the vision • Promoting use of data for continual improvement • Tending to external accountability	Standard 2. Visionary Planner a) Engage education stakeholders in developing and adopting a shared vision for using technology to improve student success, informed by the learning sciences. b) Build on the shared vision by collaboratively creating an strategic plan that articulates how technology will be used to enhance learning. c) Evaluate progress on the strategic plan, make course corrections, measure impact and scale effective approaches for using technology to transform learning d) Communicate effectively with stakeholders to gather input on the plan, celebrate successes and engage in a continuous improvement cycle. e) Share lessons learned, best practices, challenges and the impact of learning with technology with other educational leaders who want to learn from this work.
Domain 2: Facilitating technology use as part of a high-quality learning experience • Developing and monitoring curricular program • Developing and monitoring instructional program • Developing and monitoring assessment program • Maintaining safety and orderliness • Personalizing the environment to reflect students' backgrounds	Standard 3. Empowering Leader a) Empower educators to exercise professional agency, build teacher leadership skills and pursue personalized professional learning. b) Build the confidence and competency of educators to put the ISTE Standards for Students and Educators into practice. c) Inspire a culture of innovation and collaboration that allows the time and space to explore and experiment with digital tools. d) Support educators in using technology to advance learning that meets the diverse learning, cultural, and social-emotional needs of individual students. e) Develop learning assessments that provide a personalized, actionable view of student progress in real time.

Table 2.2 (cont.)
Unified Model of Effective Leader Practices & ISTE Standards for Education Leaders

Unified Framework	ISTE Standards for Education Leaders
Domain 3: Building professional capacity for technology integration • Providing opportunities to learn for whole faculty, including leaders • Creating communities of practice • Providing individualized consideration • Selecting for the right fit • Building trusting relationships • Supporting, buffering, and recognizing staff • Engendering responsibility for promoting learning	Standard 3. Empowering Leader (above) Standard 5. Connected Learner a) Set goals to remain current on emerging technologies for learning, innovations in pedagogy and advancements in the learning sciences. b) Participate regularly in online professional learning networks to collaboratively learn with and mentor other professionals. c) Use technology to regularly engage in reflective practices that support personal and professional growth. d) Develop the skills needed to lead and navigate change, advance systems and promote a mindset of continuous improvement and how technology can improve learning.
Domain 4: Creating a supportive organization for technology integration • Acquiring and allocating resources strategically for mission and vision • Sharing and distributing leadership • Strengthening and optimizing school culture • Building collaborative processes for decision making • Maintaining ambitious and high expectations and standards • Tending to and building on diversity • Considering context to maximize organizational functioning	Standard 1. Equity and Citizenship Advocate a) Ensure all students have skilled teachers who actively use technology to meet student learning needs. b) Ensure all students have access to the technology and connectivity necessary to participate in authentic and engaging learning opportunities. c) Model digital citizenship by critically evaluating online resources, engaging in civil discourse online and using digital tools to contribute to positive social change. d) Cultivate responsible online behavior, including the safe, ethical, and legal use of technology. Standard 4. Systems Designer a) Lead teams to collaboratively establish robust infrastructure and systems needed to implement the strategic plan. b) Ensure that resources for supporting the effective use of technology for learning are sufficient and scalable to meet future demand.

Table 2.2 (cont.)
Unified Model of Effective Leader Practices & ISTE Standards for Education Leaders

Unified Framework	ISTE Standards for Education Leaders
Domain 4: Creating a supportive organization for technology integration (continued)	Standard 4. Systems Designer (continued) c) Lead teams to collaboratively establish robust infrastructure and systems needed to implement the strategic plan. d) Ensure that resources for supporting the effective use of technology for learning are sufficient and scalable to meet future demand. e) Protect privacy and security by ensuring students and staff observe effective privacy and data management policies.
Domain 5: Connecting with external partners • Engaging families and community in collaborative processes to strengthen student learning • Building productive relationships with families and external partners in the community • Anchoring schools in the community	Standard 4. Systems Designer f) Establish partnerships that support the strategic vision, achieve learning priorities and improve operations.

Note: Information from "Leadership for Technology Use, Integration and Innovation", by S. Dexter, J. W. Richardson, & J. B. Nash, 2016. In "Handbook of Research on the Education of School Leaders", M. D. Young & G. M. Crow (eds). Copyright Taylor and Francis, 2016. Information from "ISTE Standards for Education Leaders", 2018. Copyright International Society for Technology in Education.

Quantitative studies. Some quantitative studies on the topic of school technology leadership used existing instruments to measure responses from study participants. Banoğlu (2011) studied survey responses from 80 school principals in the districts of Maltepe and Kadikoy in Istanbul, Turkey. The researchers used a version of the *Principals Technology Leadership Assessment* (PTLA) (CASTLE, 2009), which was translated into Turkish from the original English version. The PTLA survey, originally developed by UCEA Center for the Advanced Study of Technology Leadership in Education (CASTLE) was based on the National Education Technology Standards for Administrators (NETS-A) (ISTE, 2009) in English and psychometrically validated by the American Institutes for Research (CASTLE, 2009). PTLA survey data were used to perform a confirmatory factor analysis (CFA) of the responses from the 80 principals. The goodness of fit was sufficient to claim construct validity (Banoğlu, 2011). Following the CFA an explanatory factor analysis (EFA) was performed. Together the CFA and EFA showed a goodness of fit between leadership and vision, learning and teaching, and assessment and evaluation (Banoğlu, 2011).

The PTLA was used in an earlier study of 129 Utah elementary public-school principals (Esplin, Stewart, & Thurston, 2018). The ISTE Standards for Administrators (2009) also served as a lens for this study. Survey results of 129 principals were analyzed. The analysis of the data using descriptive statistics showed the principals did not perceive themselves as technology leaders. A correlation attempted to answer the question, "Does the perceived technology leadership preparedness level of Utah principals correlate with the number of hours spent in technology professional development?" (Esplin et al., 2018, p. 312). Data indicated a moderate relationship

between the amount of time spent in technology leadership training and how prepared each school leader perceived themselves to lead technology.

The PTLA was used in a study of 132 public elementary school principals in the District of Columbia (Brunson, 2015). The PTLA was modified through the addition of gender identification of the participants and socio-economic status (SES) of the schools as determined by the free and reduced lunch program participation as well as other demographics. The researcher hoped to confirm the results of the Banoğlu (2011) research that showed that gender was a factor in technology leadership and to demonstrate that there was a correlation between SES and school leaders' technology leadership. Brunson (2015) analyzed the data using regression analysis and found that there was no statistical significance between men and women, a difference from Banoğlu's (2011) results that showed that women were more likely to be technology savvy school leaders than men. The results for the correlation between SES at a school and the school leader's technology leadership competency was significant (Brunson, 2015). Further results indicated that the support disposition was a moderately weak predictor of principal technology leadership competency (Brunson, 2015).

In two of the three studies previously mentioned (i.e., Banoğlu, 2011; Brunson, 2015) using PTLA, the instrument was altered for the purposes of the researcher. These alterations could have affected the data that were gathered from the two study populations and subsequently skewed the results. Comparing gender and technology use in a primarily Muslim country versus the United States produced different results. Those results may have been cultural rather than statistically significant within the respective studies.

In a later study in the Maltepe province of Istanbul, Turkey, different instruments were used to measure leadership and teacher integration of technology. In the study, 1,105 teachers and 58 principals from 69 K-12 public schools were given questionnaires (Banoğlu, Vanderlinde, & Çetin, 2016). The principals' questionnaire, the *Technology Leadership Scale* developed by Banoğlu (2012), was created through a study of 127 Turkish school principals. A 56-item draft scale was used to create a questionnaire. Both EFA and CFA were used to analyze the data from the questionnaire to determine validity and reliability.

The teacher questionnaire in the Banoğlu et al. study was similar in format to the principals' questionnaire (2016). The first part of the questionnaire demographics and the second the *Learning School Scale* by Çetin and Subaş (2014). The *Learning School Scale* was developed by Çetin and Subaş through a quantitative study of 265 elementary school teachers in Istanbul (2014). The questionnaire was developed to determine the perceptions of the teachers in Turkish schools regarding information technology and the learning organization. Both EFA and CFA were used to analyze the data from the questionnaires to determine validity and reliability.

Results of the 2016 study showed that teachers' perception of the systems thinking school culture obtained the highest mean whereas team learning received the lowest (Banoğlu et al., 2016). The correlation estimates revealed that the older the principal, the less frequently they used technology. Principals' internet usage frequency was associated with their systemic improvement and digital citizenship technology leadership practices (Banoğlu et al., 2016).

In research on school technology leadership, researchers created their own instruments to gather data on the subject. In research conducted by Weng and Tang (2014) in Taiwan, 323 administrators from 82 schools were given a two-part researcher developed questionnaire, the *Technology Leadership Strategies and School Administrative Effectiveness Scale.* This instrument was created to determine:

> (a) the level of school technology leadership used by administrators in elementary schools; (b) the degree to which administrators are aware of the effectiveness of school administration; (c) the relationship between administrators' technology leadership strategies and the effectiveness of elementary school administration; and (d) whether administrators' technology leadership strategies can predict the effectiveness of elementary school administration (Weng & Tang, 2014, p. 91).

A four-phase development process was used to first ascertain the framework for the instrument, to conduct interviews with school leaders to evaluate and refine the instrument, to pilot test the instrument, and finally to test the refined instrument in the field (Weng & Tang, 2014).

Research findings indicated that elementary school administrators were highly conscious of using school technology leadership strategies (Weng & Tang, 2014). Elementary school leaders also possessed a high degree of effectiveness in school administration (Weng & Tang, 2014). Technology leadership strategies had a significantly positive impact on the effectiveness of school administration. In fact, based

on this study, technology leadership strategies could predict effectiveness of school administration (Weng & Tang, 2014).

In another study where the instruments were created as part of the study, one thousand teachers from Taiwanese elementary schools were asked to measure the effectiveness of their principals' technology leadership, teacher technology literacy and teaching effectiveness using the *Principals' Technological Leadership Instrument*, the *Teachers' Technological Literacy Instrument*, and the *Teachers' Effectiveness Instrument* (Chang, 2012). The instruments were developed by the researcher and piloted prior to the research study. All three instruments were tested for validity and reliability. The purpose of the study was to ascertain the connections "among the technology leadership of principals and the technology literacy and teaching effectiveness of elementary school teachers" (Chang, 2012, p. 329). The findings from this SEM study showed that principal technology leadership actually improved teachers' technology literacy and encouraged teachers to integrate technology into their lessons (Chang, 2012). Further, teachers' technology literacy had an effect on their effectiveness in teaching (Chang, 2012). Finally, the study showed that leadership mediated by teacher technology literacy can affect teaching effectiveness (Chang, 2012).

Researchers in a different study created a structural equation model (SEM) to ascertain the relationship of four variables: transformational leadership, computer competence, computer use, and professional development (Afshari, Bakar, Luan, & Siraj, 2012). In the analysis of 320 principals' responses on the *Multifactor Leadership Questionnaire 5x* (MLQ5x) (Avolio & Bass, 2004) and a 25-item researcher-developed computer competence scale, the researchers found that principals' computer competence

positively influenced the transformational leadership role of principals in implementing ICT in schools (Afshari et al., 2012). The Multifactor Leadership Questionnaire identifies three different leadership styles, transformational, transactional, and passive-avoidant (Avolio & Bass, 2004). The benchmark for transformational leadership variables set by Avolio and Bass (2004) was a value greater than 3. However, none of the principals in this study met the benchmark, indicating they were not transformational leaders (Afshari et al., 2012). The study also indicated ICT related professional learning was positively related to principals' computer competence (Afshari et al., 2012).

In a study of 398 principals, researchers investigated whether professional learning in technology influenced the integration into classrooms (Dawson & Rakes, 2003). The *School Technology and Readiness (STaR) Chart Assessment* developed by the CEO forum was used to gather data (Dawson & Rakes, 2003). "The STaR Chart Assessment questionnaire tests five components: (a) connectivity, (b) hardware, (c) content, (d) professional development, and (e) integration and use" (Dawson & Rakes, 2003, p. 34). The researchers found that there was a statistical significance for both the amount of professional development a principal received and technology integration by teachers and the types of professional development a principal received and technology integration (Dawson & Rakes, 2003). The researchers contended that "no matter how much training teachers receive to prepare them for technology integration, most of the teachers will not integrate technology without the leadership of the principal" (Dawson & Rakes, 2003, p. 30). In addition, based on their findings in this study, administrators cannot fully or effectively support technology if they do not understand it (Dawson & Rakes, 2003).

Whether principals or teachers have been surveyed, these research studies point to the efforts researchers have made to determine the relationship of school technology leadership and various aspects of technology implementation. Both principals and teachers have been surveyed to ascertain information on the leadership and environment controlled by school leaders that is relevant to the use of technology in meaningful learning in classrooms across the world. The next section will explore the qualitative studies on the same topic.

Qualitative studies. There are several methods utilized in the area of qualitative research regarding school technology leadership. Alenzi (2017) conducted structured interviews of sixteen male librarians from Saudi schools. The study participants were asked to self-assess their technology competence, their level of technology support to others, and their perceptions of technology leadership. Grounded theory was used to analyze the data generated from the interviews. The researcher concluded from the data collected that "technology leadership is poorly shaped as a driver of ICT implementation in Saudi schools via effective uses of libraries" (Alenzi, 2017, p. 1129). This may be due in part to the pressure Saudi teachers feel to implement technology even though it seems to be in conflict with the more acceptable traditional teaching methods currently practiced.

A research study consisting of a cross-case analysis of five previous case studies of team-based technology leadership in middle school was conducted (Dexter, 2011). The five cases looked at: (a) technology leadership team membership, (b) focus, (c) system of leadership practices, and (d) implications of these systems for teachers learning about technology supported instruction (Dexter, 2011). The researcher examined a series of

artifacts from each of five middle schools working on 1:1 laptop implementations. The researcher found that "schools in this study with instruction-oriented visions for their laptop programs created a more compelling setting for technology integration through strong technology leadership practices" (Dexter, 2011, p. 184). Those schools in turn had higher rates of teacher technology integration (Dexter, 2011). The researcher concluded that one of the greatest tasks of technology leadership is to set a strong vision by soliciting a team of personnel made up of leaders and teachers to define the goals of the technology program. This study advocates for strong support of teachers attempting to implement a technology initiative such as one-to-one computing from the district and local school administration as well as the technology coordinator and the teachers who take on the roles of technology leaders. Dexter (2011) suggests "technology leadership should be considered a school characteristic, one shared by a team of people and whose results are technology access and support" (p. 184).

In a study of principals in nine Bureau of Indian Education schools, Richardson and McLeod (2011) performed telephone interviews to ascertain the use of NETS-A in this specific population in the United States. The researchers discovered that this population faced similar issues to those of rural schools across the United States. The study uncovered five specific issues within the group: (a) principals did not understand digital age learning; (b) principals rarely used technology for personal use; (c) principals failed to focus on a classroom level technology integration; (d) principals did not use technology to improve teaching and learning; and (e) principals did not comprehend digital citizenship (Richardson & McLeod, 2011). In short, the principals interviewed did not understand or implement NETS-A in their schools (Richardson & McLeod, 2011).

The challenges expressed by the principals in their interviews were "unreceptive staff, lack of a technology coordinator, isolation and poverty, poor facilities, family problems, unfamiliarity with the technology standards and outdated technology" (Richardson & McLeod, 2011, p. 10). The researchers also concluded that most of the school leaders interviewed were transactional leaders even though some described themselves as transformational leaders with vision working to make changes (Richardson & McLeod, 2011).

A research study that included six district and four high school leaders as well as eleven teachers focused on gathering interview data to study leadership practices during a first year iPad learning initiative (Hughes, Boklage, & Ok, 2016). This descriptive case study explored how the vision was developed; how the leaders created opportunities for teachers and staff to learn iPad technical and integration skills; and how leaders made the organization technologically ready to support an iPad learning initiative (Hughes et al., 2016, p. 289). The researchers concluded that effective technology leadership is a significant predictor of teachers' and students' use of technology (Hughes et al., 2016). One limitation of this particular study is that the technical leader and the iPad initiative leader refused to participate. In addition, with only one school involved, there was no chance of generalizing the results to other schools.

Schrum and Levin (2013) studied three award winning school leaders and their schools. Over 150 participants were interviewed or participated in focus groups. The purpose of the study was to identify ways that the school leader modified school culture and the expectations of staff and community through the use of technology with the

ultimate goal of improved student achievement (Schrum & Levin, 2013, 2016). The framework for this research was distributed leadership. The research questions were:

(a) What lessons can be learned from exemplary school and district leaders who have used technology successfully as a lever for school improvement?

(b) In what ways do school and district leaders use distributed leadership, if at all, in creating systemic change in their systems?

(c) What role(s) does technology play in school improvement in exemplary, award-winning secondary schools (Schrum & Levin, 2013, p. 380)?

After analyzing the data including interviews, observations, and document analyses, the researchers concluded that school leaders have a responsibility for establishing a culture and environment that supports all students in their academic pursuits (Schrum & Levin, 2013, 2016). While the three school leaders had many individual characteristics, many of them situational to their current assignment, the school leaders also shared some characteristics. These leaders exemplified many of the characteristics that make up the domains of the *Unified Framework*. "They shared leadership with others, developed support systems for educations, arranged time for collaboration, vocalized a shared vision and listened to feedback. They build partnerships and celebrated successes" (Schrum & Levin, 2013, p. 397).

Other qualitative studies have been conducted with many of the same methods and outcomes. One study with more participants that many of the other studies mentioned was an African study (Msila, 2011). Six schools were visited twice a month for three

months. During the visits the researcher conducted focus groups and individual interviews of school leaders and teachers. In total six principals and 42 teachers participated in the study (Msila, 2011). The study found that principals influence teachers through their enthusiasm for technology use. It also found that teachers often try to influence the principal and when this happens, often there is little change in the integration of technology (Msila, 2011). "Technology and computers will hardly be successful in schools without the support of those at the helm" (Msila, 2011, p. 130).

In another study, eleven superintendents who had been recognized as tech- savvy by eSchool News, an educational technology publication for educators, participated in 30 to 60-minute recorded interviews (Richardson, Sauers, & McLeod, 2015). The purpose of this qualitative phenomenological study was to understand how the superintendents met "the technological needs of their students, staff, schools and greater communities" (Richardson, Sauers, & McLeod, 2015, p. 15).

The most prevalent leadership dispositions that emerged from this study were that technology-savvy superintendents "understood that technological change requires ongoing collaboration" (Richardson, Sauers, & McLeod, 2015, p. 19) and set clear expectations for the use of the technology tools and the pedagogy they supported. The superintendents tended to be risk-takers, personally engaged in the use of technology and learned the connection between the technologies and the appropriate pedagogies. The superintendents also had a vision for how technology should be used in their district (Richardson, Sauers, & McLeod, 2015). While focused on district superintendents, this study has some bearing on the current study since school level leaders in Catholic schools

have more freedom to make decisions at the local level regarding technology and can affect change, similar to the superintendents in this study.

In another study, researchers found that there were six main challenges shared by virtual school leaders and bricks-and-mortar school leaders (Richardson, LaFrance, & Beck, 2015). Eighteen virtual school leaders from virtual schools accredited by AdvancEd were interviewed to determine the challenges that these leaders faced. The challenges that were uncovered were " funding, staff, accountability, time, parents, and professional development" (Richardson, LaFrance, & Beck, 2015, p. 21). The researchers asserted that these aligned with previous research on challenges faced by school leaders in bricks-and-mortar schools (Richardson, LaFrance, & Beck, 2015). It is important to note that school leaders encounter challenges as they lead their schools toward technology integration.

Mixed methods studies. At times, a combination of quantitative and qualitative studies is necessary to more thoroughly study a research question. One of these mixed methods studies was of 70 middle school teachers from 18 schools and 20 leaders from 11 schools in Australia (Hilton, Hilton, Dole, & Goos, 2015). Teachers participated in a professional learning opportunity on a new school initiative. In some cases, the school leader participated with their teachers and in some cases the leaders did not. School leaders and teachers were given surveys, were interviewed, and had group discussions to gather data on the impact school leaders had on teachers' and school leaders' professional growth when leaders participated in teachers' professional development (Hilton et al., 2015). The results of the study showed that school leaders' participation in teacher

professional development had a positive influence on the professional growth of both the leaders themselves and their teachers (Hilton et al., 2015).

Further, both teachers and school leaders felt that the school leaders' participation in the professional development promoted school-wide culture and signaled leaders' support for the teachers implementing their new learning (Hilton et al., 2015). Finally, the opportunity to collaborate and work together was meaningful for the teachers (Hilton et al., 2015). These researchers claimed a profound difference in teachers whose leaders did not participate in the professional development (Hilton et al., 2015). Those teachers more often cited constraints to implementing the professional development and felt a lack of support from their school leaders for the new initiative related to the professional development (Hilton et al., 2015). The collaboration between leaders and teachers was found to be essential for the best experience.

In a three-part study focused on educational leadership and technology integration, researchers began phase one of the study by investigating the requirements for technology training for administrative licensure (Schrum et al., 2011). In this phase of the study the researchers found that only two states, Michigan and New Mexico, have any requirements at all for technology training for administrative licensing. In phase two of the study, the researchers contacted state universities to investigate the presence of technology leadership training within administrative preparatory classes. They found that 92% of the universities contacted had no stated technology requirement for administrative preparation (Schrum et al., 2011).

Finally, in phase three of the study, the researchers developed an online questionnaire to identify skills, knowledge, training, and experiences that administrators

had regarding technology (Schrum et al., 2011). A purposeful sample of administrators, all users of an ISTE Ning and bloggers regarding technology use, were invited to take the questionnaire. In all, 48 principals, assistant principals, superintendents, and central office administrators participated as well as 98 technology specific administrators and teacher leaders. The data, generated from open-ended response questions, were analyzed by the researchers for common themes regarding how leaders learned technology, how they worked with staff to integrate technology, and where they see technology going over the subsequent 5 years (Schrum et al., 2011). While administrators are hungry for more technology training, universities are not providing training in their regular course of studies. Also, without state regulation of administrative requirements for technology competency, the efforts of individual administrators to serve as models for teachers and other staff is left to the ability of the administrator to self-teach or connect with other technology using administrators to share ideas.

In another mixed methods study in the United States, the researcher used the PTLA instrument to survey 24 principals who lead Apple Distinguished Schools, followed by 5 interviews from the same pool of participants (Wirt, 2012). The researcher was looking for common characteristics and behaviors of school leaders who were recognized as leading a successful 1:1 environment. Each participant was given the PTLA through Survey Monkey. Answers were compiled and the data analyzed. After reviewing the quantitative results, the researcher identified those to be interviewed. They received an email with seven questions that requested written responses. Each of the questions were aligned to the 2009 version of the ISTE NETS-A Standards (Wirt, 2012). This study emphasizes the need for distributed leadership when implementing a 1:1

program. This leadership is responsible for visioning, planning, implementing, and evaluating the use of technology within a particular school.

Peer-reviewed research literature regarding technology in Catholic schools is rare (Cho, 2017; Swallow, 2017; Swallow & Olofson, 2017). One mixed methods research study focused on how the school vision and mission of a Catholic school and technology implementation in a one-to-one program were compatible (Cho, 2017). Data were generated through both interviews and survey data from one Catholic school in the mid-western United States. Interviews were conducted first. Then some of the wording from the interviews was used on the researcher-developed survey tool (Cho, 2017). The researcher used a semi-structured interview for the 22 interviews. Role groups included school administrators and teachers. The quantitative data were collected from 59 teachers and administrators. The survey included attitudinal items such as the impact of devices on classroom learning; school vision items gauging the perception of the vision of the participant for teaching and learning; and the one-to-one supports items that measured the satisfaction of supports such as professional development and technical support (Cho, 2017). A descriptive account of the school's mission and one-to-one implementation was developed from a combination of interview and survey data (Cho, 2017). Findings revealed that the vision and mission of the school influenced the support of the teachers and students rather than the technology itself. However, that support was translated into many projects, including the one-to-one implementation because of the relationships that were built between administration, faculty, and students (Cho, 2017). Teachers and students were allowed to decide how the devices would be used in the teaching and learning environment (Cho, 2017). This study promotes a more hands-off approach by

administrators where the administrator fosters the environment and allows the teachers to do what they believe is best.

These studies have focused on school technology leadership from several different perspectives. Some studies focused on school leaders' data and what they believed about school technology leadership. Other studies focused on teachers' data and what they believed about school technology leadership. Finally, some studies concentrated on both school leaders and teachers' beliefs regarding school technology leadership. Using the lens of the *Unified Framework*, good school technology leadership is just good school leadership (Dexter et al., 2016).

Technology Integration

Some of the literature important to the current study is the research focusing on technology integration. Most of these studies have teachers as participants. The following studies discuss technology integration and some of the barriers that teachers and school leaders face in technology integration. Those studies in Catholic schools are noted. Otherwise the studies were in public schools.

In a longitudinal multiple case study of four teachers who completed extra technology coursework during their education programs, researchers studied how the teachers' "technology integration knowledge, self-efficacy beliefs, intentions, and practices developed over time" (Ottenbreit-Leftwich, Liao, Sadik, & Ertmer, 2018, p. 283). The study spanned four years and had three phases. In the first phase all participants completed university requirements for both secondary teaching licensing and computer education licensing. Data collected in this phase included e-portfolio analysis and semi-structured interviews (Ottenbreit-Leftwich et al., 2018). The interviews in phase

one the pre-service teachers were asked questions based on their e-portfolio, their beliefs regarding the value of technology, their confidence in using technology, their plans to use technology in the future (Ottenbreit-Leftwich et al., 2018). Participants were also given scenario questions pertaining to the integration of technology so that the researchers could determine their espoused beliefs and their enacted beliefs ((Ottenbreit-Leftwich et al., 2018). In phase two, all four teachers completed their student teaching in both their core area and computer education. In phase two interviews, the four participants had semi-structured interviews that included all of the topics in phase one but a question regarding their actual practice. Phase two included scenarios as well. In phase three, the four teachers were contacted two years after they had been teaching and had the same semi-structured interview as in phase two, followed by the scenarios (Ottenbreit-Leftwich et al., 2018).

Only one of the four researchers conducted the 12 interviews and followed the same interview protocol (Ottenbreit-Leftwich et al., 2018). Prior to the second and third interviews, the researcher reviewed the material in order to create consistency. Results of the research indicated that even though the subjects of this study had more technology training than most teachers, their school environment impacted whether they used technology and how they used technology (Ottenbreit-Leftwich et al., 2018). Researchers concluded that teachers need both additional technology experiences and supportive school environments to integrate technology.

In another study, Franklin (2007) studied 100 graduates' responses to a researcher-developed questionnaire to determine the ways elementary teachers use computer technology and what factors influence computer use. The study was comprised

of graduates who were in their first through third years of teaching. In analyzing the data from the questionnaire, it was discovered that with this sample, there was no significant relationship between the computer use of the teachers and measures of support from leadership, time, access, or availability of technology (Franklin, 2007).

In another study, researchers used mail to distribute a researcher-developed survey to 514 third-grade teachers in Ohio (Howley, Wood, & Hough, 2011). The instrument was created based on previous studies and after the initial version of the survey was refined by feedback from an expert and an online pilot test and focus group interviews with elementary teachers, the instrument was finalized. The 56-item survey was sent via mail to 1000 third-grade teachers across Ohio. Useable responses were obtained from 514 teachers employed in rural and non-rural schools. The researcher concentrated on five areas that could possibly differ from rural and non-rural teachers. Those areas were: "(a) perceptions of the adequacy of technology, (b) perceptions of preparation for using technology, (c) perceptions of the level of administrator support for technology integration, (d) attitudes toward technology integration, and (e) perceptions for student sophistication of technology use" (Howley et al., 2011, p. 6). By analyzing data from the survey researchers showed that rural teachers have a more positive attitude than non-rural teachers regarding the integration of technology (Howley et al., 2011). The research further demonstrated that attitudes of the teacher, teacher preparation to use technology in teaching, and availability of technology, all had significantly positive associations (Howley et al., 2011). Students' learning in rural schools was considered better off than their counterparts in non-rural schools because their teachers' attitudes toward technology use were more positive, so rural students were more likely to use

technology when it was available (Howley et al., 2011). Neither the support of school leaders nor school resources had a significant effect.

Other researchers used semi-structured telephone interviews of teachers to collect data on what teachers believed about the use of technology and writing instruction (Regan et al., 2019). These 47 telephone interviews lasted between 30 and 60 minutes and were audio-recorded and transcribed for analysis. The interview protocol was 25 questions focused on the teacher's personal use of technology, their level of comfort using technology, their level of integration of technology in the classroom, the levels of technology accessibility in their school, and if they had any experience using assistive technologies with their students (Regan et al., 2019). The team of researchers identified categories and codes to organize the transcript data. The team then read through the data set and analyzed the data, discussing any differences that might have occurred and identifying emerging themes. The results of the study identified several barriers to technology integration that teachers expressed repeatedly. The first was that it was too time consuming. The second was that teachers had limited access to tools. The third was that some teachers perceived access to technology as a competition that they were unwilling to participate in (Regan et al., 2019).

In a research study involving seven teachers from two Catholic schools, researchers interviewed the teachers using semi-structured interviews four times each over the course of the two-year study (Swallow & Olofson, 2017). The purposes of the study were to understand the contextual factors within the TPACK framework and how those factors related to teachers' enactment of TPACK in Catholic schools. Survey questions focused on "teacher's classroom use of technology, opinions on the benefits

and challenges, and the perceived impact on student learning" (Swallow & Olofson, 2017, p. 232). Included in the school level questions were perceptions of community involvement and support of technology integration. Observations were also conducted four times over the course of the two-year study. The researchers took on the roles of observers as participants and were contributors to teachers' lesson planning and class activities (Swallow & Olofson, 2017). Finally, the researchers collected field evidence including "school policies, strategic plans, inventories of available technologies, mission statement, leadership structure, teacher reflections, blog posts, videos of lessons, and teacher conversations with the researchers" (Swallow & Olofson, 2017, p. 233). Data were examined through multiple iterations of coding to find the emergent themes. Results of this study of seven teachers in two Catholic schools showed that TPACK was at different levels for each of the teachers. Teacher backgrounds, beliefs about technology, and personal philosophy of teaching and learning moderated their enactment of TPACK (Swallow & Olofson, 2017). "Attempting to understand the development of pedagogical and content knowledge with the integration of technology requires attention to teacher-level circumstances" (Swallow & Olofson, 2017, p. 239). When teachers have the same access to technology they may not use the technology in the same ways because of their individual context.

In a different multiple case study by Swallow (2017), teachers at a Catholic school with a new technology initiative were chosen as participants. The technology initiative included a middle level one-to-one initiative in which all teachers and students were provided 24/7 access to internet capable tablet devices. In addition, teachers had new classroom television sets and a teacher laptop. Four middle level teachers were

interviewed using individual semi-structured interviews and later focus groups. Teachers were also observed in their classrooms. The researcher took an active role in lesson planning and classroom activities. The researcher also helped the participants to learn to use the devices and offered professional development on educational technology (Swallow, 2017). Finally, the researcher used historical documents to gather evidence on classroom practices and school context. Data were analyzed by looking for emergent themes. The researcher used a priori coding based on two frameworks, Miller's (2006) elements of a Catholic school and Cook and Simonds' (2011) framework for renewal of Catholic schools (Swallow, 2017). The results of the study found two themes related to 21st century learning. The first was "shifting classroom dynamics influenced pedagogical approaches" (Swallow, 2017, p. 170). The second was the content area that teachers taught played a "central role in technology integration and instruction" (Swallow, 2017, p. 170).

These studies show that teachers' integration of technology into the learning environment is a complex process with many variables. Some of those variables are teacher beliefs and attitudes, school leader support, access to technology, content taught, and location of the school. Each of these variables gives us more information as the study of technology integration in K-12 schools continues. Of particular interest in this study is school leader support and the effect that has on teacher technology integration.

LoTi Survey and Technology Integration

Several researchers used the LoTi survey as an instrument to collect data for their studies. A mixed methods research study was performed in high schools in Jamaica to determine the level of technology integration and to determine how technology

innovations were being used in teaching and learning (Malcolm-Bell, 2009). A total of 231 educators including teachers and principals took the LoTi survey. This survey is based on both the CBAM and ACOT models (Moersch, 1994). The survey has been aligned with the ISTE NETS-T Standards and the ISTE NETS-A Standards (Moersch, 1994). After the LoTi online survey, a researcher-designed interview protocol collected information from focus groups to "assess participants' perceptions of technology integration in schools" (Malcolm-Bell, 2009, i). In total, thirteen teachers and one principal participated in the focus groups. This interview data could also be used to validate the LoTi responses. Results of the study suggested technology was being integrated at low levels in schools under study. Barriers to teachers' technology integration included inadequate professional development and inadequate access to technology (Malcolm-Bell, 2009).

In a quantitative study, researchers used the LoTi framework and questionnaire to gather data on teacher self-reported technology integration, their personal computer use, and their current instructional practices (Summak & Samancioğlu, 2011). The study also addressed the relationship of gender and age on teachers' technology integration. Data were gathered from 232 K-12 vocational teachers in Turkey. The questionnaire was adapted by the researchers. The adapted version of the questionnaire was tested for reliability and validity and was found to have an overall reliability of .90 (Summak & Samancioğlu, 2011). Data were processed using both descriptive and inferential statistics using SPSS© 14 and Excel programs. Results of the study indicated that men were more likely to score higher on the technology integration and personal computer use scores

than women. Younger teachers had a higher personal computer use score than their older colleagues (Summak & Samancioğlu, 2011).

In a mixed methods study sponsored by the Friday Institute at North Carolina State University, 452 K-12 teachers in North Carolina took part in the study (Spires, Bartlett, Garry, & Quick, 2012). Each teacher took the LoTi survey to identify the teacher's level of technology integration on the LoTi scale. Results were analyzed with a one-way ANOVA. On average, elementary teachers had higher LoTi scores than did middle school or high school teachers (Spires et al., 2012). A purposive sampling procedure was employed and 52 teachers who scored in the higher range of the LoTi survey were selected to participate in a focus group session. A total of 13 agreed to participate in the focus groups. The teachers represented all levels of schooling, elementary, middle and high school, as well as various stages in their careers, early, mid-career, and seasoned professionals (Spires et al., 2012). The groups followed a semi-structured interview process. Data were clustered into relevant themes based on the research topics and teachers' responses that corresponded to the themes. Results of the study indicated that "educators must have more support in making the digital shift and the support needs to be systemic throughout the enterprise" (Spires et al., 2012, p. 16).

Summary

In this chapter school leadership was discussed at length. Three frameworks together make up the *Unified Framework* (Hitt & Tucker, 2016), the *Ontario Leadership Framework* (Leithwood, 2012), the *Essential Supports Framework* (Sebring et al., 2006), and the *Learning-Centered Leadership Framework* (Murphy et al., 2006). This *Unified Framework* aligns with the *National Standards and Benchmarks for Effective Catholic*

Elementary and Secondary Schools (NSBECS, 2012) as well as the *ISTE Standards for Education Leaders* (2018). The work of Dexter et al. (2016) using the *Unified Framework* connects general school leadership with school technology leadership. This leads us to conclude that good school technology leadership is good school leadership (Richardson, 2011).

Catholic schools have a long-standing reputation for academic excellence in the United States and around the world. While Catholic schools are prevalent in the United States, very little research has been done regarding technology in Catholic schools and in the area of school technology leadership in Catholic schools in particular (Cho, 2017; Swallow, 2017). This study is one that could add to the literature regarding school technology leadership and how it affects teachers' integration of technology in Catholic schools. In the next chapter, a method for studying this problem is discussed.

Chapter 3

Methodology

The purpose of this study was to identify the effects of school leaders' support on teachers' technology integration in Catholic schools. This was a sequential mixed methods explanatory study with the first research question being addressed in the quantitative portion of the study. The second research question was addressed in the qualitative portion of the study. Mixed methods research provided a better understanding of research than either quantitative or qualitative research could provide separately (Creswell & Plano Clark, 2011). The framework used for this study is the *Unified Model of Effective Leader Practices* (*Unified Framework*) (Hitt & Tucker, 2016) as applied to technology (Dexter et al., 2016).

This chapter describes the mixed methods study that addressed the research questions. It begins with the research questions. These questions are designed to explore the relationship between school leaders' support and teachers' integration of technology.

The research design explains why a mixed methods approach was chosen and why this method is best for this study. In the quantitative portion of the study, details of the *LoTi Survey* instruments are given, a description of the research participants, and a description of the data is also given. Variables are described and the method of analysis is explained. A model of the research was hypothesized and goodness of fit, reliability and validity were discussed.

Results of the quantitative study were used to identify the school leaders who were invited to be interviewed. The data on school leaders' support of technology integration, personal computer use, and current instructional practice was expected to

have a high correlation with teachers' technology integration. In the qualitative phase of the study, these school leaders were interviewed by the researcher and results were analyzed. Measures of credibility, transferability, dependability and confirmability were discussed.

Research Questions

1. To what degree does school leaders' overall support affect teachers' technology integration in Catholic schools?
   a. To what degree is leader support of teachers' personal and professional use of technology predictive of teacher technology integration?
   b. To what degree is leader support of teachers' technology integration predictive of teacher technology integration?
   c. To what degree is leader support of teachers' current instructional practice predictive of teacher technology integration?
   d. To what degree is leader support of teachers' personal and professional use of technology, support of teachers' technology integration, and support of current instructional practice together predictive of teachers' technology integration ?
2. How do school leaders support teachers' integration of technology in Catholic schools?

In this chapter, the research will be discussed beginning with the research design which will explain the advantages of a mixed methods study. Each phase of the study will then be discussed in detail as well as the specific quantitative and qualitative methods that

will be used and why they were chosen. Participants and instruments will be identified. Finally, a discussion of reliability and validity will be made for each phase.

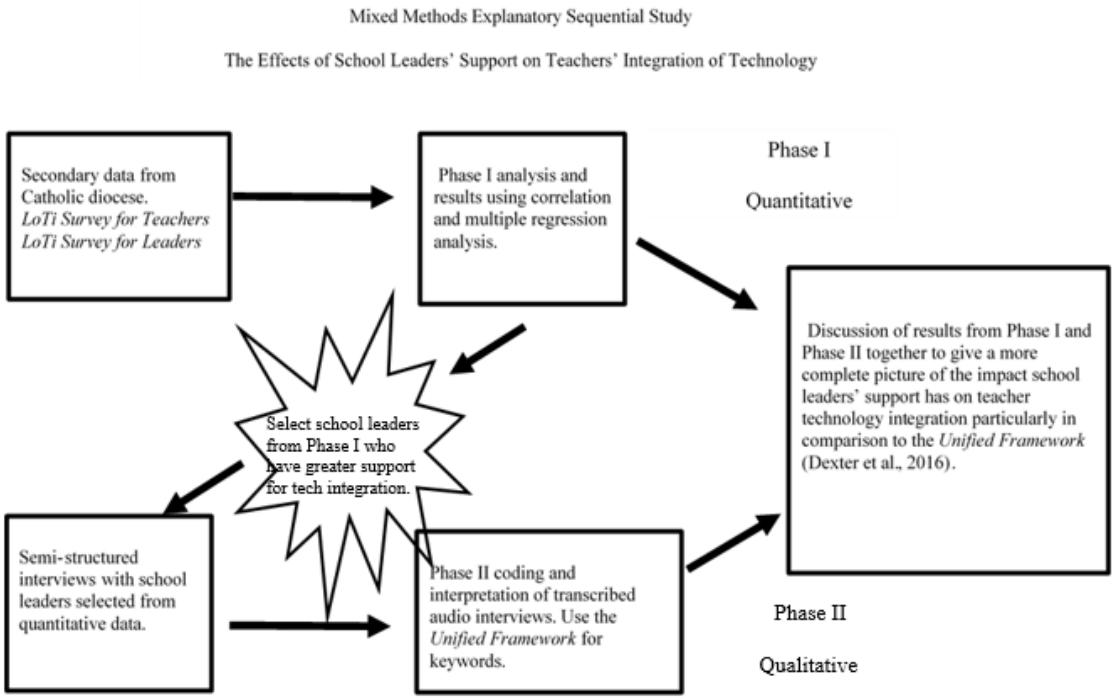
Research Design

To gain an in-depth understanding of school leaders' effect on teachers' technology integration, a sequential mixed methods explanatory design was used in this study. This study began with a quantitative phase to ascertain the effects of leader support of teachers personal and professional use of technology, teacher technology integration, and teacher use of current instructional practice, as well as the effect of the combined leader support of all three teacher areas on teacher integration of technology. The qualitative phase sought to determine the specific supports leaders use to support teacher technology integration. By performing the research in this order, it was possible to see to what degree each of the leader supports were significant and if significant, how those supports were manifested in schools with high performing leaders.

The use of a mixed method research design allows the researcher to collect and analyze both quantitative and qualitative data (Creswell & Plano Clark, 2011). In this study the qualitative data built on what was already learned in the analysis of the quantitative data. In the quantitative portion of the study, using correlation and regression analysis allowed the researcher to quantify the relationship between the supports given by school leaders and the effects those supports had on the integration of technology by teachers. This research identified whether leaders' supports have an effect on teachers' technology integration. After analyzing those supports, the researcher then interviewed school leaders to determine the specifics of the supports given to teachers that best lead to the integration of technology. The combination of the quantitative results and the

qualitative results of this mixed methods study allows for a better understanding of how leader supports affect teacher technology integration in Catholic schools and what the specific supports are as articulated by the leaders. This study benefits from the combined approach of both quantitative and qualitative methods.

Figure 3.1 Research Design



Phase I

The first phase of the research study was the quantitative portion of the study. The purpose of this quantitative investigation was to identify the extent to which teachers' integration of technology is affected by school leaders' support. The literature indicates that school leaders' overall support in the five domains of the *Unified Framework* (Hitt & Tucker, 2016) applied to technology (Dexter, Richardson, & Nash, 2016) is the best way to support teachers' technology integration.

In a crosswalk of the *Unified Framework* applied to technology (Dexter et al., 2016) with the statements from the *LoTi Digital Age Survey for Leaders* (2018), the LoTi statements fit well within the five domains of the *Unified Framework*. However, the LoTi statements do not exhaust all of the dimensions of the *Unified Framework*. This crosswalk appears in Appendix J.

Research participants. All teachers and school leaders in the schools in one southeastern U.S. Catholic diocese were asked to take the *LoTi Digital Age Survey* in the spring of 2018 as part of a bi-annual survey of technology use. Two different surveys were administered, one for teachers and one for leaders. School leaders were identified as those who provided support to classroom teachers. The roles of those leaders were principals, assistant principals, school technology coordinators, technology coaches, library media specialists, and curriculum coaches. A total of 65 school leaders completed the *LoTi Digital Age Survey for Leaders*. Teachers were those who provided instruction for students. A total of 700 teachers completed the *LoTi Digital Age Survey for Teachers*. The data generated from those surveys were used in quantitative phase of this study.

No participants in this study were identified by name and all schools were assigned a random number to prevent breaches in confidentiality. All data was handled with the utmost care to keep participants' information confidential.

Data description. For this research study, data was used from the *LoTi Digital Age Survey for Teachers* and the *LoTi Digital Age Survey for Leaders.* The *LoTi Digital Age Survey for Teachers* is made up of 37 Likert-type questions related to personal and professional use of technology, technology integration, and current instructional practices. Additionally, demographic data in the form of years of experience, gender, and

school level was also collected. The survey was available online for teachers for a period of 90 days during the spring of 2018. At the close of the survey period, 700 teachers from 6 high schools and 32 elementary schools had participated. The *LoTi Digital Age Survey for Teachers* appears in Appendix A.

The *LoTi Digital Age Survey for Leaders* is made up of 37 Likert-type questions. Focused on school leader support, data were collected in the areas of school leader support for teachers' personal and professional use of technology, support for teachers' integration of technology, and support teachers' current instructional practice. The same areas of demographic data were collected for school leaders as collected for teachers, namely, years of experience, gender, and school level. The survey was available for administrators for a period of 90 days during the spring of 2018. At the close of the survey period, 65 school leaders from 31 schools had taken the survey. School leaders from 6 high schools and 24 elementary schools participated. More than one leader participated in some schools and only one in others so an average leader score was used for the leader variables. The *LoTi Digital Age Survey for Leaders* appears in Appendix B.

The *LoTi Digital Age Survey* data used in this study are secondary data since the primary purpose of the data collection was for the diocese to inform schools on their progress in integrating technology into the curriculum. This use of secondary data is effective since the data comes from its original source without alteration or interpretation (Glaser, 1963; Smith, 2008). These secondary data were used to determine the relationships between school leader results and teacher results on the *LoTi Digital Age Surveys*. Permission was obtained from the superintendent of the diocese studied to use the data from the 2018 LoTi surveys (Appendix E). Permission was also obtained from

the LoTi Connection, the company that licenses the use of the surveys and reports aggregated data (Appendix G).

Variables. For this research study, data from two measurement instruments were used. The LoTi score from the *LoTi Digital Age Survey for Teachers,* reports the level of teachers' integration of technology in their teaching. The *LoTi Digital Age Survey for Leaders* reports three categories used in this study: (a) a score which represents the level of support the leader gives for teacher the integration of technology; (b) a score which represents the level of support the leader gives to teachers to use technology in teachers' planning, implementation, and evaluation of lessons whether teacher-centered or student-centered; and (c) a score which represents the level of support the leader gives to teachers to use student-centered instruction in ways that support student choice and differentiation.

In Phase I, correlational and multiple regression analyses were performed using SPSS© 26 to ascertain the extent to which school leader support influences teachers' technology integration. The *Unified Framework* (Hitt & Tucker, 2016) and the literature cited indicate that school leader support is a factor in teachers' integration of technology.

Table 3.1

Definitions of variables

Variable	Definition
LOTIT	Teachers integration of technology
AvgPCUL	The average leaders' support for teachers' personal and professional computer use
AvgLOTIL	The average leaders' support for teachers' integration of technology
AvgCIPL	The average leaders' support for teachers' current instructional practice
YRSEDT	The years of experience of teachers, 0 for 0-9 years, 1 for 10 or more
SEXT	The gender of the teachers, 0 for male, 1 for female
SCHLVL	The school level of the teacher, 0 for elementary, 1 for secondary
ε	The error

Model. The hypothesized models for research question 1 are:

a. $LOTIT = \beta_0 + \beta_1 AvgPCUL + \varepsilon$

b. $LOTIT = \beta_0 + \beta_1 AvgLOTIL + \varepsilon$

c. $LOTIT = \beta_0 + \beta_1 AvgCIPL + \varepsilon$

d. $LOTIT = \beta_0 + \beta_1 LOTIL + \beta_2 PCUL + \beta_3 CIPL + \beta_4 YRSEDT + \beta_5 SEXT + \beta_6 SCHLVL + \epsilon.$

Goodness of fit. The standard to determine goodness of fit is r^2 or the coefficient of multiple determination. The r^2 in this multiple regression equation indicates the proportion of variation in the dependent variable explained by all the independent variables (Lewis-Beck, 1980). This is a calculated statistic that is affected by the number of independent variables in the equation. It is best to test models that use the fewest variables that give the best fit (parsimony).

Reliability and validity. An analysis of the *LoTi Digital Age Survey for Teachers* and *LoTi Digital Age Survey for Leaders* indicates that the reliability of the surveys are high: Cronbach's alpha (α) = .93 (Stolzfus, 2006). Cronbach's alpha is a test of internal consistency reliability. This is a measure of the degree to which the responses are consistent across all items of the instrument (Kline, 2016). The quality of the data to be used in this study should be reliable since it was gathered through an anonymous online survey. Since the instruments are reliable, the data gathered under these circumstances should also be reliable.

Content validity reflects how well survey items sample the entire range of what is being measured (Cohen & Swerdlik, 2004). The *LoTi Surveys* are based on the work of David Dwyer and his Apple Classrooms of Tomorrow and built reflecting the Concerns Based Adoption Model (Stoltzfus, 2006). Construct validity indicates whether scores on the *LoTi Survey* measure "a target hypothetical construct" (Kline, 2016, p. 93). Content validity also includes the accuracy of how well a survey reflects a person's stand on the particular construct. This type of validity is particularly important for instruments that obtain self-reported information (Stoltzfus, 2006). "Criterion-related validity demonstrates how well a survey reflects one's standing on an objective, non-self-reported external criterion outside of the survey itself" (Stoltzfus, 2006, p. 5). This standard of measurement allows for interpretation of scores against the criterion. In her two studies of the *LoTi Survey*, Stoltzfus (2006, 2009) demonstrated that the *LoTi Survey* had content, construct, and criterion-related validity.

Interphase to Identify Leader Participants

School leaders were chosen to be interviewed based on high scores on the *LoTi Survey for Leaders* with high teachers' technology integration scores on the *LoTi Survey for Teachers* in their schools. Eleven pairs were identified according to this criteria. If this data were graphed, (Leader, Teacher), the selection criterion for leaders to be invited to be interviewed would be leaders who have a high score, that is, those who are farther to the right of the other scores. The eleven leaders were invited to participate in semi-structured interviews with the hope of having at least five participants.

The purpose of this selection method of participants was to discover any shared characteristics among those leaders with high LoTi scores that lead schools with teachers who integrate technology well. The overall purpose of these interviews was to address the research question: How do school leaders support teachers' integration of technology in Catholic schools? Interview questions were based on the *Unified Framework* (Hitt & Tucker, 2016). The interview questions for the participants are listed in Appendix C.

Phase II

The second phase of the research was the qualitative portion of the study. It consisted of interviews of leaders whose scores on the *LoTi Digital Age Survey for Leaders* indicated high leadership scores and whose teachers demonstrated high integration scores. School leaders were invited by email to participate in the study (Appendix F). There were no rewards or penalties for school leaders who participated or did not participate in the study.

Data were generated through semi-structured interviews. Field notes were taken to give more clarity to the responses. The interview questions were based on the *Unified*

Framework as it applies to technology (Dexter et al., 2016). The interview protocol can be found in Appendix C. A description of the qualitative portion of the study was given to each participant outlining the scope of the interview (Appendix D) along with a consent form (Appendix H).

Data analysis. Interviews were digitally recorded and transcribed by the researcher using *Braina*© software. Interview data was analyzed using line-by-line analysis recommended by Gibbs (2007)**.** The first time the interview data was sorted it helped develop the initial or Level 1 coding (Yin, 2011) by being compared to the *Unified Framework*. Interview responses were coded against the dimensions of each domain to determine which dimensions and to what extent the school leader discussed each of the five *Unified Framework* domains. This iterative sorting of the interviews went on until all of the unique ideas from the individual interviews were captured.

After the initial sorting, relationship codes were developed. These codes are also known as Level 2 codes (Yin, 2011). These codes were characterized by repeated themes. Evidence in the form of statements from the participants supported the claims made at Level 2. These codes were used to establish a framework that could be developed regarding the influence of school leaders on teachers' technology integration. Results for the qualitative analysis appears in Chapter 4.

Credibility, transferability, dependability, and confirmability. The threats to qualitative research are credibility, transferability, dependability, and confirmability (Lincoln & Guba, 1985). Credibility refers to the quality of the data that is generated from the semi-structured interviews. It is important that the participants in qualitative research believe the findings are accurate and believable. In semi-structured interviews

the two threats to credibility are inaccurate reporting and inaccurate coding (Creswell, 2009; Glessne, 2011). To address this threat, the researcher performed and audio-recorded all interviews. Those interviewed had the opportunity to review their transcript before any coding occured. After the coding took place, the researcher sought an expert opinion in determining the accuracy of the coding. This expert was a researcher who has qualitative research experience and could guide the researcher if coding errors had occurred.

Another test of valid data is dependability. Dependability refers to getting the same results in the interview if it were repeated. (Gibbs, 2007; Onwuegbuzie & Leech, 2007). Since those interviewed had the opportunity to review their transcripts they were able to determine whether they would say the same thing in a second instance. All transcripts were checked to make sure they did not contain transcription errors (Gibbs, 2007). Gibbs (2007) also recommends that the researcher check to make sure there is no drift in the definitions of the codes. This can be accomplished by constantly comparing data with codes and by writing memos about the codes and their definitions (Yin, 2011). There were no unexpected occurrances. The qualitative portion of this study should be able to be replicated.

Confirmability refers to objectivity in evaluating the results of the qualitative portion of the study. It is important that the research findings are supported by the data collected (Onwuegbuzie & Leech, 2007). In order to check for objectivity in evaluating the responses of the semi-structured interview results, participants checked the findings and conclusions of this portion of the study to verify that the results were accurate and flow from the actual interviews.

The last check of validity is transferability. This refers to the extent the findings can be transferred to other contexts (Onwuegbuzie & Leech, 2007). This implies that the results are generalizable and can be applied to similar settings. In this study, school leaders from multiple sites were chosen to be interviewed. Common themes that emerged occurred frequently in the interviews and could be generalized to schools in similar dioceses.

Bias. The researcher for this mixed methods study is an employee of the diocese participating in the study. All participants remained anonymous in the reporting of interview data. While there was no deliberate coercion or pressure placed on participants, the participants themselves could have felt some pressure to respond to questions in ways they think would be most favorably received by the interviewer. However, every effort was made to minimize this situation. Participants had the option to withdraw at any point from the study.

Integration of Results

Overall results of the quantitative and qualitative portions of the study were compared using the *LoTi Digital Age Survey for Leaders* data, the *LoTi Digital Age Survey for Teachers* data, and the semi-structured interview data. The different types of data collected and compared provided for a deeper understanding of the connection between school leader support and teacher technology integration in Catholic schools.

This comparison highlights the benefit of the mixed methods study in combining the quantitative and qualitative approaches to determine if there is any deeper explanation that can be gleaned from the two methods together rather than the quantitative or qualitative portions of the study separately (Creswell, & Plano Clark, 2011). This

addresses how well the results of research question one and research question two together show the effects that support from school leaders have on the technology integration of teachers in Catholic schools.

Summary

The proposed quantitative model appears to satisfy the theoretical concept of overall school leaders' support affecting teachers' technology integration. This helps answer the research question: Does school leaders' overall support affect teachers' technology integration in Catholic schools?

The results of this study are based solely on one southeastern diocese. The purpose of the qualitative portion of the mixed methods study is to expand on the information gathered from the quantitative data and provide a more complete picture of the effect of overall school leaders' support for teacher technology integration. This addressed research question two: How do school leaders support teachers' integration of technology in Catholic schools?

Finally, the results of the quantitative portion of the study and the qualitative portion of the study were compared. This comparison honors the nature of the mixed methods study in combining the two approaches to determine if there is any deeper explanation from the two methods together rather than the quantitative or qualitative portions of the study separately. This addressed how well the results of research question one and research question two align to show the effect the supports that school leaders have on the technology integration of teachers in Catholic schools.

In the next chapter, the results of both the quantitative and qualitative phases of the research study will be given. These results were used to determine the answers to the two research questions.

Chapter 4

Results

The purpose of this study was to determine the effects of school leaders' support on teachers' technology integration in Catholic schools. The study was guided by the following research questions:

1. To what degree does school leaders' overall support affect teachers' digital technology integration in Catholic schools?
    a. To what degree is leader support of teachers' personal and professional use of technology predictive of teacher technology integration?
    b. To what degree is leader support of teachers' technology integration predictive of teacher technology integration?
    c. To what degree is leader support of teachers' current instructional practice predictive of teacher technology integration?
    d. To what degree is leader support of teachers' personal and professional use of technology, support of teachers' technology integration, and support of current instructional practice together predictive of teachers' technology integration?
2. How do school leaders support teachers' integration of digital technology in Catholic schools?

This study was a mixed methods sequential explanatory design, where Phase I of the study was the quantitative data being analyzed first and Phase II the qualitative data being collected and analyzed after that. Quantitative results were used to inform the

selection of school leaders for the qualitative interviews. In this chapter the results of implementing the study design as outlined in Chapter 3 are presented.

Phase I - Quantitative Results

Results from the *LoTi Digital Age Survey for Teachers (*2018) and the *LoTi Digital Age Survey for Leaders* (2018) from a Catholic diocese in the southeastern region of the United States were used to determine the relationships between teachers' integration of technology and the three areas of leader support. As stated in the four parts of Research Question 1, these supports were examined individually and collectively to see which had the greatest effect on teachers' integration of technology in Catholic schools.

Responses to 37 statements were collected through both the teacher survey located in Appendix A, and the school leader survey located in Appendix B. Participants chose the answer that best described their behavior on a scale of 0 (never) to 7 (daily). Responses were grouped into three constructs by the survey creator: Personal Computer Use (PCU), Current Instructional Practice (CIP), and Levels of Teaching Innovation (LoTi). This is true for both teachers and leaders. Teachers responded regarding their personal practices while leaders responded in light of their support of teacher practices. Together the teacher and leader responses define the technology culture in individual schools and collectively in dioceses and archdioceses.

Table 4.1

Definitions of Variables

Variable	Definition
LOTIT	Teachers integration of technology
AvgPCUL	The average leaders' support for teachers' personal and professional computer use
AvgLOTIL	The average leaders' support for teachers' integration of technology
AvgCIPL	The average leaders' support for teachers' current instructional practice
YRSEDT	The years of experience of teachers, 0 for 0-9 years, 1 for 10 or more
SEXT	The gender of the teachers, 0 for male, 1 for female
SCHLVL	The school level of the teacher, 0 for elementary, 1 for secondary

Demographic data were collected through the teacher survey, data that describe the number of years a teacher has been in education and their gender. Demographic data were also collected on the leaders' survey, this data described the number of years a school leader had been in education and their gender. The initial data set obtained from the diocese under study included over 700 teacher surveys. However, for the current study only schools with both teacher and leader data were used. As a result, 624 teacher surveys were used in the data analysis. There was a total of 65 leader surveys from 31 schools. All leader surveys were used in the analysis. Schools were randomly numbered and data were identified from that point on as from a numerical school rather than by school name to preserve confidentiality of the teachers, the school leaders, and the school. Due to multiple leader data in some schools and not in others, the mean of the school leader scores was used. Thus, all teachers from School 1 were paired with the average leaders' score from School 1 and so on.

The descriptive statistics are listed in Table 4.2. This table shows that the average LoTi score for teachers (LoTiT) is below the average support levels in all areas of leadership support: average LoTi for leaders (AvgLoTiL), average personal computer use by leaders (AvgPCUL), and average current instructional practice (AvgCIPL).

Table 4.2

Descriptive Statistics

	Mean	Std.Deviation	N
LoTiT	2.88	1.63	624
AvgLOTIL	3.25	1.38	31
AvgPCUL	4.67	.944	31
AvgCIP	4.42	1.15	31

In Table 4.3 the correlations of the dependent and independent variables used in this study were examined. The predictor variables AvgLOTIL, AvgPCUL, and AvgCIPL were well correlated with the LOTIT dependent variable. However, the correlations of the predictor variables to predictor variables were above the threshold usually held for non-collinearity ($x < .7$). A further test for tolerance and the variance inflation factor was conducted. The results can be found in Table 4.4. Those results showed that the three predictor variables, AvgLOTIL, AvgPCUL, and AvgCIPL were multicollinear and would affect the interpretation of the data if all three were used in the same regression model. However, the first three parts of research question 1 allow for the examination of the teacher integration results with each of the predictor variables separately.

Table 4.3

Correlations of Variables

		LoTiT	AvgLOTIL	AvgPCUL	AvgCIPL
Pearson Correlation	LOTIT	1.00	.18*	.15*	.17*
	AvgLOTIL	.18*	1.00	.92*	.92*
	AvgPCUL	.15*	.92*	1.00	.87*
	AvgCIPL	.17*	.92*	.87*	1.00

*p < .05, one-tailed

Table 4.4

Collinearity Statistics

	Tolerance	VIF
AvgLOTIL	.101	9.927
AvgPCUL	.155	6.459
AvgCIPL	.151	6.621

Tables 4.5, 4.6 and 4.7 show the descriptive data for those teachers who participated in the survey.

Table 4.5

Teachers' Years of Experience and Gender

	Male	Female
Less than 10 years of experience	55	212
More than 10 years of experience	52	305

Table 4.6

Teachers' School Level and Gender

	Male	Female
Elementary School K-8	53	428
Secondary School 9-12	54	89

Table 4.7

Teachers' Years of Experience and School Level

	Elementary K-8	Secondary 9-12
Less than 10 years of experience	217	50
More than 10 years of experience	264	93

Research Question 1a

To what degree is leader support of teachers' personal and professional use of technology predictive of teacher technology integration?

To analyze this portion of the research question, it was necessary to look at one dependent variable, teachers' integration of technology, LOTIT, and one predictor variable, the average leaders' support for personal and professional computer use, AvgPCUL. This generated Model 1: $\widehat{LOTIT_i} = \hat{\beta}_0 + \hat{\beta}_1 AvgPCUL_i$.

Table 4.8 shows the models that could be built upon Model 1 expressing the relationship of teacher technology integration and the average leader's support for personal and professional computer use. In Model 2, the variable representing the teachers' years in education, YRSEDT, was used to determine if that variable might strengthen the effect with the variable AvgPCUL, the leaders' support of teachers' personal and professional use of technology, in predicting the level of teachers' integration of technology, LOTIT. The equation for Model 2 is $\widehat{LOTIT_i} = \hat{\beta}_0 + \hat{\beta}_1 AvgPCUL_i + \hat{\beta}_2 YRSEDT_i$. In comparing Model 1 and Model 2, the values of the slope of AvgPCUL are .261 and .259 respectively. Both of these values are significant in their respective models at the $p < .05$ level. The value for the slope of YRSEDT is small and not statistically significant. However, the r^2 value for Model 1 is less than that for

Model 2 and the standard error of regression is the same in both models, making Model 2 slightly better than Model 1 in describing the degree to which AvgPCUL predicts LOTIT. In Model 2, AvgPCUL describes 2.4% of the change in the levels of teachers' technology integration when years of teachers' experience are considered.

In total, five models were considered. Model 5, which included variables for years of experience, gender, and school level, as well as personal and professional use of technology, had the highest r^2 value with a comparatively low standard error of regression. The r^2 value for Model 5 was 3.2% of the change in variance is explained by this model with a standard error of regression of 1.610. The theoretical Model 5 is $\widehat{LOTIT_i} = \hat{\beta}_0 + \hat{\beta}_1 AvgPCUL_i + \hat{\beta}_2 YRSEDT_i + \hat{\beta}_3 SEXT_i + \widehat{\beta}_4 SCHLVL_i$. The linear regression equation using the *LoTi Digital Age Survey* (2018) data was

LOTIT = 1.870 +.245 AvgPCUL - .047 YRSEDT - .147 SEXT +.283 SCHLVL.

In Model 5, $\beta_0 = 1.870$, indicates the average level of teachers' integration of technology when the average leaders' support of personal and professional computer use, years of experience are zero and teachers are male and the school level is elementary school. The average change in teachers' integration of technology, $\beta_1 = .245$ when leaders' support of personal and professional computer use increases by one unit controlling for years of experience of teachers, gender of teachers, and school level. $\beta_2 =$ -.047 which represents the average change in teachers' integration of technology when teachers have ten years of experience or more, controlling for leaders' support of personal and professional computer use, the gender of teachers, and the school level. $\beta_3 = -.147$ represents the average difference in LoTi scores of teachers between male and female teachers controlling for leaders' support of personal and professional computer use, the

years of experience of the teachers, and the school level. $\beta_4 = .283$ indicates the average difference between elementary and secondary teachers while controlling for all other variables.

The data shows that leaders' support of teachers' personal and professional use of technology is slightly predictive of teachers' technology integration. Model 5 proved to be a slightly better model than Model 1 with an r^2 value of 3.2%. In all models 1-5, the change in teachers' technology integration was significantly affected by the school leaders' support of teachers' personal and professional use of technology and that this was not just by chance.

Table 4.8

Comparison of AvgPCUL Models

	Model 1	Model 2	Model 3	Model 4	Model 5
	AvgPCUL	AvgPCUL YRSEDT	AvgPCUL SEXT	AvgPCUL SCHLVL	AvgPCUL YRSEDT SEXT SCHLVL
AvgPCUL	.261* (.068)	.259* (.068)	.261* (.068)	.246* (.069)	.245* (.069)
AvgLOTIL					
AvgCIPL					
YRSEDT		-.041 (.056)			-.047 (.056)
SEXT			-.255 (.171)		-.147 (.181)
SCHLVL				.309* (.154)	.283 (.163)
Constant	1.658* (.326)	1.734* (.034)	1.873* (.356)	1.659* (.325)	1.870* (.367)
r^2	.023	.024	.026	.029	.032
Adjusted r^2	.021	.021	.023	.026	.025
Stand. error of regression	1.611	1.611	1.609	1.607	1.607

*p < .05

Research Question 1b

To what degree is leader support of teachers' technology integration predictive of teacher technology integration?

To analyze this portion of research question one, it was necessary to consider one dependent variable, teachers' integration of technology, LOTIT, and one predictor variable, the average leaders' support for teachers' technology integration, AvgLOTIL. This generated Model 6: $\widehat{LOTIT_i} = \hat{\beta}_0 + \hat{\beta}_1 AvgLOTIL_i$.

Table 4.9 shows the models that can be built on Model 6 expressing the relationship of teachers' technology integration and the average leader's support for technology integration.

Table 4.9

Comparison of AvgLOTIL Models

	Model 6	Model 7	Model 8	Model 9	Model 10
	AvgLOTIL	AvgLOTIL YRSEDT	AvgLOTIL SEXT	AvgLOTIL SCHLVL	AvgLOTIL YRSEDT SEXT SCHLVL
AvgPCUL AvgLOTIL	.206* (.047)	.206* (.047)	.208* (.047)	.195* (.047)	.227* (.189)
AvgCIPL YRSEDT		.044 (.055)			-.048 (.056)
SEXT			-.280 (.047)		-.179 (.180)
SCHLEVEL				.291 (.154)	.255 (.163)
Constant	2.208* (.031)	2.282* (.189)	2.433* (.214)	2.178* (.165)	2.406* (.233)
r^2	.031	.032	.035	.036	.039
Adjusted r^2	.029	.028	.032	.033	.033
Stand. error of regression	1.605	1.605	1.602	1.601	1.601

*p< .05

The best performing model appears to be Model 10, $\widehat{LOTIT_i} = \hat{\beta}_0 + \hat{\beta}_1 AvgLOTIL_i + \hat{\beta}_2 YRSEDT_i + \hat{\beta}_3 SEXT_i + \hat{\beta}_4 SCHLVL_i$. The linear regression yielded the following: LOTIT = 2.406 +.227 AvgLOTIL -.048 YRSEDT - .179 SEXT +.255 SCHLEVEL, with an r^2 of .039 and a standard error of regression of 1.601. The intercept is 2.406 controlling for all variables. β_1 = .227 which indicates that the average level of teachers' technology integration increases by .227 when the leaders' support of teachers'

technology integration increases by one unit, controlling for years of experience of teachers, gender of teachers, and school level. β_2 = -.048, which represents the average change in teachers' integration of technology when teachers have ten years of experience or more, controlling for leaders' support of technology integration, the gender of teachers, and the school level. β_3 = -.179 indicates that teachers' technology integration level drops by -.179 when teachers are female, controlling for all other variables. β_4 = .255 indicates the average difference between elementary and secondary teachers' technology integration, controlling for leaders' support of technology integration, the years of experience in education, and the gender of teachers.

Models 6 through 10 explore the relationships of the variables in terms of linear regression. Model 10 explains the degree of leaders' support for teachers' technology integration being 3.9% more of the variance in teachers' technology integration than that which might occur by chance. The standard error of regression for Model 10 was 1.601.

Research Question 1c

To what degree is leader support of teachers' current instructional practice predictive of teacher technology integration?

To analyze this portion of the research question, it was necessary to look at one dependent variable, teachers' integration of technology, LOTIT, and one predictor variable, the average leaders' support for current instructional practice, AvgCIPL. This generated Model 11: $\widehat{LOTIT_i} = \hat{\beta}_0 + \hat{\beta}_1 AvgCIPL_i$.

Four additional models were developed from this basic model using the other variables that were available, namely the years of experience for teachers, the gender of

the teachers, and whether the teachers taught in an elementary or secondary school. Table 4.10 shows the models that were developed.

Table 4.10

Comparison of AvgCIPL Models

	Model 11	Model 12	Model 13	Model 14	Model 15
	AvgCIPL	AvgCIPL YRSEDT	AvgCIPL SEXT	AvgCIPL SCHLVL	AvgCIPL YRSEDT SEXT SCHLVL
AvgPCUL					
AvgLOTIL					
AvgCIPL	.235* (.056)	.233* (.056)	.239* (.056)	.229* (.056)	.229* (.056)
YRSEDT		.036 (.056)			-.041 (.056)
SEXT			.290 (.171)		-.174 (.180)
SCHLVL				.340 (.153)	.304 (.162)
Constant	1.840* (.255)	1.907* (.270)	2.063* (.287)	1.790* (.256)	2.007* (.305)
r^2	.028	.028	.032	.035	.038
Adjusted r^2	.026	.025	.029	.032	.032
Standard error of regression	1.607	1.608	1.605	1.602	1.602

*p < .05

The best performing model appears to be Model 15, $\widehat{LOTIT_i} = \hat{\beta}_0 + \hat{\beta}_1 AvgCIPL_i + \hat{\beta}_2 YRSEDT_i + \hat{\beta}_3 SEXT_i + \widehat{\beta_4} SCHLEVEL_i$. The linear regression yielded the following: LOTIT = 2.007 +.229 AvgCIPL -.041 YRSEDT - .174 SEXT +.304 SCHLVL with an r^2 of .038 and a standard error of regression of 1.602. The intercept, $\beta_0 = 2.007$ indicates the average level of teachers' integration of technology when all variables are zero. $\beta_1 = .229$, the average change in teachers' integration of technology when leaders' support current instructional practice increases by one unit

controlling for years of experience of teachers, gender of teachers, and school level. β_2 = -.041 which represents the average change in teachers' integration of technology when teachers have ten years of experience or more, controlling for leaders' support current instructional practice, the gender of teachers, and the school level. β_3 = -.174 represents the average difference in LoTi scores of teachers between male and female teachers controlling for leaders' support of current instructional practice, the years of experience of the teachers, and the school level. β_4 = .304 indicates the average difference between elementary and secondary teachers while controlling for all other variables.

Model 15 proved to be a slightly better model than Model 11 with an r^2 value of 3.8%. In all models 11-15, the change in teachers' technology integration was significantly affected by the school leaders' support of teachers' current instructional practice and that this was not just by chance.

Research Question 1d

> *To what degree is leader support of teachers' personal and professional use of technology, support of teachers' technology integration, and support of current instructional practice together predictive of teachers' technology integration?*

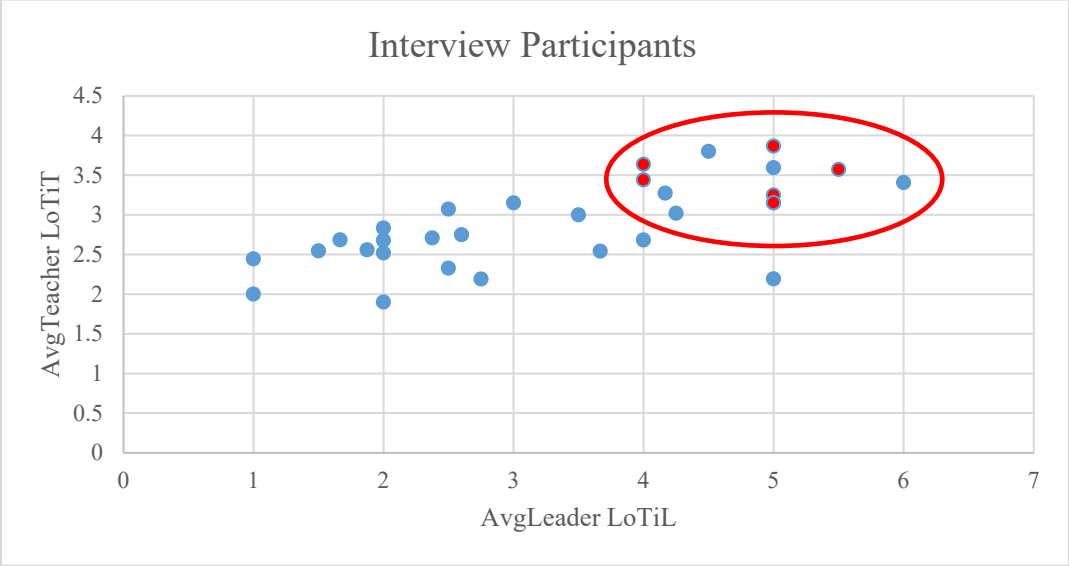
As was discussed earlier, the problem of multicollinearity prevents the use of all three predictor variables being used in a single model. Therefore, combined leaders' support of teachers' personal and professional use of technology, support of teachers' technology integration, and support of teachers' current instructional practice cannot be

statistically considered, even though each individually yielded a significant relationship with teachers' integration of technology.

Interphase – Selection of Interview Participants

According to the research design for this study found in Chapter 3, the plan was to select school leaders from Phase I with greater support for technology integration, so that they could be interviewed in Phase II. In order to determine those school leaders, all school leaders' LoTi scores were averaged by school and graphed to determine those leaders who had the highest scores, paired with the teachers' average. Eleven school leaders emerged with the highest LoTi scores whose teachers had a higher average LoTi score. School leaders were invited by email, found in Appendix D, to participate in semi-structured interviews. Of the eleven leaders, two had retired and two did not respond to the invitation even after a reminder was sent. One leader was unable to participate due to personal reasons and six school leaders agreed to be interviewed. Figure 4.1 shows the graph of potential participants with the invited participants occurring within the red oval. Those interviewed appear in red within the red oval.

Figure 4.1 *Potential Interview Participants*



Phase II – Interviews

Appointment times were set up to accommodate the interviewee's schedules. All six chose to be interviewed in their own school environments. The six participants were one elementary school (K-8) assistant principal, one secondary assistant principal (9-12), two elementary school principals (K-8), and two secondary school principals (9-12). Interviews were expected to take from thirty to sixty minutes depending on how the school leader elaborated in their answers during the interview. All interviews were conducted from December 2, 2019 through December 17, 2019.

Each interview was conducted at a time and location determined by the participants. Each chose to be interviewed in their own schools. The Unified Framework (Hitt & Tucker, 2016), as it applies to technology (Dexter, et. al, 2016) was used as a basis for the questions asked during the interviews. These questions appear in Appendix C. Keywords from the Unified Framework were used in coding the interviews to

determine common threads of information. Descriptive information on the interviewees appears in Table 4.11.

Table 4.11

Participant Data

	Role	School	Grades	Years in Current Role	Years in Education	Gender
Interview 1 (I1)	Assistant principal	Elementary	PreK-8	5	>10	F
Interview 2 (I2)	Assistant principal	Secondary	9-12	>5	>10	F
Interview 3 (I3)	Principal	Elementary	PreK-8	4	>15	F
Interview 4 (I4)	Principal	Secondary	9-12 STEM	4	>15	F
Interview 5 (I5)	Principal	Secondary	9-12	>10	>20	M
Interview 6 (I6)	Principal	Elementary	PreK-8	5	>10	M

Hitt and Tucker's (2016) first domain is *Establishing and Conveying the Vision*. In the six interviews that took place, school leaders discussed how they shared the vision for technology with their staffs. They shared their specific expectations for technology use in their schools and how they conveyed those expectations to their teachers. Finally, they discussed collecting data in order to monitor their journey of continuous improvement.

Expectations for technology use were similar among those interviewed. The elementary school assistant principal stated that she believed that technology should be used for tasks that "cannot be done with pencil and paper," (I1). Those kinds of tasks were the ones that were encouraged by the administration of the school. This view was supported by all who were interviewed.

The secondary assistant principal and both the secondary principals expanded that idea. Their expectations were fundamental, that teachers use technology. Each of the three specifically stated this in their interviews and went on to say that technology is expected to be used to differentiate lessons, engage students, build skills, teach students to research, create interactive lessons, and teach students to collaborate on assignments (I2, I4, I5). Using technology has become a way of life in all six of the schools.

These expectations are conveyed in different ways, depending on the school. One secondary principal stated that her STEM coordinator created specific training tools for the faculty so that everyone had the same information (I4). Others leaders stated that their expectations were a part of faculty handbooks and printed newsletters (I3, I1). In one school, administrators deliberately send a consistent message and all expectations come from all administrators (I2). This allows all teachers to know the performance expectations that have become "the way we do things around (here). Onboarding is almost indoctrination" (I6).

Some schools have different expectations for younger students than older ones. This is true both in elementary schools and in high schools. In elementary school, the age of the child is a factor in what is expected at some schools (I1, I3). This is true of the quantity of finished products as well as the tasks that are expected. Age is also a factor in what tool is used. At one school, younger students use iPads because they are more "kid-friendly" while older students in middle school use Chromebooks (I1).

In other elementary schools, students K-8 are expected to use technology for the same purposes. In one school, everyone is expected to do tasks that are age-appropriate but still have a focus on being more than a research tool (I3). "I believe we need to give

students of all ages tasks that cannot be done without technology" (I3). Another elementary principal agrees that expectations are the same across grades. In his school, "everyone is expected to do the same things: (a) make it global; (b) make it project-based-learning; and (c) make it apply to the real world" (I6).

The expectations of the high school principal at the STEM certified school is different for 9th graders than it is for 12th graders. Ninth graders start from the beginning in this school so that everyone learns proper research techniques: how to paraphrase and not plagiarize how to collaborate with other students, how to understand the conventions of research but know how to synthesize information and analyze situations (I4). By the time students are in the twelfth grade, the expectation is that they will not only research and gain information but they will communicate that information with individuals in the community (I4). The assistant principal at the single-sex school agrees. At her school, freshmen need more coaching on how to take notes, use technology for organization, how to use the learning management system (I2). By the time students are seniors, they do not need that coaching (I2). However, the principal at the co-ed high school disagrees. He believes that students are already pretty sophisticated when they arrive in high school. The expectation of teachers at his school is that the students have a better understanding of how the technology works (I5).

Administrators seem to agree that students should have age-appropriate tasks assigned (I1, I2, I4). These tasks need to be meaningful work that goes beyond what one can do without technology. Research is fundamental in at least one high school as they learn in a graduated fashion the key components of research and application of learning

in collaborative groups with other students. As older students they use this new-found research prowess to engage with the community (I4).

The second domain is *Facilitating Technology Use as Part of a High-Quality Learning Experience* (Dexter, et al., 2016). School leaders were asked how they encourage and mentor teachers' use of technology in their day-to-day work. There were several key ideas expressed during the interviews that intersected with this domain. The first is that administrators need to know what is going on in each classroom. It is through developing a robust curriculum, instructional program, and assessment program, that are coordinated with technology, that administrators can help guide teachers in their use of technology. That can take place through classroom walkthroughs or visits to professional learning community meetings (I1, I4). Exemplars often are identified for individual faculty members or for the staff at large to indicate what is possible using technology (I1, I4).

Coaching is provided at the request of teachers or at the recommendation of the administrator (I1, I2, I3, I4, I5, I6). The secondary assistant principal stated, "We very much want to make sure that they're (the teachers) comfortable using the technology here" (I2). The secondary principal at the STEM school indicated that she wanted her teachers to have as many resources as possible, feeling the more resource-rich the learning environment was, the more in-depth learning was taking place there (I4). The principal at the co-ed high school indicated that though the community was lagging behind in their use of technology compared to the school, the community wanted the school to excel in its use of technology for learning (I5).

An important component of the curricular program that technology seems to facilitate well is differentiation of instruction. One elementary principal was emphatic in his discussion of how technology had changed his instructional and assessment programs (I6). The principal said, “We can monitor our students’ progress using Kahoot or Socrative or other apps and then we can adjust instruction on the fly” (I6). “It’s that flexibility of changing on the fly that teachers are still working on” (I6).

The principal of the co-ed high school felt that technology creates a level of engagement that is not possible by just grouping students and only one group at a time receiving direct support from the teacher (I5). As a long-time teacher and administrator, this school leader was suspicious at first of the engagement level of the students. He suspected the students were engaging in off-task behavior. However, after monitoring several instances, he’s convinced that students are on task more often using their cell phones or laptops than they were without the technology (I5). This school, which is small, would not be able to have a dual credit program without technology. The principal of the STEM school wholeheartedly agrees. “Our students have the opportunity for more engagement for all students at the same time” (I4).

The third domain is *Building Professional Capacity for Technology Integration* (Dexter, et al., 2016). This domain is intertwined with domain two. In fact, answers to the interview questions crossed over the two domains. Leaders indicated that they were invested in providing opportunities for the faculty and the leaders to learn. These opportunities included local opportunities like short trainings during faculty meetings (I1, I3, I4, I6) and during professional learning community time (I1, I3, I6). Local opportunities also included one-on-one coaching from designated people in the school

ranging from proficient classroom teachers to designated coaches, who bore different titles depending on the school in which they worked (I1, I2, I3, I4, I5, I6). Teachers and leaders attended specialized training outside the school at diocesan workshops and at local, regional, and national conferences (I1, I2, I3, I4, I5, I6). Those who attended workshops outside the schools were expected to bring new learning back to the school and share with the teachers and administrators who were not able to attend (I1, I2, I3, I4, I5, I6). All leaders emphasized that they learned along-side their teachers in order to assist teachers who were having difficulties (I1, I2, I3, I4, I6). However, in the case of the principal of the co-ed high school, he was learning because he needed to know how to use technology in his job as well (I5).

In one of the elementary schools, the principal reported that his staff would look for apps and programs that they thought would benefit their teachers. The teachers would research, find potential apps, learn to use and apply the apps to their students' learning, and often present at the faculty meeting in order to share their findings with their teacher colleagues and the principal (I6). At the STEM high school, teachers would be identified by the principal as having a good use of technology (I4). The teachers' use of technology would be written up as positive examples in the school's internal communication, and if the use had broad enough appeal, the teachers would be asked to present at the next faculty meeting (I4). At another elementary school, teachers observe each other to learn to use specific software and hardware (I1). The same is true at the third elementary school, and after the observation, teachers can have technology coaches who mentor them if they need more assistance (I3).

The most unique form of building professional capacity expressed was at the STEM school. At that school, the STEM coordinator/technology coordinator would make short video segments for the faculty on a variety of topics ranging from the learning management system to the z-space computers in the STEM lab. These videos were available both at school and at home so that faculty could avail themselves of just-in-time learning that was tailored to their school situation. Teachers were also encouraged to post informational videos for the rest of the staff (I4).

The fourth domain is *Creating a Supportive Organization for Technology Integration* (Dexter, et al., 2016). This domain addresses the acquisition and allocation of resources in order to fulfill the mission and vision of the use of technology. Five of the six schools represented by the leaders who were interviewed had at least partial one-to-one programs (I1, I2, I3, I4, I6). The two high schools included in the five were completely one-to-one in grades 9-12 (I2, I4). One of the elementary principals considered his school one-to-one in grades K-8, with grades K-4 leaving their iPads at school and grades 5-8 taking them home (I6). The other two elementary schools were one-to-one in grades, 5-8 and 6-8 respectively with carts being available in all other grades to accommodate the use of technology by teachers of younger grades (I1, I3). Only one high school, the co-ed high school, did not provide devices for every student but did have a checkout program for students who did not have their own device. The school also provided sets of laptops and iPads for use by classroom teachers on a sign-out basis (I5).

As was already discussed, teachers participated in bringing information to the school group from a variety of sources (I1, I2, I3, I4, I5, I6). Leaders were asked how

teachers express their technology needs and wants. The assistant principal in the elementary school stated that there was a form for all needs/wants that was turned in by teachers at the end of one school year in preparation for the next school year (I1). Throughout the school year, teachers could use the "open-door" policy of the school leaders and express what they would like to have (I1). While every need that is expressed is considered, those that align with the school goals in the school improvement plan will get the highest priority (I1). Expense also plays a factor in the acquisition of technology materials (I1). The use of the technology is also considered. If the technology is something that might be used occasionally, then it's less likely that it will be a priority (I1).

At the single-sex high school, the assistant principal reported that the parent association has teachers sign up for different things (I2). Recently the association furnished all teachers with a mouse to use with their teachers' iPads (I2). Other needs are met through the instructional technology department. Finally, the school administration takes a temperature check to determine if iPads are still the devices that meet the academic needs of the students (I2). This distributive leadership gives the teachers an opportunity to have input on the devices that best meet student and teacher needs (I2).

At another elementary school, the principal said that a survey was created to determine teachers' professional development needs and their technology needs (I3). In addition, the technology coordinator and technology teacher are out in classrooms working with the teachers. If they hear of a need, they will carry it forward (I3). Teachers have a voice regarding the training they need (I3). "We are at the point that we need to sit

down and think about where we are going and how we plan to manage aging equipment. How do we fit in with what the high schools are doing?" (I3).

At the STEM certified school, teachers can just send an email or tell the STEM coordinator what they need. In addition, the STEM coordinator checks in with each faculty member at least once a month (I4). Similar to the first elementary school the principal and STEM coordinator look at the professional growth plans at the beginning of the year and then review the portion for technology mid-year and at the end of the year (I4). The school leaders ask what are your (teachers') technology needs? What are teachers' technology wants? How will teachers integrate these tools into STEM learning next year (I4)? The STEM coordinator checks to make sure the app/device/equipment integrates into their system and how effective it is and then if it is something that will fit, she learns the tool and can present it in a way that the faculty can immediately implement it (I4).

In the co-ed high school, the process is about the same. Teachers contact the school technology coordinator, the dean of academics, or the principal to express their needs. Sometimes the requests need to be carefully considered such as when the art department requested a drone to do aerial photography (I5). The principal indicated that he and his team go request by request. However, sometimes it is necessary to do a complete refresh on equipment (I5). The school has just moved from a Windows environment to Macs. Budget is a major factor in what we can do (I5). Sometimes requests must be deferred due to lack of funds but they are placed on a list and are addressed as soon as possible (I5). "The teachers come any time and have a face-to-face conversation with me (the principal)" (I5).

The male elementary principal indicated much the same thing as the co-ed high school principal. “Teachers find things during conferences or in their reading and I (the principal) get phone calls, emails or drop-in conversations regarding new or different technology” (I6). The principal also indicated that he had never had to prioritize to date. By thinking about the budget differently, they have been able to purchase what it is that the principal or faculty has wanted (I6). “If we don’t have the money in the budget, then I’ve found some creative ways to find money” (I6). This is a learning community activity. “I ask them to vet it (what they want), talk to other teachers who might be using the technology, look on blogs and show the benefit of the technology, and show how it fits in our program. So, they vet it, then they get it, and they use it, and learning increases” (I6).

The fifth and final domain is *Connecting with External Partners* (Dexter, et al., 2016). While all school leaders interviewed bring families into a collaborative process and keep them informed regarding school initiatives and student learning, few bring families into the technology life of the school community (I1, I2, I3, I4, I5, I6). Beyond the school families, community partners are not involved in half of the schools whose leaders were interviewed. The three leaders that did speak about teachers interacting outside the school and connecting with community partners did so as part of the academic program. In the STEM high school, students are required as seniors to collaborate with local businesses to work on a project (I4). In the last year, students participated in the planning and renovation of a historic neighborhood business, among other projects. These real-world projects allow students to learn to plan with professionals and be a part of a project that is important to the community at large (I4).

The second project was one in which an elementary school was paired through the church with a school in India (I1). Students traded information on agricultural practices here in the United States and students in India reported the same for their region (I1). Students then planted a crop and reported on its progress over the course of the project (I1). The elementary assistant principal reported that the project would not have been possible without the use of technology for communication and information gathering (I1).

At one of the other elementary schools the principal stated that he always looks for global connections. Currently his staff has projects connecting classrooms in several states in the United States and one location in Africa (I6). “That is what project-based learning is all about, real-world problems with global connections” (I6).

Summary

Phase I had weak relationships expressed with the teachers’ technology use variable and the school leaders’ support of teachers’ personal and professional use technology, school leaders’ support of teachers’ technology integration, and school leaders’ support of current instructional practice. However, all relationships were significant. This meant that the *LoTi Digital Age Survey for Teachers* (2018) and the *LoTi Digital Age Survey for Leaders* (2018) captured some, but not all, of the significant reasons for teachers’ integration of technology. However, there were more variables that affected teachers’ technology integration that were not captured with this data. Finally, the last portion of research question 1 was to look at the combined effect of all the predictor variables. Due to severe multi-collinearity, it was not possible to use all three variables in one model. As a result, research question 1d could not be explored.

Phase II generated how school leaders' can successfully support teachers' technology integration. The articulated areas of support were providing clear expectations for their teachers' use of technology, providing necessary tools and devices for teachers, participating in professional learning with teachers, and giving their teachers methods to request needed training and equipment. These successful leaders expanded their support of personal and professional use of technology through institutionalized practices. There was an allocation of time and resources that was equitable and the leader made themselves available as a technology leader to answer questions or troubleshoot problems. There was an attitude of "we're in this together" that lead to teacher buy-in and better integration of technology.

Interestingly, the school leaders who were interviewed talked about professional learning communities providing both a location for technology learning and a location for technology support. Professional learning communities was not a variable tested in the quantitative portion of the study. All leaders had designated personnel with various titles who were assigned to assist teachers in their integration of technology whether by teacher request, or by observation of the school leader when assistance seemed needed. These coaching positions were also not represented in the quantitative portion of the study.

Looking ahead, Chapter 5 will begin with a brief review of the first four chapters of this dissertation. The results of both the quantitative and qualitative phases of the research will be discussed in more detail. Finally, limitations and opportunities for future research will also be discussed.

Chapter 5

Summary and Discussion

The focus of this study was the relationship between school leaders' support of teachers' technology integration and teachers' actual integration of technology in Catholic schools in one NCEA southeastern Catholic diocese. Many researchers studied technology leader support in other schools around the world (Gibbs et al., 2008; Hadjioannou, 2011; Hew & Brush, 2007; Moersch, 2016; Summak & Samancioglu, 2011). However, several researchers have commented on how little research has been done in Catholic schools in the United States regarding technology (Cho, 2017; Galla, 2010; Gibbs et al., 2008; Swallow, 2017; Swallow & Olofson, 2017).

The research questions addressed in this research:

> *To what degree does school leaders' overall support affect teachers' digital technology integration in Catholic schools?*
>
> *How do school leaders support teachers' integration of digital technology in Catholic schools?*

A sequential-explanatory mixed method design was chosen to address these questions. In this study, the quantitative analysis of secondary data occurred first. The quantitative and qualitative portions of the study were connected by using the quantitative data to select school leaders to be interviewed. School leaders who demonstrated high levels of support for teacher integration in each area of support, leading schools with high levels of teacher technology integration were invited to be interviewed. Six school leaders agreed to participate in the qualitative portion of the study. These leaders were

interviewed and the results were coded using keywords from the *Unified Framework* (Hitt & Tucker, 2016) as applied to technology (Dexter, et al., 2016).

Phase I Results

To address the first research question, three areas of school leaders' support were examined. These areas were school leaders' support of personal and professional use of technology, support of teachers' technology integration, and support of current instructional practices. In each of the linear regression models, a small portion of the change in teachers' technology integration could be attributed to leaders' support. Though small, each of these values was statistically significant. This indicated that school leaders' do have an effect on teachers' technology integration. These results were similar to Brunson's (2015) results that showed the support disposition was a moderately weak predictor of principal technology leadership competency. Similar to the findings of the current study, Chang's (2012) findings showed that principal technology leadership actually improved teachers' technology literacy and encouraged teachers to integrate technology into their lessons.

The results of the current study were statistically significant whereas in Watts' (2009) study researching public schools, there were no significant factors. In a public-school study, Hughes et al. (2016) found that effective leadership is a significant predictor of teachers' use of technology. While some researchers studied the gender of school leaders and the varying effects on teachers' technology integration (e.g., Banoğlu, 2011), none studied the gender of the teachers and the differences of technology integration based on their gender. In the current study, males' technology integration was affected by the support of school leaders to a greater degree than females. In addition,

teachers with less than ten years of experience were affected to a greater degree than those with more than ten years of experience.

Finally, in the current study, high school teachers were affected more than elementary school teachers by the school leaders' support in each of the three areas of personal and professional technology use, technology integration, and current instructional practice. When teachers have the same access to technology they may not use the technology in the same ways because of their individual context even though they have received the same training and support as other teachers in the school. Swallow and Olofson, (2017) found the same results in their research study in Catholic schools.

Swallow and Olofson's (2017) findings also are consistent with the current study which found that teacher gender matters when looking for the greatest impact of leadership support on technology integration. Leaders' support spanned technology integration, personal and professional technology use, and current instructional practice. Male teachers' technology integration was affected to a higher degree than female teachers' technology integration by leaders' support. This was also true of years of experience, as those teachers with less than ten years of experience were affected more greatly by leadership support. Finally, high school teachers were affected more greatly by leadership support than elementary school teachers.

Phase II Results

Six school leaders were interviewed using questions formulated by the researcher, based on the work of Dexter et al. (2016), applying the work of Hitt and Tucker (2016) to technology. These questions can be found in Appendix C. The results were discussed at length in Chapter 4. Several common best practices emerged on how school leaders could

support teachers' technology integration. These leaders clearly embodied many of five domains and twenty-eight dimensions of the *Unified Framework*. What follows is a discussion of the findings as it relates to those domains and as extended into the extant literature.

Domain I: Establishing and conveying the vision. Effective leadership begins with building a shared vision (Day & Sammons, 2013; Ishimaru & Galloway, 2014; Leithwood, Harris, & Hopkins, 2008; Leithwood, Harris, & Hopkins, 2019). Each of the principals interviewed in this study expressed that there was a shared vision at their school and how the shared vision affected all teachers. This was compatible with the work of Krüger et al. (2007) who found that shared vision affected all strategies used within the school. In her work on technology leadership, Dexter (2011) concluded that one of the greatest tasks of technology leadership is to set a strong vision by soliciting a team of personnel made up of leaders and teachers to define the goals of the technology program. Richardson, Sauers, and McLeod (2015) defined five technology leadership dispositions, one of which was leaders having a clear vision of both technology and learning. The leaders who participated in this study all had a clear vision for the use of technology in their individual schools.

Further, the expectations for teachers in the current study had a positive effect on teachers' technology integration by letting teachers know exactly what normal use of technology was in the school and emphasizing this in writing and in one-on-one contact with teachers. Hitt and Tucker (2016) stated that the vision should be implemented by setting goals and performance expectations. Leaders need to do whatever is required to inform all stakeholders of goals and expectations (Crum & Sherman, 2008; Leithwood,

2012). School leaders in the current study emphasized a shared vision for the use of technology. In fact, setting high expectations and being collaborative were other dispositions of technology savvy leaders (Richardson et al., 2015). Those dispositions were evident in the leaders interviewed in the current study. Each spoke of what their expectations were and how teachers participated in setting and meeting those expectations.

Findings from the current study also aligned with the domains in the *Unified Framework* as applied to technology (Dexter et al., 2016) in so far as leaders should model aspirational and ethical practices. Results showed that the school leaders modeled the use of technology for teachers and served as coaches and mentors in order to forward the use of technology. This practice requires the leader to hold high expectations for teachers (Ishimaru & Galloway, 2014) and to provide an environment that mirrors the local stakeholders and their values (Louis & Wahlstrom, 2011). Similarly, in a study of African teachers, Msila (2011) found that school leaders influence teachers' technology use through their enthusiasm for technology. Msila (2011) further claimed that technology could not be successful without the support of school leaders. The findings of the current study are compatible with Msila's (2011) findings in that leader support was evident in the vision, implementation, and use of technology in all six schools.

Cho (2017) found that the general vision and mission of the Catholic school influenced the teachers and students rather than the use of technology. This influence translated into many projects, including those with technology such as one-to-one programs, but in general this study promoted a more hands-off approach by school leaders where the leaders fostered the school environment and allowed the teachers to do

what they believed was best. Cho's (2017) results were completely different from the current study where school leaders were very specific in what the expectations for technology were and teachers were expected to reach those expectations albeit with support from a variety of sources. The difference between Cho's study and the current study might be that the leaders in the current study for a variety of reasons, one of which is that the schools were located in different dioceses. In the current study, school leaders were well versed in what constituted best practice and fostered that culture.

Domain II: Facilitating technology use as part of a high-quality learning experience. School leaders in the current study expressed how technology was value added in the curriculum, instruction, and assessment of the school, and that technology was not value neutral. School leaders also expressed the belief that the use of technology was non-negotiable in providing curricular, instructional, and assessment programs that met the needs of all students. Teachers surveyed regarding their working conditions stated that school leaders provided materials required to support the instructional program (Ladd, 2011). Similarly, Murphy et al. (2006) noted that the support of the school leader was at the very core of the school program since they control the time, funding, and materials necessary for the program to function. However, Franklin (2007) found that there was no significant relationship between the computer use of the teachers and measures of support from leadership, time, access, or availability of technology. In the current study, it was evident that school leaders, with input from faculty, controlled the time, access, and availability of technology but that teachers responded to this support and engaged with the school leaders when they needed more technology.

The only way to maintain a strong program is for the school leader to be involved with teachers and how they teach (Marzano, Waters, & McNulty, 2005). Once the alignment of curriculum, instruction, and assessment has been determined, it is the responsibility of the school leader to communicate the data to the teachers and other stakeholders and use the data to make informed decisions (Marsh & Farrell, 2014; Murphy et. al., 2006). In the current study, school leaders noted that technology was used to personalize student experiences based on their specific needs. Much of this individualization was achieved through teachers' use of technology.

Domain III: Building professional capacity for technology integration. The school leaders in the current study were strong believers in professional learning for all teachers and administrators. Catholic school teachers have the advantage of just-in-time learning within their own buildings. Many of the school leaders in the current study had modified the school calendar to include half-day professional learning days four or more times a year for school-specific technology and other training. Catholic school leaders agreed that professional learning in just-in-time models work best for most teachers and provide the learning that teachers need and want in addition to the basic technology skills that school leaders want teachers to have. Being a school leader in a Catholic school means being a school technology leader in a Catholic school as well.

All of the leaders spoke of participating in professional learning alongside their teachers. When teachers and administrators learn side-by side, the teachers are willing to attempt to use the learning in the context of their classrooms (Dawson & Rakes, 2003; Ganser, 2000; Moore, 2018). In a study on whether the engagement of school leaders as active participants in teacher professional learning had an effect on teachers, Hilton et al.

(2015) found that both teachers and school leaders felt that the participation of school leaders in professional learning with teachers promoted school-wide culture and indicated the leaders' support for teachers implementing their new learning. Through this professional learning, a school leader and their teachers create a common set of norms and values and a climate of innovation emerges (Frost, 2012). In the current study, school leaders regularly participated in professional learning with teachers and later coached the teachers if they were having difficulty.

In addition to common professional learning, the current study found that teachers received support and exposure to new technology practices through professional learning communities (PLC). These PLCs were organized differently in each school, but the common thread was they allowed the school leader access to small groups of teachers who could learn and practice technology use and leaders could reinforce the norms for using technology in that school. DuFour and Eaker (1998) stressed that this collaboration is essential to improve performance. Leaders must provide these opportunities for teachers to collaborate on decisions that directly affect their work (Leithwood, 2012; Sheppard & Dibbon, 2011). The practice of school leaders participating with teachers in their PLCs was considered to be a positive influence in fostering teacher technology integration in the current study. It was in those meetings that leaders exhibited their personal engagement in the use of technology, another of the dispositions of technology savvy leaders (Richardson et al., 2015).

Freed from having to follow a state or district curriculum, Catholic schools can incorporate new learning tools into the teaching and learning environment without having to follow state-mandated restrictions on products and purchases. In the current study this

practice of adopting of new technology was evident from the responses of school leaders on how new technologies were recommended and adopted in the schools. As schools determined their technology vision, many have focused on the implementation of a rigorous curriculum supported by technology. Hagan and Houchens (2016) assert that faculty meetings are the one place where teachers and school leaders can learn from one another. Likewise, in the current study, faculty meetings were also places where school leaders could communicate clear expectations for technology use.

Domain IV: Creating a supportive organization for technology integration. In the current study, school leaders expressed their support for technology integration. They spoke about the types of support they had in place for their teachers including making the vision clear, backing teachers with financial support for technology, and sponsoring evenings with the community at large to showcase the efforts of the teachers using technology. Financial support for teachers is different in Catholic schools since all school expenses must be met by combinations of tuition, parish subsidy, and fundraising. This includes technology purchases, which can be quite costly.

Every school leader in the current study spoke of financing their technology programs in these ways. All except one school leader interviewed indicated that decisions are more likely to garner teacher and community buy-in if the teachers and school leaders have been involved in planning and carrying out the change together. This type of shared leadership leads to a more positive school climate that encourages teachers' buy-in (Hughes & Pickeral, 2013). Each of the leaders in the current study had at least some if not all of their students with devices provided through the school for one-to-one use by

students. They spoke of good stewardship in discussing the use of these devices by students at school and at home.

School leaders in the current study emphasized that teachers must on their part be strategic in their use of resources and practice good stewardship in order to make those resources last. This aligns with the literature body in that principals must focus on strategic orientation (Davies & Davies, 2010; Quong & Walker, 2010). However, in a study in a Catholic school, Swallow (2017) found that teachers do not use technology the same even at the same school. Teacher preference and content area taught often affects whether teachers integrate technology or not. While teacher preference and content area were not studied in the current study, there was a wide range of teacher survey scores on the *LoTi Digital Age Survey for Teachers* (2018) indicating that teachers in the same school were responding in different ways to the same levels of support by the school leader.

Dexter (2011) suggested that school technology leadership be considered a school characteristic, whose results are technology access and support. The school leader must help create the school cognizant of the school community's cultural orientation. If this school culture fails to materialize, there is a risk of students being marginalized as evidenced by Mahatmya et al. (2016). School leaders in the current study spoke about wanting to include parents and members of the broader community into conversations on expectations and use of technology, however there only one school leader who actually did so. In their study, Hughes and Pickeral (2013) found that decisions are more likely to garner teacher and community buy-in if the teachers and school leaders have been involved in planning and carrying out the change together.

Domain V: Connecting with external partners. In the current study, only three school leaders spoke about connecting with the community beyond parents. Those connections in one case included working with community partners on projects in the local community. In another case, the pastor of the parish organized a project where students collaborated with students in his hometown in India. The third case was farther reaching, where the school focused on project-based learning routinely working with community and global partners on various projects. These findings align with the results of a study of a project supporting school staff to increase parental engagement with children's learning, where Goodall (2018) stated that when tools are able to connect the school with the community, profound changes in outlook, belief, and practices can occur. This new understanding allows community members to understand the mission and vision of the school and how they are going about realizing that vision. In the current study, the definition of community varied. In some schools it meant the local community, in some various locations across the United States, and in others, the community was global.

Once a relationship with the community is established, it becomes easier for teachers to request the community to collaborate with them in supporting student learning (Murray & Mereoiu, 2016). Teachers also have more perspective on how certain learning will be received by parents and other members of the community based on race and ethnic customs (Goodall, 2018; Sebring et. al, 2006). In the current study, school leaders interpreted "Catholic" as universal or worldwide when thinking about the place of Catholic schools interacting with local and global partners. Interactions with American Catholic school students helped the students in India understand the American culture

better. Being Catholic assisted students working on community projects to understand the empathy and compassion necessary to work on social justice projects in the local community. Moreover, it allowed students to interact with other students and adults across the country and the globe, allowing a cross-cultural exchange to occur that would have been impossible without technology. While all school leaders talked about this, it is a definite area for growth in most of the schools whose leaders were interviewed.

Rogers' diffusion of innovations theory. This culture of best practice was similar to how Rogers (2003) described the perceived characteristics of innovation in his conceptualization of the diffusion of innoations theory. The first characteristic is *relative advantage*. Rogers defines relative advantage as the perception that the innovation is better than the idea it is replacing. Leaders in the current study stated that they worked with their faculties to impress upon them the value of technology to improve student learning and made expectations for the use of technology clearly known.

The second perceived characteristic of innovation is *compatibility*. This characteristic describes the degree to which the innovation is consistent with current values, "past experiences, and needs of potential adopters" (Rogers, 2003, p. 15). Again, if the teachers perceive technology integration consistent with the vision of the school then it is easier for them to embrace the change in practice and integrate technology.

Complexity is the third perceived characteristic of Rogers' (2003) diffusion of innovation theory. If moving from traditional teaching to using technology is perceived as too difficult, then teachers will resist the integration of technology. The more difficult the innovation is, the harder it will be to achieve integration.

The fourth perceived characteristic is *trialability*. The easier the innovation is to try, the faster the adoption will occur. This study showed that exemplary school technology leaders are those that attempt to make the adoption of technology integration as simple as possible and try to give teachers the opportunity to try technology without fear of failure.

Observability is the final characteristic of innovations. If school leaders continually point out the successes of teachers' technology integration throughout the school, more teachers will attempt to implement the innovation (Rogers, 2003). This is closely related to the simplicity/complexity of implementation. If the school leader makes the innovation inviting to teachers, they are more likely to attempt the innovation.

By implementing the five perceived characteristics of innovation, *relative advantage, compatibility, complexity, trialability,* and *observability*, school leaders have a real opportunity to intervene in the adoption process and speed up the adoption process, increasing the numbers of adopters and reducing the number of laggards (Rogers, 2003). These five characteristics were observed in the current study. School leaders in this study relied on the perceived characteristics of innovation in their practice by working with the teachers to demonstrate the *relative advantage* of technology integration through participation in professional learning and professional learning communities, showing how technology improved the teaching and learning environment stressing the *compatibility* and *simplicity (non-complexity)* of integrating technology, encouraging teachers to try technology in their teaching practicing *trialability*, and offering teachers opportunities to *observe* others integrating technology. In fact, because of the work of the school leaders it is possible that the implementation curve was modified in those schools

speeding up the technology integration process of all but the innovators and early adopters.

Limitations of the Study

There are several limitations of this study. One limitation is that while the three school leader variables studied in the quantitative portion of this study had a significant relationship with teachers' technology integration, there are other variables that need to be studied in order to have a more complete picture of what affects teachers' technology integration. The relationship of each of the leaders' support variables with teachers' technology integration were statistically significant, but very small. This indicates that there are other variables affecting teacher technology integration not studied in this study.

Another limitation of this study is that only one Catholic diocese in the southeastern United States was studied. This was a research design limitation due to time constraints. While this diocese provided useful information, the results could not be generalized beyond the studied diocese. This limits the usefulness of the study in the general literature.

Additionally, only six school leaders were interviewed in the qualitative portion of the study. All of these school leaders were considered to be exemplars. The study would have benefited if all school leaders who took the *LoTi Survey for School Leaders* (2018) had been interviewed. This would have determined whether the best practices found with the school leaders who had teachers integrating technology were different from those who did not have teachers integrating technology.

The data that was analyzed in the quantitative portion of this study were from one point in time. While these data were valid, expanding the data set to prior iterations of the

LoTi Digital Survey for both teachers and school leaders would give a picture of leader support and teacher integration of technology over time.

Recommendations for Future Study

Expanding the study from one diocese to many dioceses throughout the United States would provide for a larger and more diverse sample population of school leaders and teachers from which generalizable inferences could be drawn. The current study took place in one diocese in the southeastern United States. If data were collected from across the country, inferences could be made by region or across the entire United States. These inferences would then be able to inform the literature on the effect of school leaders' support on teachers' integration of technology in Catholic schools throughout the United States.

While the three leader variables in this study were statistically significant, their effect on teacher technology integration was very small. During the interviews with school leaders, several potential variables surfaced that could be studied and might have a larger impact on teacher technology integration. They include the effect of professional learning communities on teachers' technology integration, the effect of school leaders' support for shared leadership, the effect of one-to-one technology on teachers' technology integration, and the effect of formal and informal coaching on teachers' technology integration. Several mitigating variables that might be studied are the age of the school leader, the actual age of the teacher (this study looked at experience of the school leader and the teacher), and the effect of content areas taught on teacher technology integration.

While this study has made the case for Catholic schools being different from public schools, studying the differences between public school and Catholic school survey data could give a better look at community practices. A study of that type could give insight into whether teachers' technology integration is the same in different types of schools in the same relative locale. If so, this might indicate a geographically local vision of technology use rather than discrete visions in each type of school.

In studying school technology leadership of school leaders, more research needs to be done in Catholic schools to determine whether school leaders actually perceive themselves as school technology leaders. It was clear that the principals and assistant principals who were interviewed for this study were leaders in their schools. However, of the six interviewed, all deferred to someone else in the school as the resident technology expert.

Another possible research study would be to modify the Richardson et al., (2015) study to explore the dispositions of technology savvy Catholic school leaders. Since Catholic school leaders are more autonomous than public school leaders, their work is much closer to the superintenedent of a small district than to a principal in a public school. It would be interesting to see if the dispositions of Catholic school leaders are the same as technology savvy superintendents.

The selection of school leaders to participate in the interview phase of the current study was limited to those school leaders who demonstrated high support of teachers in the three areas of personal and professional technology use, technology integration, and current instructional practices and had teachers integrating technology well. This yielded a set of usable practices shared by those school leaders who lead well. However, studying

all leaders might provide information on whether the usable practices are unique to exemplary school leaders and if there are other behaviors that still need to be unearthed.

Catholic schools in this study were in a diocese that has been affected by a Blaine Amendment to the state constitution. This restricts state funding from flowing to Catholic schools. A future study could be done in states that do not have Blaine Amendments to their state constitutions to determine whether sources of public funding affects the integration of technology in Catholic schools.

Conclusions

The findings from the current research indicate that there is a significant, albeit small, relationship between school technology leaders' support and teachers' technology integration. This includes school leaders' support for teachers' personal and professional use of technology, school leaders' support for teachers technology integration, and school leaders' support of teachers' current instructional practice and how each of these separately affects teachers' technology integration. Several conclusions can be drawn from the survey data and the interviews of six exemplary school leaders.

Technology fits with the overall mission and vision of Catholic schools. The mandate for Catholic schools is to be at least as academically distinguished as the other schools in the same location (Can. 806 §2). "An excellent Catholic school has a clearly articulated rigorous curriculum, aligned with relevant standards, 21st century skills, and Gospel values, implemented through effective instruction" (NSBECS, 2012, p. 22). Most dioceses adopt the two-fold mission for Catholic schools of faith formation and academic excellence. This is certainly true for the diocese in this study.

School leaders must make their expectations for technology use known to teachers. In this study it was evident that school leaders carefully communicated the expectations for technology use to teachers in as many ways possible. Leaders conveyed their expectations to individuals, in small PLC groups, and in faculty meetings. Faculty handbooks had expectations for technology use in writing. This gave teachers a clear and consistent message that technology is important and it is to be used in specific ways.

School leaders must be willing to share leadership with those who have more technology expertise for the good of the teachers and the students. Throughout the interviews, school leaders talked about specific persons on staff who assisted them with the training of faculty in the use of technology. Some of these people had titles such as coach or technology coordinator. However, in some schools, the faculty leaders were simply other teachers who were early adopters of a particular technology.

Creating collaborative environments where teachers teach teachers is empowering and necessary. These interactions with teachers promote the leadership qualities of the teacher who is teaching and empower the teacher who is learning technology skills. Having a peer mentor, which many may find less intimidating than a school leader, promotes growth throughout the school. In this study, creating collaborative environments whether through PLCs or one-on-one training allowed teachers to have just-in-time training without having to go outside the school itself. It also allowed those who have learned and practiced a skill to teach it to other teachers, thus strengthening the technology capacity of the faculty throughout a school (Riel & Becker, 2008).

The support of the school leader is important in personal and professional technology use, technology integration, and current instructional practice in order to

improve teachers' technology integration. While this study showed that each of these supports by the leader were statistically significant, they are also necessary for the overall health of the school program. If the school leader does not support the use of technology in these three areas, teachers are left to decide whether the use of technology is of value to them rather than to take a wider view of the value of technology use to the increased learning of students.

School leaders who participate in professional learning with their teachers have a better chance that those teachers will actually use what they have learned in the professional learning. This result echoes the results of Hilton et al. (2015) in demonstrating that school leaders who participate in professional learning with their faculties affect a greater change in practice than those leaders who do not participate in professional learning with their faculties. This participation allows leaders to know current technology practice and application so that they may use these skills themselves and they may help teachers who need their assistance. The act of participating with teachers sends two messages. The first is that the learning is worth the leader's time and effort. The second is that the learning is important to the school as a whole.

Catholic school leaders are encouraged to provide three types of leadership, spiritual leadership, instructional leadership, and managerial leadership (Boyle, Haller, & Hunt, 2016; Ciriello, 1998). Catholic school leaders in this study practiced all three types of leadership. However, instructional leadership and managerial leadership were most evident in this study. The *Unified Framework* applied to technology (Dexter et al., 2016) provides a research-based framework for Catholic school leaders to carry out their instructional leadership and managerial leadership mandate.

Catholic school leaders excelled in the first four domains of the *Unified Framework* applied to technology (Dexter et al., 2016). Domain V: *Connecting with external partners* was the weakest in terms of what school leaders were doing to support teachers work with community partners. One reason for this deficit could be the focus of the school leader on the school program and how it fits into the parish or sponsoring congregation rather than on how the school fits into the community at large. This inward focus prevents the school leader from encouraging teachers to reach out into the community to interact with local and global partners. This is an area in which Catholic schools can improve with the use of technology.

Being Catholic had an effect on the results of this study in several ways. Catholic schools are not restricted in their purchases of technology, unlike their counterparts in public education. While diocesan recommendations are considered, each school leader is able to purchase what they would like, as long as they can afford the technology. This allows for a broad range of tools among Catholic schools, but it also allows local leaders and teachers to assess their needs and to decide what technology tools are best for them. Catholic school leaders have the latitude to purchase devices for students and teachers that best fit into their context. One school leader stated that her school, now a STEM school, started a one-to-one program more than ten years ago, but at the time it was more for promotional value than for instructional value. In her mind, that was a large price tag for public relations. In the last six years, the school has moved from everyone merely having their own devices, to all teachers and students using devices every day to implement their learning program.

Individual school leaders, in collaboration with their teachers, make school decisions on what technology tools are needed and how they can be procured. This emphasizes the need for school leaders to be both instructional and managerial leaders. Leadership matters in all schools, but in Catholic schools, local leadership matters more because of the governance systems built into the institution, with principals responsible only to the pastors of the parish or of the religious congregation that sponsors the school. The governance of Catholic schools is more local than systematized like public schools. Most diocesan schools refer to themselves as a system of schools rather than a school system because of the ability of the local leader to govern the school they lead.

This leadership model is not without flaws. One missed opportunity that was uncovered in this study was that school leaders acting as spiritual leaders could support teachers in the use of technology to support the Catholic mission of social justice. The use of technology allows the reach of the individual school community to be worldwide. Catholic schools which exist around the world have the opportunity to network in ways that others schools are not able. The common mission of Catholic schools translates to a common technology vision in stewarding Catholic schools to a connectedness with the global community that can spearhead good will and understanding throughout the world.

Summary

This research focused on the effects school leaders' support has on teachers' technology integration. The mixed methods study took place in one southeastern Catholic diocese. The study sought to demonstrate common best practices on the part of school leaders who were considered exemplars in supporting technology integration. The origins and differences of Catholic schools and public schools were discussed with two major

differences emerging. First, the governance structure for Catholic schools is different, giving principals and other school leaders in Catholic schools more autonomy in leading their schools. Second, the financing of Catholic schools is typically by tuition, subsidies from either a parish or a sponsoring religious congregation, and fundraising including donations, grants and other efforts, rather than being funded by state and federal dollars as public schools are, again, giving the Catholic school leader more autonomy than public school leaders.

The secondary data from the *LoTi Digital Age Survey for Teachers* (2018) and the *LoTi Digital Age Survey for Leaders* (2018) were used in Phase I of this study to examine the degree to which each of the school leaders' measures of support affected teachers' technology integration. Using correlation and linear regression to analyze the data, the results were small but significant indicating school leaders' support was important but there were unknown factors that accounted for most of the change in teachers' technology integration.

After the quantitative analysis of the survey data, six school leaders were interviewed in Phase II of the study, using questions based on the *Unified Framework* (Hitt & Tucker, 2016) as applied to technology (Dexter et al., 2016). Each school leader explained their support of technology and the effect their support had on their teachers' integration of technology. Reponses among the participants for many of the questions were similar. However, the use of technology to connect with the local and global community was different, with only three schools actually implementing any connected activities with the community at large. Evidence from the quantitative portion of the

study that was reinforced by the qualitative portion of the study indicates that school leadership matters for teachers' integration of technology in Catholic schools.

Appendix A

LoTi Digital Age Survey: Teacher Statements

Select the response that best represents how often the statement mirrors the instructional practices in your learning environment.

0	1	2	3	4	5	6	7
Never	*At least once a year*	*At least once a semester*	*At least once a month*	*A few times a month*	*At least once a week*	*A few times a week*	*Daily*

1. My students work together using digital tools and/or environmental resources that require them to analyze information and ask questions based on a teacher-provided prompt.
2. My students work alone or in groups to create traditional reports with web-based or multimedia presentations (e.g., Prezi, PowerPoint, Google Slides) that showcase information on topics that I assign in class.
3. I assign my students tasks that emphasize teacher-directed investigations with a known outcome (e.g., science experiments, mathematical problem solving, literary analysis) using the available digital tools and/or environmental resources.
4. I provide different formative and summative assessments that encourage students to demonstrate their content understanding in nontraditional ways.
5. My students use digital tools and/or environmental resources to participate in teacher-directed activities that require them to transfer their learning to a new situation.
6. My students use collaborative digital tools (e.g., Google Docs, social media, wikis) and/or environmental resources beyond the school building (e.g., community action groups, parents, elected officials) to create solutions for real world problems (e.g., bullying, health awareness, election apathy, global warming).
7. I promote, monitor, and model the ethical use of digital tools in my classroom (e.g., appropriate citing of resources, respecting copyright permissions).
8. I use digital tools to expand my communication opportunities with students, parents, and peers.
9. My students find innovative ways to use our school's advanced digital tools (e.g., 1:1 mobile devices, digital media authoring tools, probeware with GPS systems) for inquiry-based learning opportunities that use social media.
10. I model and facilitate the effective use of current and emerging digital tools to support teaching and learning in my classroom.
11. I use digital tools to support my instruction (e.g., multimedia, online tutorials, online simulations, videos) so that students can better understand the content that I teach.
12. I alone use the classroom digital tools during instruction due to the amount of content that I have to cover by the end of each marking period.
13. My students use a variety of digital tools that support the evolving nature of my grade level content and promote student academic success.

14. My students readily self-select the most appropriate digital tool to aid them in completing any given task.

15. I employ learner-centered strategies (e.g., communities of inquiry, learning contracts) to address the diverse needs of my students using developmentally-appropriate digital tools.

16. My students use digital tools and/or environmental resources to participate in problem-solving activities with others beyond the classroom.

17. My students use digital tools and/or environmental resources for (1) collaboration, (2) publishing, and (3) research to tackle real world questions, themes, and/or challenges within our community.

18. I model for my students the safe and legal use of digital tools while I am delivering content and/or confirming student understanding of pertinent concepts.

0	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Never	*At least once a year*	*At least once a semester*	*At least once a month*	*A few times a month*	*At least once a week*	*A few times a week*	*Daily*

19. My students model the “correct and careful” use of digital tools (e.g., ethical uSage.., proper digital etiquette, protecting their personal information) and are aware of the consequences regarding their misuse.

20. I collaborate with others (e.g., students, faculty members, business experts) to explore creative applications of digital tools that improve student learning.

21. My students use digital tools and/or environmental resources to define real life problems and then find solutions that are grade level appropriate.

22. My students engage in standards-based applied learning projects that emphasize student investigations using digital tools.

23. I use student-centered performance assessments that involve students transferring what they have learned to a real world context using the available digital tools and/or environmental resources.

24. My students’ questions, interests, and readiness levels directly impact how I design learning activities that address the content standards.

25. My students use the classroom digital tools and/or environmental resources to engage in relevant, challenging, self-directed learning experiences that address the content standards.

26. My students complete online tasks that emphasize high level cognitive skills (e.g., Bloom—analyzing, evaluating, creating; Webb—strategic and extended thinking).

27. My students use digital tools and/or environmental resources to confirm their content understanding or to improve their basic math and literacy skills.

28. My students use digital tools and/or environmental resources to explore deeper content connections (e.g., analyzing data from surveys and experiments, making inferences from text pasSage..s) that require them to draw conclusions.

29. My students collaborate with me in setting both group and individual academic goals that provide opportunities for them to direct their own learning aligned to the content standards.

30. I promote global awareness in my classroom by providing students with digital opportunities to collaborate with others beyond the classroom.

31. My students apply their classroom content learning to real world situations within the local or global community using the digital tools at our disposal.
32. I reinforce specific content standards and confirm student learning using digital tools (e.g., discussion forums, digital student response system, wikis, blogs) and/or environmental resources (e.g., manipulatives, graphic organizers, dioramas).
33. My students self-select digital tools and/or environmental resources for higher-order thinking and personal inquiry related to project-based learning (PBL) experiences.
34. My students use all forms of the most advanced digital tools to pursue collaborative problem-solving opportunities of personal and/or social importance.
35. I use digital tools and resources to differentiate the content, process, and/or product of learning experiences.
36. I promote the effective use of digital tools on my campus and within my professional community.
37. I consider how my students will apply what they have learned in class to the world they live in when planning group projects.

Appendix B

LoTi Digital Age Survey: Instructional Leader Statements

Select the response that best represents how often the statement mirrors the instructional practices in your school/district.

0	1	2	3	4	5	6	7
Never	*At least once a year*	*At least once a semester*	*At least once a month*	*A few times a month*	*At least once a week*	*A few times a week*	*Daily*

1. Students on my campus use digital tools and/or environmental resources that require them to analyze information and ask questions.
2. Students on my campus replace traditional reports with web-based or multimedia presentations (e.g., Prezi, PowerPoint, Google Slides) that showcase information on topics assigned by their teachers.
3. Students on my campus participate in web-based tasks that emphasize problem-solving and decision-making aligned to the content standards.
4. I use the principles of data-driven decision-making to guide continuous improvement and increase the performance levels of staff and students on my campus.
5. Students on my campus use digital tools and/or environmental resources to explore solutions to teacher-directed problems that require inventive thinking.
6. Students on my campus use collaborative digital tools (e.g., Google Docs, social media, wikis) and/or environmental resources beyond the school building (e.g., community action groups, parents, elected officials) to create solutions for real world problems (e.g., bullying, health awareness, election apathy, global warming).
7. I promote, monitor, and model the ethical use of digital tools on my campus (e.g., appropriate citing of resources, respecting copyright permissions).
8. I advocate for programs and funding opportunities at the local, state, and/or national levels that promote the strategic and intentional uses of digital tools in the classroom.
9. Students on my campus find innovative ways to use our school's advanced digital tools (e.g., 1:1 mobile devices, digital media authoring tools, probeware with GPS systems) for inquiry-based learning opportunities that use social media.
10. I model and facilitate the effective use of current and emerging digital tools to support a shared vision for teaching and learning on my campus.
11. I expect staff to use digital tools to support their instruction (e.g., multimedia, online tutorials, online simulations, videos) so that students can better understand the content being taught.
12. I expect that teachers alone should use the classroom digital tools during instruction due to the amount of content that must be covered by the end of each marking period.
13. I intentionally promote professional learning communities for staff to explore different digital tools unique to their grade level/content area that support a shared vision for student success and innovation in the classroom.
14. I take the necessary steps (e.g., conversations with building/district technology liaisons, emails to staff, discussions at curriculum meetings) to ensure that all digital tools and/or

environmental resources on campus are (1) current, functional, and accessible for staff and students and (2) aligned with all continuous improvement efforts.

15. I strategically promote and monitor professional learning communities that enable staff to analyze data and make recommendations impacting student academic growth and current instructional practices on campus.
16. Students on my campus use digital tools and/or environmental resources to participate in online projects with others beyond the classroom.
17. Students on my campus use digital tools and/or environmental resources for (1) collaboration, (2) publishing, and (3) research to tackle real world questions, issues, and/or controversies within our community.
18. I encourage staff to model for students the safe and legal use of digital tools while they are delivering content and/or confirming student understanding of pertinent concepts.
19. Students on my campus model the “correct and careful” use of digital tools (e.g., ethical usage, proper digital etiquette, protecting their personal information) and are aware of the consequences regarding their misuse.
20. I continually work with my staff to generate a shared vision as well as an expectation for the ongoing use of digital tools and/or environmental resources to improve student learning.
21. Students on my campus use digital tools and/or environmental resources to define real life problems and then find solutions that are grade level appropriate.
22. Students on my campus engage in standards-based applied learning projects that emphasize creative thinking and student use of digital tools.
23. I provide ongoing professional growth opportunities for staff to design student-centered performance assessments that involve students transferring what they have learned to a real world context using the available digital tools and/or environmental resources.
24. I promote strategic partnerships with outside organizations, businesses, government agencies, or other entities to provide authentic opportunities for staff and students to engage in real world problem-solving aligned to our content standards.
25. Students on my campus use the classroom digital tools and/or environmental resources to engage in relevant, challenging,self-directed learning experiences that address the content standards.
26. Students on my campus complete web-based tasks that emphasize high level cognitive skills (e.g., Bloom—analyzing, evaluating, creating; Webb—strategic and extended thinking).
27. Students on my campus use digital tools and/or environmental resources to confirm their content understanding or to improve their basic math and literacy skills.
28. Students on my campus use digital tools and/or environmental resources for research purposes (e.g., data collection from questionnaires and surveys) that require them to make predictions and draw conclusions.
29. I elicit feedback from stakeholders on campus to ensure that the most current technology infrastructure is in place to support learning outcomes that promote higher order thinking, engaged learning, and authentic connections to the content.
30. I allocate the necessary financial and human resources to provide equitable digital age learning and working environments for all students and staff members.
31. Students on my campus apply their classroom content learning to real world situations within the local or global community using the digital tools at their disposal.

32. Students on my campus use digital tools (e.g., interactive whiteboard, digital student response system, wikis, blogs) and/or environmental resources (e.g., manipulatives, graphic organizers, dioramas) to reinforce specific content standards and confirm student learning.
33. Students on my campus use digital tools and/or environmental resources for higher-order thinking and personal inquiry related to project-based learning (PBL) experiences.
34. Students on my campus use all forms of the most advanced digital tools to pursue collaborative problem-solving opportunities of personal and/or social importance.
35. I model and advocate for the use of assistive technologies that are available to meet the diverse demands of special needs students.
36. I promote the effective use of digital tools on my campus and within my professional community.
37. I challenge my staff to consider how students will apply what they have learned in class to the world they live in when planning instruction and assessment strategies.

Appendix C

I would like to talk with you today to gain some clarity on your expectations for technology integration by your teachers. I want to know what works here at your school. I hope you will share your experiences with me so I can better understand your teachers' success in integrating technology into the teaching and learning environment.

Interview Guide for School Leaders Based on the Unified Framework (Hitt & Tucker, 2016)

Based on Domain 1: Establishing and conveying the vision

1. What are your specific expectations for technology use here at ____?
2. How are those expectations conveyed?
3. Are your expectations different for teachers of younger children? Older children?

Based on Domain 2: Facilitating technology use as part of a high-quality learning experience (Dexter et al., 2016)

4. How do you encourage and mentor teachers' use of technology in their day-to-day work?
5. How does technology use help differentiate instruction in your school?

Based on Domain 3: Building professional capacity for technology integration (Dexter et al., 2016)

6. Tell me about the opportunities you provide for your teachers to learn about how to use technology.
7. Do you ever participate with your teachers in professional learning about technology?

Based on Domain 4: Creating a supportive organization for technology integration (Dexter et al., 2016)

8. How do your teachers express technology needs and wants?
9. How do you prioritize fulfilling those technology needs and wants?

Based on Domain 5: Connecting with external partners (Hitt & Tucker, 2016)

10. How do you connect with your stakeholders (students, teachers, parents, community) regarding technology use here at your school?
11. Is there anything else that you would like to add?

Appendix D

Dear School Leader,

My name is Donna Reeves-Brown and I am a doctoral candidate in the College of Education at the University of Kentucky. I am working on a research study that seeks to explore the effects school leaders have on teachers' integration of technology in Catholic schools. You are being invited to take part in this research study because you are a school leader in the diocese that is being studied.

I hope to interview you for a minimum of 30 minutes and a maximum of 60 minutes on your current and past practices with your faculty and staff regarding technology implementation and integration. Your answers are very important to the study.

Of course, you have a choice about whether or not to participate, but if you do participate, you will have an opportunity to stop the interview at any time.

Although you will not get personal benefit from taking part in this research study, your responses may provide greater insight into the phenomena of school leaders affecting teachers' technology integration practice.

As I said earlier, the semi-structured interview will last approximately 30 – 60 minutes.

Your responses are anonymous which means no names of individuals or schools will appear or be used on research documents, or be used in presentations or publications. While I will know the information came from you, it will not be catalogued or saved with your name or school designation. When I finish transcribing your interview, you will be asked to review the transcription to make sure it reflects what you think you said in the interview.

I will be coding your information along with that of your colleagues to determine pertinent themes that emerge. Again, your name and location will not be associated with your responses.

If you have questions about the study, please feel free to ask; my contact information is given below. If you have complaints, suggestions, or questions about your rights as a research volunteer, contact the staff in the University of Kentucky Office of Research Integrity at 859-257-9428 or toll-free at 1-866-400-9428.

Donna Brown
Doctoral Candidate
Department of Educational Leadership Studies
University of Kentucky

donna.brown@uky.edu

Appendix E

ARCHDIOCESE
OF LOUISVILLE

January 18, 2019

Donna Brown
Doctoral Candidate
109 South Whipps Mill
Louisville, KY 40222

Dear Donna,

I have reviewed your research proposal, and you may proceed with your study, " Effects School Leaders Have on Teachers' Technology Integration in Catholic Schools " in the Archdiocese of Louisville Catholic schools.

As part of the study, you may have access to our 2018 LoTi data and to contact Catholic school leaders in the Archdiocese of Louisville to participate in the study as interview subjects. Their participation is voluntary and at their own discretion. The Archdiocese of Louisville reserves the right to withdraw from the study at any time if our circumstances change.

I understand the data collected will remain entirely confidential and may not be provi ded to anyone outside of the research team without permission from the University of Kentucky's Institutional Research Board (IRB).

Sincerely,

Leisa Schulz

Leisa Schulz
Superintendent of Schools
lschulz@archlou.org
(502) 585-3291

Office of Catholic Schools
Pastoral Center, 3940 Poplar Level Road, Louisville, KY 40213-1463
(502) 585-3291 | (502) 585-2466 (Fax) | schools@archlou.org

CATHOLIC SCHOOLS
in the Archdiocese of Louisville

Appendix F

From: Donna Brown
Sent: Friday, November 3, 2017 3:22 PM
To: 'Fred Saunders'
Subject: Permission to use LoTi results

Fred,

I am a PhD student working on my dissertation at the University of Kentucky. I expect to be awarded my degree in May of 2019. I would like permission to use the LoTi results for the Archdiocese of Louisville for my dissertation. I currently have the verbal permission of the superintendent of the Archdiocese of Louisville Catholic Schools.

Donna

Donna Brown

Technology Curriculum Consultant

dbrown@archlou.org 502-585-3291 ext.1174

Archdiocese of Louisville

Pastoral Center

3940 Poplar Level Rd.

Louisville, KY 40213

Appendix G

LoTi Connection, Inc.

PO Box 130037
Carlsbad, CA 92013-0037 (V) 760-431-2232 (F) 760-946-7605

www.loticonnection.com

November 20th, 2017

Permission for Use of the LoTi Framework

To: University of Kentucky

Dissertation Review Boards

Please accept this letter as notification that Donna Brown is hereby granted permission to utilize the LoTi Framework and corresponding Digital-Age Survey to collect data for her doctoral dissertation study. Donna is permitted to use the Digital-Age Survey and the LoTi Framework for purposes of the study only. In addition, Donna has permission to review all available LoTI Digital-Age results on the individuals taking place in her study.

The guidelines for using LoTi Connection copyrighted material as part of this dissertation study are as follows:

1. Permission to reprint the LoTi Framework is granted provided that the content remains unchanged and that attribution is given to LoTi Connection.

2. Permission to reprint selected results including graphs and tables in the Appendices of the study is granted provided that the content remains unchanged and that attribution is given to LoTi Connection.
3. Permission to reprint selected questions from the Digital-Age Survey in the Appendices of the study is granted provided that the content remains unchanged and that attribution is given to LoTi Connection.
4. LoTi Connection holds the right to restrict usage of any intellectual property if LoTi Connection finds that the content is being used in an inappropriate manner.

Sincerely,

Dennee Saunders

Assistant Executive Director Date 011/20/2017

Appendix H

Consent to Participate in a Research Study

KEY INFORMATION FOR THE EFFECTS OF SCHOOL LEADERS' SUPPORT ON TEACHERS' TECHNOLOGY INTEGRATION

I am asking you to choose whether or not to volunteer for a research study about school leaders' support of teachers' technology integration. I am asking you because you are a school leader in the diocese where the research is taking place. This page is to give you key information to help you decide whether to participate. Please ask the researcher questions if you have any. If you have questions later, the contact information for the research investigator in charge of the study is below.

WHAT IS THE STUDY ABOUT AND HOW LONG WILL IT LAST?

This is a mixed methods study that first used 2018 LoTi survey data from your diocese to correlate the information given by school leaders and teachers regarding technology integration to determine the effects of leader support of technology integration, support of teachers' personal computer use, and support of current instructional practice, on teachers' technology integration. After the LoTi data was examined using descriptive statistics, correlation, and multivariate regression, leaders who took the 2018 LoTi Survey were identified to be interviewed regarding their expectations and practices with teachers regarding the integration of technology in their schools. The identifiers of school and position were used to obtain your name through your diocese in order to invite you to participate. This connection of your name with the data has not been written down or recorded in any permanent way. By participating in this study, I hope to determine if there are successful common practices that lead to increased teacher technology integration. Finally, I hope to find commonalities between what the LoTi data and the interview data indicate regarding best practices to support teachers' technology integration.

It is likely not a surprise to you that as Technology Curriculum Consultant for the diocese, I have access to the LoTi data, in fact, we may have already discussed your school scores earlier

in the context of my position with the diocese. However, in this research study, I am most interested in the general themes that emerge from analysis of all of the LoTi data and from all the interviews I am conducting. For my research study, your name and the name of your school will not be used.

Your interview for this research will take place in a location of your choosing and last about an hour or less on one occasion. After the interview is transcribed I will email you a copy of the transcription of your interview and ask you to review it to make sure I captured your responses correctly with the answers I recorded. Your total time commitment would be the interview time and reading and commenting on your interview at a later date, within a few weeks of the original interview. Research questions follow this consent form.

What are KEY reasons you might choose to volunteer for this study?

A person may want to volunteer for this study because of its importance to the overall value of leaders' influence on technology integration in schools.

What are Key reasons you might choose NOT to volunteer for this study?

The most important reason a person might not want to participate in this study is lack of time for a complete interview. If you would like to stop the interview at any time you may do so. You may also choose not to answer any question. The study poses minimal risks regarding confidentiality since your name and your school name will not be associated with your interview or the reporting of the results of the study.

DO YOU HAVE TO TAKE PART IN THE STUDY?

If you decide to take part in the study, it should be because you really want to volunteer. You will not lose any services, benefits, or rights you would normally have if you choose not to volunteer.

WHAT IF YOU HAVE QUESTIONS, SUGGESTIONS OR CONCERNS?

If you have questions, suggestions, or concerns regarding this study or you want to withdraw from the study contact Donna Brown, Ph.D. Candidate at the University of Kentucky, Department of Educational Leadership at 502-230-3351.

If you have any concerns or questions about your rights as a volunteer in this research, contact staff in the University of Kentucky (UK) Office of Research Integrity (ORI) between the business hours of 8am and 5pm EST, Monday-Friday at 859-257-9428 or toll free at 1-866-400-9428.

ARE THERE REASONS WHY YOU WOULD NOT QUALIFY FOR THIS STUDY?

Only those who have qualified for the interview portion of the study have received this consent form. However to qualify you must have taken the 2018 LoTi Survey for Leaders.

WHERE WILL THE STUDY TAKE PLACE AND WHAT IS THE TOTAL AMOUNT OF TIME INVOLVED?

The interview will take place in your school at a time of your choosing. The interview will last no longer than an hour. After I have transcribed the audio recording of your interview, I will send you a copy via email for your review to make sure I have captured what you had to say.

WHAT WILL YOU BE ASKED TO DO?

You will be asked to answer a series of questions that deal with what you expect your teachers to do regarding technology integration and how you convey your expectations to your teachers. The list of interview questions follow this Consent Form.

WHAT ARE THE POSSIBLE RISKS AND DISCOMFORTS?

There are no known risks to participating in this study. There is a remote chance that someone who reads my dissertation and knows the details of your school very well might link the generalizations to your school but that would be conjecture on their part.

WILL YOU BENEFIT FROM TAKING PART IN THIS STUDY?

You will not get any personal benefit from taking part in this study.

IF YOU DON'T WANT TO TAKE PART IN THE STUDY, ARE THERE OTHER CHOICES?

If you do not want to be in the study, there are no other choices except not to take part in the study.

WHAT WILL IT COST YOU TO PARTICIPATE?

There are no costs associated with taking part in this study.

WHO WILL SEE THE INFORMATION THAT YOU GIVE?

When I write about or share the results from the study, I will write about the combined information I receive from all interviews. I will keep your name and other identifying information private. Your employer will not know who participated and who did not. Participating does not affect the status of anyone's employment one way or another.

I will make every effort to prevent anyone who is not on the research team from knowing that you gave us information, or what that information is. Your interview will be stored on password-protected device which only I have access to. My dissertation chairs will verify my coding of the data and will read your interview but will not have any identifying information to link back to you.

CAN YOU CHOOSE TO WITHDRAW FROM THE STUDY EARLY?

You can choose to leave the study at any time. You will not be treated differently if you decide to stop taking part in the study. If you choose to leave the study early, data collected until that point will remain in the study database and may not be removed.

WILL YOU RECEIVE ANY REWARDS FOR TAKING PART IN THIS STUDY?

You will not receive any rewards or payment for taking part in the study.

WHAT IF NEW INFORMATION IS LEARNED DURING THE STUDY THAT MIGHT AFFECT YOUR DECISION TO PARTICIPATE?

I will tell you if I learn new information that could change your mind about staying in the study. I may ask you to sign a new consent form if the information is provided to you after you have joined the study.

WILL YOU BE GIVEN INDIVIDUAL RESULTS FROM THE RESEARCH TESTS/SURVEYS?

You will receive a copy of the transcript of your interview via email for your approval.

WHAT ELSE DO YOU NEED TO KNOW?

If you volunteer to take part in this study, you will be one of 10 people to do so.

I am being guided in this research by Dr. Justin Bathon and Dr. Jayson Richardson. There may be other people on the research team assisting at different times during the study.

WILL YOUR INFORMATION BE USED FOR FUTURE RESEARCH?

Your information collected for this study will NOT be used or shared for future research studies, identifiable information like your name or school will be removed from the interview data.

STORING AND SHARING YOUR INFORMATION FOR FUTURE USE

The University has asked me to store the data for a period of six years after the study. However, the information from this study will not be shared with other researchers or used in other studies.

INFORMED CONSENT SIGNATURES

This consent includes the following:

- **Key Information Page**

- **Detailed Consent**
- **Appendix: Interview Questions**

You are the subject or are authorized to act on behalf of the subject. You will receive a copy of this consent form after it has been signed.

_____ **Signature of research subject** *or, if applicable,* **research subject's legal representative*	_____ **Date**
_____ **Printed name of research subject**	
_____ Printed name of [authorized] person obtaining informed consent	_____ Date

Appendix I

University of Kentucky | Office of Research Integrity
IRB, RDRC

XP Initial Review

Approval Ends:	IRB Number:
November 12, 2020	54493

TO: Donna Brown,
Educational Leadership Studies
PI phone #: [redacted]

PI email: donna.brown@uky.edu

FROM: Chairperson/Vice Chairperson
Nonmedical Institutional Review Board (IRB)

SUBJECT: Approval of Protocol

DATE: 11/14/2019

On November 13, 2019, the Nonmedical Institutional Review Board approved your protocol entitled:

The Effects of School Leaders' Support on Teachers' Integration of Technology in Catholic Schools

Approval is effective from November 13, 2019 until November 12, 2020 and extends to any consent/assent form, cover letter, and/or phone script. If applicable, the IRB approved consent/assent document(s) to be used when enrolling subjects can be found in the "All Attachments" menu item of your E-IRB application. [Note, subjects can only be enrolled using consent/assent forms which have a valid "IRB Approval" stamp unless special waiver has been obtained from the IRB.] Prior to the end of this period, you will be sent a Continuation Review (CR)/Administrative Annual Review (AAR) request which must be completed and submitted to the Office of Research Integrity so that the protocol can be reviewed and approved for the next period.

In implementing the research activities, you are responsible for complying with IRB decisions, conditions and requirements. The research procedures should be implemented as approved in the IRB protocol. It is the principal investigator's responsibility to ensure any changes planned for the research are submitted for review and approval by the IRB prior to implementation. Protocol changes made without prior IRB approval to eliminate apparent hazards to the subject(s) should be reported in writing immediately to the IRB. Furthermore, discontinuing a study or completion of a study is considered a change in the protocol's status and therefore the IRB should be promptly notified in writing.

For information describing investigator responsibilities after obtaining IRB approval, download and read the document "PI Guidance to Responsibilities, Qualifications, Records and Documentation of Human Subjects Research" available in the online Office of Research Integrity's IRB Survival Handbook. Additional information regarding IRB review, federal regulations, and institutional policies may be found through ORI's web site. If you have questions, need additional information, or would like a paper copy of the above mentioned document, contact the Office of Research Integrity at 859-257-9428.

Appendix J

Unified Framework and LoTi Digital Age Survey for Leaders Crosswalk

1. Establishing and conveying the vision

a. Creating, articulating, and stewarding shared mission and vision

LoTi Q20. I continually work with my staff to generate a shared vision as well as an expectation for the ongoing use of digital tools and/or environmental resources to improve student learning.

b. Implementing vision by setting goals and performance expectations

LoTi Q11. I expect staff to use digital tools to support their instruction (e.g., multimedia, online tutorials, online.simulations, videos) so that students can better understand the content being taught.

LoTi Q14. I take the necessary steps (e.g., conversations with building/district technology liaisons, emails to staff, discussions at curriculum meetings) to ensure that all digital tools and/or environmental resources on campus are (1) current, functional, and accessible for staff and students and (2) aligned with all continuous improvement efforts.

c. Modeling aspirational and ethical practices

LoTi Q7. I promote, monitor, and model the ethical use of digital tools on my campus (e.g., appropriate citing of resources, respecting copyright permissions).

d. Communicating broadly the state of the vision

LoTi Q10. I model and facilitate the effective use of current and emerging digital tools to support a shared vision for teaching and learning on my campus.

e. Promoting use of data for continual improvement

LoTi Q4. I use the principles of data-driven decision-making to guide continuous improvement and increase the performance levels of staff and students on my campus.

f. Tending to external accountability

2. Facilitating technology use as part of a high-quality learning experience

a. Developing and monitoring curricular program

LoTi Q18. I encourage staff to model for students the safe and legal use of digital tools while they are delivering content and/or confirming student understanding of pertinent concepts.

LoTi Q25. Students on my campus use the classroom digital tools and/or environmental resources to engage in relevant, challenging, self-directed learning experiences that address the content standards.

LoTi Q26. Students on my campus complete web-based tasks that emphasize high level cognitive skills (e.g., Bloom—analyzing, evaluating, creating; Webb—strategic and extended thinking).

LoTi Q28. Students on my campus use digital tools and/or environmental resources for research purposes (e.g.data collection from questionnaires and surveys) that require them to make predictions and draw conclusions.

LoTi Q33. Students on my campus use digital tools and/or environmental resources for higher-order thinking and personal inquiry related to project-based learning (PBL) experiences.

b. Developing and monitoring instructional program

LoTi Q2.Students on my campus replace traditional reports with web-based or multimedia presentations (e.g.,Prezi, PowerPoint, Google Slides) that showcase information on topics assigned by their teachers.
LoTi Q3. Students on my campus participate in web-based tasks that emphasize problem-solving and decision-making aligned to the content standards.
LoTi Q5. Students on my campus use digital tools and/or environmental resources to explore solutions to teacher-directed problems that require inventive thinking.
LoTi Q12. I expect that teachers alone should use the classroom digital tools during instruction due to the amount of content that must be covered by the end of each marking period.
LoTi Q16. Students on my campus use digital tools and/or environmental resources to participate in online projects with others beyond the classroom.
LoTi Q19. Students on my campus model the "correct and careful" use of digital tools (e.g., ethical usage, proper digital etiquette, protecting their personal information) and are aware of the consequences regarding their misuse.
LoTi Q21. Students on my campus use digital tools and/or environmental resources to define real life problems and then find solutions that are grade level appropriate.
LoTi Q34. Students on my campus use all forms of the most advanced digital tools to pursue collaborative problem-solving opportunities of personal and/or social importance.
LoTi Q37. I challenge my staff to consider how students will apply what they have learned in class to the world they live in when planning instruction and assessment strategies.

c. Developing and monitoring assessment program

LoTi Q27. Students on my campus use digital tools and/or environmental resources to confirm their content understanding or to improve their basic math and literacy skills.
LoTi Q32. Students on my campus apply their classroom content learning to real world situations within the localor global community using the digital tools at their disposal.

d. Maintaining safety and orderliness

e. Personalizing the environment to reflect students' backgrounds

LoTi Q35. I model and advocate for the use of assistive technologies that are available to meet the diverse demands of special needs students.

3. Building professional capacity for technology integration
   a. Providing opportunities to learn for whole faculty, including leader(s)

LoTi Q23. I provide ongoing professional growth opportunities for staff to design student-centered performance assessments that involve students transferring what they have learned to a real world context using the available digital tools and/or environmental resources.

   b. Creating communities of practice

LoTi Q13. I intentionally promote professional learning communities for staff to explore different digital tools unique to their grade level/content area that support a shared vision for student success and innovation in the classroom.
LoTi Q15. I strategically promote and monitor professional learning communities that enable staff to analyze data and make recommendations impacting student academic growth and current instructional practices on campus.

   c. Providing individualized consideration

   d. Selecting for the right fit

   e. Building trusting relationships

   f. Supporting, buffering, and recognizing staff

g. Engendering responsibility for promoting learning

4. Creating a supportive organization for technology integration
   a. Acquiring and allocating resources strategically for mission and vision
      LoTi Q1. Students on my campus use digital tools and/or environmental resources that require them to analyze information and ask questions.
      LoTi Q7. I advocate for programs and funding opportunities at the local, state, and/or national levels that promote the strategic and intentional uses of digital tools in the classroom.
      LoTi Q8. Students on my campus find innovative ways to use our school's advanced digital tools (e.g., 1:1 mobile devices, digital media authoring tools, probeware with GPS systems) for inquiry-based learning opportunities that use social media.
      LoTi Q30. I allocate the necessary financial and human resources to provide equitable digital age learning and working environments for all students and staff members.
   b. Sharing and distributing leadership

   c. Strengthening and optimizing school culture

   d. Building collaborative processes for decision making
      LoTi Q29. I elicit feedback from stakeholders on campus to ensure that the most current technology infrastructure is in place to support learning outcomes that promote higher order thinking, engaged learning, and authentic connections to the content.
   e. Maintaining ambitious and high expectations and standards
      LoTi Q36. I promote the effective use of digital tools on my campus and within my professional community.
   f. Tending to build on diversity

   g. Considering context to maximize organizational functioning

5. Connecting with external partners
   a. Engaging families and community in collaborative processes to strengthen student learning

   b. Building productive relationships with families and external partners in the community

   c. Anchoring schools in the community
      LoTi Q6. Students on my campus use collaborative digital tools (e.g., Google Docs, social media, wikis) and/or environmental resources beyond the school building (e.g., community action groups, parents, elected officials) to create solutions for real world problems (e.g., bullying, health awareness, election apathy, global warming).
      LoTi Q17. Students on my campus use digital tools and/or environmental resources for (1) collaboration, (2) publishing, and (3) research to tackle real world questions, issues, and/or controversies within our community.
      LoTi Q22. Students on my campus engage in standards-based applied learning projects that emphasize creative thinking and student use of digital tools.
      LoTi Q24. I promote strategic partnerships with outside organizations, businesses, government agencies, or other entities to provide authentic opportunities for staff and students to engage in real world problem-solving aligned to our content standards.
      LoTi Q31. Students on my campus apply their classroom content learning to real world situations within the local or global community using the digital tools at their disposal.

Note: Information from "Leadership for Technology Use, Integration and Innovation", by S. Dexter, J. W. Richardson, & J. B. Nash, 2016. In "Handbook of Research on the Education of School Leaders", M. D. Young & G. M. Crow (eds.). Copyright Taylor and Francis, 2016; "LoTi Digital Age Survey for Leaders" (2018) by LoTi Connection, Inc., Carlsbad, CA.

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VITA

Donna Reeves-Brown
Louisville, KY

Education

M.Ed. Guidance and Counseling, University of Louisville — May 1975

B.A. Mathematics; Spalding University — May 1971

Employment

Adjunct Professor/Instructor
Bellarmine University — Spring 2015 - present
Louisville, KY

Lecturer
University of Louisville — Fall 2002
Louisville, KY

Technology Curriculum Consultant
Archdiocese of Louisville Catholic Schools — August 2000 - present

Mathematics and Computer Science Teacher
Jefferson County Public Schools — August 1973 - May 2000
Waggener High School
Butler High School
Louisville, KY

Sumter District 2 — December 1971 – May 1973
Ebeneezer Middle School
Dalzell, SC

Honors

2007 ISTE Making IT Happen Award

1999 Ashland Teacher Achievement Award Recipient

1996 GTE Teacher of the Year Award

Publications

Reeves-Brown, D., Buntin, W., Burslem, R., Grace, G., Mallini, K., Payne, J., Treece, A., Waterhouse, A., & Wilcox, N. (2017). Teachers affect the school technology culture. In *Retooling schooling*, (pp. 21-33). http://go.uky.edu/retooling.

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