Role of the Principal in Implementing Blended Learning in Algebra I Courses in South Carolina Public Schools

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ROLE OF THE PRINCIPAL IN IMPLEMENTING BLENDED LEARNING IN ALGEBRA I COURSES IN SOUTH CAROLINA PUBLIC SCHOOLS

by

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Dedication

This dissertation is dedicated to my family whose support and encouragement sustained me throughout this process. The greatest lessons I have learned in life were not even close to a classroom.

To my Grandmother “Ruth” Vivian Bowman, thank you for the lessons in humor and dignity.

To my Grandmother Mary “Lee” Murphy, thank you for the lessons in grace, Style, and selfless service.

To my “Uncle” Sergeant Major Norwood Fowler, Sr, thank you for the lessons in duty, honor, and respect.

And to my Aunt Lula “Darlene” Bowman, who showed me extreme courage under tremendous adversity and pain… all without ever having felt sorry for herself.

Lastly, to my wife Sherell and daughter Deja, this was truly a team effort that required numerous sacrifices from both of you. I could not have completed this work without you all.
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Abstract

In the state of South Carolina, the primary indicator of student achievement in high schools is the End of Course Test. In order to increase passing rates on this test, many schools are turning to online tutorials or more advanced online intelligent tutoring systems. Any combination of online delivery of educational content with classroom interaction and live instruction is known as blended learning. This study examined the role of the principal in implementing blended learning in Algebra 1 courses in South Carolina public schools.

This study was guided by three primary research questions: What is the self-perceived role of the principal in effective implementation of a blended learning course in Algebra I in South Carolina public high schools? What leader behaviors do principals believe are associated with successful implementation of a blended learning course in Algebra I in South Carolina public high schools? How do principals believe their goals shape the implementation of a blended learning course in Algebra I in South Carolina public high schools?

As a result of this study, two primary roles for the principal emerged: Principal as Technology Leader and Principal as Manager. The primary behaviors were creating and communicating a strong vision as well as creating a plan to sustain the vision. Lastly, the major goals of the principals were to improve student achievement and to provide differentiation for struggling students. The implications for these findings are discussed.
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Chapter 1

Introduction

The National Center for Education Statistics (2000) indicates that principal leadership has been described as one of the important factors affecting the effective use of technology in classrooms. In this era of accountability, principals are tasked with improving performance on standardized tests yet have limited time and resources to attain appropriate results. Oftentimes, they turn to the latest innovation in packaged curricular programs or instructional technology in attempts to address low academic performance and low standardized test scores. A melding of these two options results in blended learning. Blended learning combines online delivery of educational content with the best features of classroom interaction and live instruction to personalize learning, allowing for thoughtful reflection and differentiated instruction (Watson, 2008). When properly implemented, students should not experience blended learning as just another district or school level initiative. It is a fundamental redesign of instructional models with the goal of accelerating learning toward college and career readiness (Blended Learning Implementation Guide, 2013).

For this study, South Carolina high school principals compose the population from which the sample was drawn. Participation criteria included principals of schools who have implemented the internet based program ALEKS (www.aleks.com) in a blended learning model within the last five years. According to the ALEKS website,
ALEKS is a web-based, artificially intelligent assessment and learning system. With all the challenges facing the teaching and learning of mathematics, the use of ALEKS has been shown to be effective with students learning mathematics in both a traditional and a hybrid learning environment (Nwaogu, 2012).

**Purpose of the Study**

This study examined the managerial, instructional, and leadership roles of the principals as technology leaders of their respective schools. More specifically, it examined how the principal can influence the effectiveness of blended learning on current and repeating 9th grade students enrolled in an Algebra I course supplemented with the ALEKS program in South Carolina public schools.

Technology leadership is defined as tasks and inclinations of the principal that support effective instructional technology integration (McLeod, 2008). This study sought to identify the competencies most needed by the principal as technology leader when implementing a blended learning or hybrid Algebra I course in South Carolina secondary schools. The data were collected using the Principals Technology Leadership Assessment (PTLA) survey as well as principal interviews. The sample population consisted of 15 South Carolina high school principals who have implemented the math program ALEKS in a blended learning model for Algebra I within the past five years.

**Methodology**

This study utilized the Principals Technology Leadership Assessment (PTLA) survey as well as principal interviews. The purpose of the PTLA is to provide principals with detailed and comparative information about their technology leadership. The PTLA
consists of 35 questions covering 6 different dimensions of technology leadership. The
PTLA survey asked principals to rate the extent of each item within each of the five
domains of technology leadership using a 5-point Likert-type scale. The numeric values
assigned to the scale were: fully (5), significantly (4), somewhat (3), minimally (2), and
not at all (1). A link to the online version of the assessment was sent to each of the 15
high school principals participating in this study. The time required to complete the
survey was approximately 15 to 25 minutes.

This information was then compared with the principals’ own perceptions,
gathered through interviews, of their leadership in the process of implementing a hybrid
course. The sample was limited to South Carolina high school principals who
implemented the math program ALEKS in a blended learning model for Algebra I within
the past five years. There are currently eight school districts in the state that are
considered high usage districts by the ALEKS Corporation. High usage districts are
defined as having more than five schools in the district that are utilizing the program.
From these eight districts, 15 high schools were found to have implemented the program
in the classroom setting within the past five years. These 15 schools were included in the
PTLA survey.

From the group of 15 schools, eight principals were then purposefully selected to
provide balanced feedback based on group demographics to determine their perceptions
of their roles and behaviors in implementing the hybrid course. Individual interviews
were conducted with the eight high school principals. The interviews consisted of 12
open-ended questions formulated by the researcher to provide consistency among
different participants. The interviews were conducted via teleconference. The interviews
were digitally recorded for accuracy, transcription, and subsequent analysis of the data. The interviews required less than an hour to complete.

Information from the PTLA was combined with the semi-structured interview to gain insight regarding the behaviors and perceptions of high school principals currently utilizing this instructional model. The process of data collection and analysis enabled the researcher to gain insight into the roles of the principals as they implemented the blended course.

**Significance of the Study**

As schools try to meet ever increasing levels of proficiency, principals are tasked with finding effective ways for their schools to meet district and state objectives. Many educators are leery of electronic platforms that promise results in a prescribed period of time. The presence of a hybrid course or other technology intensive hardware does not assure meaningful learning for students. Numerous studies have been conducted in search of the correlation between technology and student achievement. Townsend (2012) concluded that despite widespread access to technology in schools, the evidence linking technology to student achievement is inconclusive. Ravitz and Mergendoller (2002) concluded that when we look broadly across schools, there is a positive relationship between achievement and technology use. Anderson and Dexter (2005) confirm that although technology infrastructure is important, technology leadership is even more necessary for effective utilization of technology in schooling. This study closely examined the role of the high school principal in implementing a blended learning or hybrid course.
Theoretical Framework

One of the more prevalent frameworks associated with educational technology and an appropriate framework when discussing the implementation of computer based technology in education is the constructivist theory. According to constructivist learning theory, students do not passively receive knowledge but actively construct new knowledge based on prior knowledge. Meaningful learning requires students' active involvement. (Cobb et al., 1992, p. 6) Galla (2010) defines the relationship between the constructivist perspective and technology by stating that:

The ways in which we use technologies in schools should change from their traditional roles of technology-as-teacher to technology-as-partner in the learning process. Students do not learn from technology; technologies support meaning making by students. Students learn with technologies when computers support knowledge construction and learning by doing (p. 8).

Constructivism provides an appropriate foundation for the implementation processes and behaviors from the leadership perspective. In applying constructivist theory as the framework for computer-based technology implementation and leadership in education, Jonassen (2006) made the distinction that technology is a great tool with which to learn rather than a great way to teach. The framework also seeks to address the leadership required to foster and sustain computer based and technology infused practices in high schools.

Positionality

McDowell (1992) noted that researchers must especially take account of their own position in relation to the research participants and research topic. There are three
experiences from my background that I must acknowledge. The first is my position as a father. Prior to utilizing the ALEKS program as a principal, I used it as a parent with my eighth grade daughter. I saw the immediate gains that my child had as a result of using the program in both her confidence and competence in solving equations. My child is currently a senior in college and has not utilized the program in the last eight years.

Another important experience that I must acknowledge is my time as a novice high school principal. When faced with struggling students and End of Course Test scores below both the state and district averages, I turned to the ALEKS tutoring system based on the results I had had with my own child. We chose to employ the program for our entire ninth grade since it was a relatively small student body. Over the course of the 4 years that we used the program, I learned many lessons through trial and error about both student and faculty motivation. This is also where I first noticed that just giving students access to the software was not enough to ensure a positive outcome. My attempt to replicate my daughter’s success with my ninth graders had an overall positive effect, but there were still many students and one out of my two teachers who were not on board.

Lastly, as a high school principal for the past ten years, I have also had the opportunity to work either directly or indirectly with two principals in the sample population. The principal of Mayer High School was previously consulted with me on a separate educational initiative. The principal of Meadowcastle has spoken with me on three occasions concerning professional references for potential employees.

Merriam (1998) also focused attention on the need for researchers to be open and clear to readers about any potential biases that may impact the research study. My own personal experience and positionality have greatly influenced me as both a parent and a
principal. I believe that the personal experiences of all leaders influence and inform how they lead.

**Research Questions**

1. What is the self-perceived role of the principal in effective implementation of a blended learning course in Algebra I in South Carolina public high schools?

2. What leader behaviors do principals believe are associated with successful implementation of a blended learning course in Algebra I in South Carolina public high schools?

3. How do principals believe their goals shape the implementation of a blended learning course in Algebra I in South Carolina public high schools?

**Definition of Relevant Terms**

*Blended learning:* A formal education program in which a student learns at least in part through online learning, with some element of student control over time, place, path, and/or pace and at least in part in a supervised brick-and-mortar location away from home (Christensen, et al., 2013).

*Hybrid learning:* Another term used to describe blended learning when a portion of the traditional face-to-face instruction is replaced by web-based online learning.
Computer Aided Instruction (CAI): Refers to the use of computers to teach academic skills and to promote communication and language development and skills. It includes computer modeling and computer tutors (Collet-Klingenberg, 2009).

Technology leadership: Technology leadership differs from traditional leadership theory in that it does not focus on the characteristics or actions of leaders but instead emphasizes that leaders should develop, guide, manage, and apply technology to different organizational operations in order to improve operational performance (Chang, 2011).

Educational technology: Refers to the study and ethical practice of facilitating learning and improving performance by creating, using, and managing appropriate technological processes and resources (AETC, 2012).

Computer Aided Instruction

The National Council of Teachers of Mathematics (NCTM) published Principles and Standards for School Mathematics and identified the following six principles: equity, curriculum, teaching, learning, assessment, and technology. The technology principle states that technology is essential in teaching and learning mathematics. The meaningful incorporation of technology influenced the mathematics that was taught and enhanced student learning. According to NCTM, “computers were essential tools for teaching, learning, and doing mathematics” (NCTM, 2000, p. 3). When computer aided instruction was available, students were able to see the mathematics and focus on problem solving, decision making, reasoning, and reflection.
Kirkpatrick and Cuban (1998) defined three uses of computers in instruction: computer assisted instruction (CAI), computer-managed instruction (CMI), and computer-enhanced instruction (CEI). CAI provides drill exercises and tutorials. CMI integrates diagnostics and informs the teacher of the areas in which students need more instruction as well as records the students’ progress for the teacher. CEI uses the internet or other computer programs to enhance instruction. Based on these definitions, this study will include both CAI and CMI in the blended classroom model.

Lockard and Abrams (2004) further stated that CAI provides instruction of content areas in a variety of formats, with or without the assistance of a teacher. CAI was designed to make instruction easier, quicker, and more efficient for both the teacher and the learners (Lockard & Abrams, 2004). There have been previous studies on the effectiveness of technology in schools. Numerous studies have identified positive, negative, and neutral relationships between technology use and student achievement (Townsend, 2012). Coley, Cradler, and Engel (1997) summarized the findings from numerous studies on the impact of CAI. They concluded that CAI has demonstrated positive gains in student achievement, and there is evidence that a variety of specific applications lead to improvements in student performance, student motivation, and teacher satisfaction.

Liao (1992) conducted a meta-analysis of existing research on the effects of CAI on learning outcomes. Thirty-one studies indicated that CAI had moderately positive effects on student learning outcomes. Kulik and Kulik (1991) also presented a meta-analysis that examined the results of 254 evaluation studies that compared student learning in classes using CAI. Their study concluded that the utilization of CAI produced
positive effects on students. The vast resources found on the Internet have been shown to facilitate student learning, but the degree to which it is effective is greatly dependent on its implementation. Whether called web enhanced courses, hybrid courses, or blended learning, all of these strategies seek to maximize the benefit of using the electronic platform to deliver or supplement direct instruction.

The program being utilized by participants in this study is ALEKS. ALEKS is classified as an intelligent tutoring system (ITS). According to Polson and Richardson (1988), an ITS is a computer program that: 1) is capable of competent problem solving in a domain, 2) can infer a learner’s approximation of competence, and 3) is able to reduce the difference between the competence of ITS and that of the student through application of various tutoring strategies.

The effectiveness of the ALEKS program has been documented by previous independent studies. Allen (2007) concluded, “It would appear that ALEKS was able to assist less prepared students reach success in elementary algebra. Based on the software's emphasis on repetition of all algebra skills and the continuous review of prerequisite arithmetic skills, this seems reasonable” (p. 11). LaVergne (2007) concluded, “Based on data collected on the use of the ALEKS Web-Based Learning System with Algebra IA students, ALEKS had a significant impact on students’ standardized math test scores” (p. 8).

**Technology Leadership**

Technology leadership is an indication of the managing of all technology usage in schools and is an essential component of effective educational administration (Anderson & Dexter, 2005). Byrom and Bingham (2001) stated, “Technology leadership is
probably the single most important factor affecting the successful integration of technology into schools” (p. 4).

When implementing new technology in a school, the principal should assume the role of the technology leader.

If principals do not use technology on a consistent basis, then they should not expect the faculty to use technology regularly. Modeling the use of technology provides an effective method for exposing teachers to new strategies and demonstrating to the staff that it is acceptable to take risks and make mistakes, without the fear of retribution (Afshari et al., 2010, p. 11).

With this statement, Afshari asserted that in order for the integration and implementation of technology to be effective, the technology leader must also model the effective use themselves. Creighton (2011) stated the central mission for school leaders is not whether technology is needed in schools, but how it will be integrated effectively into instruction and suggested that technology leaders in leading school reform must put rigorous thought in the overall role that technology plays in the enhancement of student learning.

Dooley (1998) conducted case studies of three schools to examine the effect of the principal’s leadership style on whether or not an innovation, such as technology use, would have high usage throughout a school. She concluded that where technology had diffused the furthest, the principal’s change-facilitation style was that of an initiator. The term initiator was from a previous study by Hall and Hord (1987) that described initiators as individuals who hold a clear vision for the school with long-range goals, utilize
inclusive decision making, and set high expectations that are communicated to stakeholders. Previous studies have also concluded that it is the responsibility of the principal not only to learn about technology but also to ensure that other staff in the building receive learning opportunities by providing either release time or professional development opportunities (Kearsley & Lynch, 1992; Hall, 1999).

The principal must establish the vision and goals for technology in the school (Grady, 2011). In the visionary role, principals establish a context for technology in the school and understand how technology can be used to restructure learning environments and empower teachers and students to be technologically astute (Brockmeier, Sermon, & Hope, 2005). The processes that principals follow during the implementation of a technology-based initiative is a measure of their technology leadership. Ritchie (1996) identified seven variables contributing to the failed implementation of educational technologies:

- Lack of administrative support;
- Inadequate staff development and technical support;
- Low quantity, quality, and access to technologies in the classroom;
- Nonexistent or cursory plans for adopting and implementing technology into a school;
- Failure to allocate a technology coordinator to help train teachers and coordinate technologies;
- Lack of funds and personnel to maintain equipment; and
- Continual assessment of content acquisition through traditional methods.

According to Ritchie (1996), schools are not yet effectively implementing instructional technologies in spite of the increase in the capacity of available educational technology. His study identified lack of administrative support as one of the most critical
impediments to the integration of instructional technology. Administrative support can take the form of funding, technical support for teachers, and professional development opportunities for teachers to learn how to integrate the technology in their classes. Without administrative support, one or more of the other variables, such as inadequate professional development or lack of funds, is more likely to become a roadblock to effective integration.

Technology leadership is becoming a common topic in the literature, but examination building level leadership has not been widely studied and connected to the success of technology integration and implementation of CAI. Creighton (2003) made, perhaps, the clearest assertion yet that successful principal technology leaders will be those who decide to concentrate on how best to intersect technology with teaching and learning.

Summary

Chapter 1 introduced the concepts of blended learning and computer aided instruction, provided the purpose and significance of the study, established the theoretical framework, and included some of the relevant scholarship. Chapter 2 is a comprehensive review of the literature in the areas of blended learning, the web-based program ALEKS, the roles of the principal, the principal as the technology leader, barriers to technology implementation, and standards that govern implementation of a blended learning course.
Chapter 2

Review of the Literature

Administrative leadership is probably the single most important factor affecting the successful integration of technology into schools (NCES, 2000). This chapter reviews the literature on the principal’s role in the process of planning and implementing a blended learning course. The first section will explore the past and present roles of the principal. The next section presents research that indicates that the leader with the most influence on the implementation of a technology initiative, such as CAI, is the building principal. Additionally, the principal as technology leader shall be explained and reviewed. The final section of this review of literature defines and describe the effectiveness of blended learning and discusses the web-based program ALEKS in detail. Because technology has become increasingly more prevalent in education, this research will seek to correlate the successful implementation of a blended course and the methods and strategies that principals use to lead the technology integration.

The Roles of the Principal

Beck and Murphy (1993) conducted extensive research on the changes in the principal’s roles by each decade from the 1920s until the 1990s. Although the descriptions were unique to each decade, transition to a new decade did not mean that previous roles “disappeared.” Role descriptions and their emphases appear to be based
on underlying events and philosophies of the times. Two of the roles that dominate their list and also mark a critical change in emphasis are the principal as a manager and the principal as an instructional leader.

**Principal as Manager**

There have been numerous studies conducted to describe the role of the high school principal. Barnard (1938) made an early assertion that the role of the principal was to accomplish the goals of scientific management and organizational systems management. He recognized and stressed the importance of commitment to purpose with organized activities. In the 1920s, Beck and Murphy described the principal’s role as a values broker, whereby principals’ roles emphasized values. The next decade brought a shift to that of a scientific manager. The emphasis was more on the processes associated with managing an educational institution. The principal became the expert in finance, school reports, and business management. Administrative management was also the primary role of the principal prior to the 1960s (Hallinger, 1992). Daresh and Playko (1992) concurred and described principals as managers who must develop the necessary skills and knowledge to manage a school effectively. Some skills are learned through formal training while others were learned through on-the-job training. According to Davis, Darling-Hammond, LaPointe, & Meyerson (2005),

The role of principals has swelled to include a staggering array of professional tasks and competencies. Principals are expected to be educational visionaries, instructional and curriculum leaders, assessment experts, disciplinarians, community builders, public relations and communication experts, budget analysts, facility managers, special program managers, as well as guardians of various
legal, contractual, and policy mandates and initiatives (p. 34).

Principals’ management activities in schools are unique compared to managers in other organizations. The character of schools as a public service as well as a publicly-funded organization requires high degrees of organizational autonomy and external penetration (Meyer & Scott 1983; Ingersoll 1993). The differences in managing as a principal and managing other organizations lead to discussions on what a manager is. Stewart (1996) suggested that the two simplest definitions are (1) managers are anyone responsible for the work of others and (2) managers are those above a certain level in the hierarchy of supervision. This ambiguity arises because managers pass their responsibility and authority to others who perform many seemingly managerial tasks (Grey, 1999). As managers delegate responsibility and authority, activities that may be characteristically managerial may not belong to or be performed by managers exclusively (Hales, 1994; Noordegraaf & Stewart, 2000, p. 433). Consequently, the nature of managerial work causes a fundamental problem in identifying managerial activity.

While the role of the principal as manager has been studied from the scientific management perspective, there has been little research on the social aspects of management and its effect on the organization. Ogawa and Bossert (1995) assert that theoretically-based research on school management and the managerial activity of principals in particular are not necessarily organizationally explicit. Although principals’ roles and activities are often prominently figured in discussions of accountability in education, comparatively few studies explore the more sociological perspectives concerning principals’ school management activities and their relationships to schools’ organizational environments.
**Principal as Instructional Leader**

During the early 1980’s, the duties of the principal called for them to be more involved in instruction. Spurred by the publication of *A Nation at Risk* in 1983, the role of the principal shifted from manager to instructional leader (National Commission on Excellence in Education, 1983). Instructional leadership models emerged in the early 1980s from early research on effective schools. This body of research identified strong, directive leadership focused on curriculum and instruction from the principal as a characteristic of elementary schools that were effective at teaching children in poor urban communities (Edmonds, 1979; Leithwood & Montgomery, 1982). Instructional leadership focuses predominantly on the role of the school principal in coordinating, controlling, supervising, and developing curriculum and instruction in the school (Bamburg & Andrews, 1990; Hallinger & Murphy, 1985). Hallinger (2011) states:

> Instructional leadership became the preferred term [in the field of education] because of the recognition that principals who operate from this frame of reference rely more on expertise and influence than on formal authority and power to achieve a positive and lasting impact on staff motivation and behavior and student learning (pp. 275-276).

Supovitz, Sirinides, and May (2010) describe three key factors in instructional leadership:

The role principals play in focusing the mission and goals of the organization, how principals encourage and environment of collaboration and trust in the building, and the extent to which principals actively support instructional improvement related to teaching and learning (p. 34).
Today’s principals still need to be effective managers of teachers, but they also must now be instructional leaders. The principals are expected to find a balance between the position of school manager and the expectations of being the instructional leader of the school. Inherently bound to instructional leadership are decisions about what technology to use and how to employ it in the classroom. These decisions have led to the emergence of the new role of principals’ leading in the area of technology.

**Principal as Technology Leader**

The National Center for Education Statistics (2000) states that principal leadership has been described as one of the most important factors affecting the effective use of technology in the classrooms. The mere presence of hybrid courses or other technology intensive hardware does not ensure meaningful learning for students. In general, the findings confirm that although technology infrastructure is important, technology leadership is even more necessary for effective utilization of technology in schooling (Anderson & Dexter, 2005). Wilmore and Betz (2000) stated that “information technology will only be successfully implemented in schools if the principal actively supports it, learns as well, provides adequate professional development and supports his/her staff in the process of change” (p. 15).

To expand the description of the role of the principal in the integration of technology, the concept of the principal as the technology leader should be considered. According to Chang (2011), technological leadership differs from traditional leadership theory in that it does not focus on the characteristics or actions of leaders but instead emphasizes that leaders should develop, guide, manage, and apply technology to different organizational operations so as to improve operational performance (p. 328).
Pete Pantsari (2003), CIO of the National Educational Telecommunications Association (NETA), describes an effective technology leader as one who is “Keeping it all running and up-to-date; while looking down the road at the next upgrade in hardware and software – and doing all this on a shoestring budget” (p. 1). Technology leadership can be defined as the actions principals and other school leaders take to work toward successful integration and implementation of instructional technology. The component parts of technology leadership illustrate that technology leaders must be actively involved with technology---crafting policies, using e-mail, and generally spending time with it. A school’s technology efforts are seriously threatened unless key administrators become active technology leaders in a school (Anderson & Dexter, 2005). The core issue is: the principal as technology leader must remain visible and involved in guiding the process of implementing technology, with teaching and learning as the driving force (Creighton, 2003). Principals who make technology a routine part of their jobs illustrate a commitment to it and can personally help others acquire technology expertise (Brockmeier, Sermon, & Hope, 2005). Lastly, Valdez (2004) cited three reasons that educational leaders need to know and utilize instructional technology, especially those that are used for communicating new knowledge:

1. The need to prepare students to function in an information based Internet using society.
2. The need to make students competent in using tools found in almost all work areas.
3. The need to make education more effective and efficient.
The principal as the technology leader has a major role in the successful integration and implementation of any technology initiative. Leadership and administrators’ ability to lead are an important factor in determining the success of implementing a new technology (Anderson & Dexter, 2005; Hayes, 2006). To be an effective leader the principal needs to communicate a strong vision to the educators who will be implementing the plan and allow them the time to participate in meaningful professional development to become proficient in the skills needed to teach in the blended environment. Leading by example is necessary for those trying to integrate technology into their schools. Individuals who are unable to use email, the Internet, or other technology tools effectively will have difficulty inspiring and leading others to use technology to enhance student learning (Creighton, 2003; Schmeltzer, 2001). To gain a clear definition of technology leadership, Byrom and Bingham (2001) also identified five leadership characteristics that influence the effective use of technology for teaching and learning based on their research working with 12 schools during a 5-year period. These characteristics are vision, leading by example, teacher support, open dialogue, and shared leadership. According to Byrom and Bingham, these characteristics enabled learners within a community to integrate technology effectively. Two of these characteristics, vision and teacher support are closely examined in this study.

Vision. Effective principals establish the vision and goals for all aspects of a school. One area of competence often suggested is the need for school technology leaders to have a vision for the role of educational technology in schools (Anderson & Dexter, 2005). Leadership requires a person with not only the ability to perform a specified task but also the ability to impart a vision as to the outcome of the task to those
being led. In the scholarship regarding technology leadership, there is strong emphasis on the importance of the leader’s vision. Johnston and Cooley (2001) stated that school leaders must first understand and be able to articulate a vision of how technology fits into the broader framework of school reform…and why and how they are promoting the effective and meaningful use of instructional technology to elevate student achievement.

Principals must establish a context for technology in the school and understand how the technology can be used to restructure learning, empower teachers, and help students become more technology literate. “In the visionary role, principals establish a context for technology in the school and understand how technology can be used to restructure learning environments and empower teachers and students to be technologically astute” (Brockmeier, Sermon, & Hope, 2005, p. 46). Schools that have made the most progress toward technology adoption and integration have school leaders with a vision of what is possible through the use of technology (Redish, Williamson, & Bissett, 2009).

When creating a vision, the principal should take care to help guide the process so that the vision is a shared vision for the school and not just the principal’s vision. Administrators must incorporate multiple perspectives and others’ values to create a shared vision that denotes a noble and uplifting future (Moos, Krejsler, & Kofod, 2008). Effective leadership for technology planning needs to involve the principal as instructional leader supporting and driving the process forward, identifying issues for decision making, and then seeking input and involvement from teachers and other stakeholder groups (Creighton, 2003). By involving the teachers and community in the
planning and some of the decision making, the leader will increase the buy-in to the vision from all stakeholders. The purpose in developing a vision is more than articulating how technology can support instructional programs. It is to describe an instructional program in which technology is present and regularly used as a teaching and learning tool (Brooks-Young, 2002).

Historically, the building principal has been trained to be a manager. More recent models of educational leadership have incorporated not only management skills but also leadership skills. Though a distinction is made, the interconnectivity of the two is paramount (Creighton, 2003). The leader is able to communicate the vision; the manager is able to create the plan for sustaining the vision.

Teacher Support. According to the National Council of Teachers of Mathematics (NCTM), “Without coherent, comprehensive implementation plans, the incorporation of new technology is likely to fall short in improving mathematics instruction and planning” (NCTM, 2000, p. 374). For this plan to be effective, the principal must know the level of technology competency of each member of the faculty and structure the staff development activities to the strength and weaknesses of the group. Baylor and Ritchie (2002) found that teacher morale was predicted by professional development, and technology’s effect on content acquisition was also predicted by the strength of leadership. The principal’s mission should now include designing and implementing new strategies to help teachers recognize, understand, and integrate technology with teaching and learning for students (Creighton, 2003).

Thoughtful planning and scheduling of staff development is required for each faculty member. This training will mark the next phase of proper implementation.
A poorly designed implementation plan that fails to define tasks, responsibilities, and ongoing benchmarks also will result in the change effort’s failing (Valdez, 2004).

Several authors indicated that it is a responsibility of the principal not only to learn about technology themselves but also to ensure that other staff members in the building receive learning opportunities by providing either release time or professional development opportunities (Anderson & Dexter, 2005). Training must also embrace the concept that teaching with technology is not simply adding an internet-based program to a typical math course. Hybrid instruction is presenting teachers with an opportunity to increase student participation and maximize the learning potential of each student; however, teachers need the professional development support in redesigning instruction and modifying their teaching methods accordingly (Reynard, 2007).

The focus of this training should be twofold. First, training will be for the teacher to simply learn how to use the program or software. This training needs to address all of the teachers concerns or skepticism about the validity of the platform that the school is adopting. The second part of the training should focus on the methods used to present the hybrid instruction. In teacher professional development, more time should be spent on methodology training than on technology training (Reynard, 2007). Incorporating new technology in schools also required that teachers be prepared and supported to use the technology to advance instructional goals. Technology must be part of and embedded in the curriculum, not just glitzy add-ons (Floyd, 2006). To be successful technology use needs to be implemented systematically rather than in isolation.
Barriers to Implementation to Address with Support. As with any new undertaking, there are always obstacles for the technology leader to overcome.

Teacher attitudes towards the technology, skepticism of the benefits of the technology in question, and funding are the primary barriers to the principal that will be discussed in the next section.

Teacher attitudes. One barrier of teacher preparation and the efficient implementation of computer-based technology in education is the significance of teacher attitudes and beliefs about technology and professional development (Liu & Huang, 2005). The importance of teacher readiness and their willingness to participate in professional development cannot be underestimated (Davis et al., 2010). Members of a faculty may tend to think or feel that the principal views the new technology as a “magic bullet” that will reap immediate and measurable benefits just by being used. Brinkerhoff (2006) discussed “attitudinal barriers” which include anxiety about a lack of knowledge in using technology, current technological trends, and teachers’ perceptions of their computer competency and the adequacy of their technology preparation. The technology, however, should not be treated as an end but as a vehicle to reach a desired end. As schools strive to excel in the “Information Age”, they need leaders who are versed in the potential and pitfalls of information and communication technologies for our nation’s students (Hughes, 2005).

There are teachers who simply do not wish to alter their teaching or like to learn new strategies. These teachers have a problem with change in general, and technology represents a type of change. Creighton (2003) acknowledges that principals may
encounter faculty members resistant to change. He argues that the best way to combat potential “resisters” and “saboteurs” is by involving all stakeholders in technology implementation. If teachers understand where they are going with technology, they are less likely to oppose the journey.

Another issue concerns teachers who can or will embrace change but resist the technology. Many teachers have a fear of technology and often see a move to hybrid or online learning as a move to replace them as teachers and as a way to diminish the learning experience for students (Reynard, 2007). The principal as technology leader should be mindful that he or she is not consumed by the management of technology at the expense of working through (not around) teachers’ fears and emotions (Creighton, 2003).

One of the most commonly reported barriers to the implementation of technology in instruction is the lack of sufficient time to learn to use the technology and to develop lesson plans incorporating technology (Cuban, Kirkpatrick, & Peck., 2001; Shapely et al., 2010; Soorma, 2008). Unless teachers are provided with a long-term support for learning to use and implement technology, they are unlikely to use it in their classrooms (Chance et al., 2007).

Along this same school of thought is the attitude that the teacher will not be as integral to the learning and will not require as much content knowledge to teach. To the contrary, the blended learning environment does require teachers to be content-savvy because students are progressing through a much more diverse range of curricula. Technology does not replace the teacher, but teachers need to observe actively the students, identify their difficulties, probe their thought processes and the conclusions they are forming, quickly curb any problems they are having with the technology, keep
students on task, and answer questions (Feenberg, 1999).

Finally, there is the attitude of should we even be using the technology, and if so, how much should we be using. K-12 educational organizations continue to agonize about how much acceptance and use of technology is appropriate (Valdez, 2004). Although technology use is pervasive in society, many people are still debating whether it has a place in schools. This now seems to be a moot point; the debate needs to focus on how technology can best be used in education, not if it should be there (Brooks-Young, 2002). Educators cannot forget that part of educating students is preparing them for life outside the classroom; so, even if the use of technology does not provide immediate success in the teaching and learning of mathematics concepts, students are learning how to use technologies that they may encounter in their future jobs (Chance et al., 2007). It is not surprising that teachers would show some degree of resistance to changes in their teaching practices as the process of technology integration requires teachers to modify what they have been doing for years. Yet, it is still possible for teachers to accept the new ideas if they see the patience and support from the school administrator (Dawson & Rakes, 2003).

**Skepticism of benefits.** The main criticism of technology skeptics focuses on whether the technology is as cost effective as other interventions such as smaller class size. They also note the obsolescence factor of computers and the ongoing cost of upgrading both hardware and software (Valdez, 2004). Cuban, in Sung and Lesgold (2007), noted that the sizable investment of funds into the procurement of equipment produced few substantial effects and proposed that the relationship between computer
and classroom-based instruction in the United States can be described as oversold and underused.

Some critics give examples of schools in which uses of computers are actually making education worse. In some cases, teachers use computers to entertain students with irrelevant and unconnected activities because it makes their teaching lives easier—not because it benefits students in learning important content (Valdez, 2004). And much worse, examples abound showing that technology in the classroom can be used as a disguise for poor teaching (Creighton, 2003). Creighton further commented, “I am not convinced that technology by itself will accomplish anything: Actually, I argue that by itself, it becomes a barrier and a detriment to good teaching and effective learning” (p. 102).

**Funding.** As technology use and costs have soared, school leaders are under pressure to manage and monitor the investment (Gosmire & Grady, 2007). According to quality education data (QED) surveys of U.S. district expenditures, more than $6 billion was spent (not including E-rate funds) in 2002-2003 on educational technology in schools (Anderson & Dexter, 2005). Technology leaders will have to emphasize that the upfront costs of integration represent an investment that will be realized in student achievement. As principals strive to strengthen technology programs, economic conditions and budgetary constraints often make it difficult. To deal with this funding problem, Smith (2005) suggested that principals:

- View technology funding as an ongoing process, not a one-time expenditure
- Develop and use a technology plan as a road map
• Use research and secure funds through external sources to match local funding sources.

The amount of time, energy, and financial dollars spent on the integration, implementation, and leadership of computer based educational technology is immense; it is imperative that educational leaders question, monitor, and assess the return (Galla, 2010). If a blended learning course is well planned, developed, and conducted, its cost effectiveness is obvious and proven (Gutierrez, 2006). Any opposition to the spending may also be joined by those who reject the cyclical nature of the cost of the technology. Since computers must be upgraded or replaced periodically, they are not a constant asset. The same holds true for software and hybrid learning programs that typically come with user fees and yearly subscriptions. Also, there is arguably a capitalistic motivation for the products to be less durable. Some critics indicate a belief that many hardware and software companies purposely design products to become quickly obsolete and thus require updates so that schools continue buying (Valdez, 2004). These considerations should be addressed in order for the technology leader to be effective and successful in integration and implementation of a hybrid course.

**Technology Standards**

Within the past two decades, expectations for school leaders have increasingly involved the use of technology (Redish, Williamson, & Bissett, 2009). Leaders who are seeking to make technology more effective in improving learning are fortunate that a great deal of thought has been given to creating technology standards specifically for school administrators (Valdez, 2004). The standards referenced come from the International Society for Technology in Education (ISTE). It published the National
Educational Technology Standards for Administrators (NETS-A) which originally outlined six standards that should be addressed by technology leaders. The six NETS-A standards and their corresponding 27 performance indicators outlined what a technology-savvy school leader should know and be able to do (McLeod, 2008). The NETS-A is the most recent set of suggestions in the literature about what school leaders, especially principals, should know and be able to do with educational technology (Anderson & Dexter, 2005). The standards were grouped into six sections as follows:

1. Leadership and Vision
2. Learning and Teaching
3. Productivity and Professional Practice
4. Support, Management, and Operations
5. Assessment and Evaluation
6. Social, Legal and Ethical Issues

In 2009, these standards were updated by the ISTE as follows:

1. Visionary leadership

   Educational administrators inspire and lead development and implementation of a shared vision for comprehensive integration of technology to promote excellence and support transformation throughout the organization.

2. Digital-age learning culture

   Educational administrators create, promote, and sustain a dynamic, digital age learning culture that provides a rigorous, relevant and engaging education for all students.
3. Excellence in professional practice

   Educational administrators promote an environment of professional learning and innovation that empowers educators to enhance student learning through the infusion of contemporary technologies and digital resources.

4. Systemic improvement

   Educational administrators provide digital age leadership and management to improve the organization continuously through the effective use of information and technology resources.

5. Digital citizenship

   Educational administrators model and facilitate understanding of social, ethical and legal issues and responsibilities related to an evolving digital culture.

   These standards enable educators to move from simply acknowledging the importance of administrators to defining the specifics of what administrators need to know and be able to do to discharge their responsibilities as leaders in the effective use of technology in our schools (Bosco, 2001). As with any set of standards or indicators, it should not be assumed that simply following this checklist will assure successful integration and implementation. The standards should be referred to as only a guide to best practices associated with successful implementation. These standards are indicators of effective leadership for technology in schools. They define neither the minimum nor maximum level of knowledge and skills required of a leader and are neither a comprehensive list nor a guaranteed recipe for effective technology leadership (Bosco, 2001). The NETS-A is not entirely comprehensive as noted by Anderson and Dexter (2005), “However, one area where NETS-A is weak is in the role of leadership in matters of culture and community. They tend to ignore the fact that the culture and communities
Thusly, the standards and indicators are not stand-alone principles that are universally applicable. Principals will still need to identify specific indicators and to what extent they apply and are relevant to their particular school and setting.

Educational researchers have used the NETS-A standards to create survey instruments for their particular studies (Peterson, 2000; Redish & Chan, 2007). For the purpose of this study, the survey instrument was the Principals Technology Leadership Assessment (PTLA) (2006) designed to measure principals’ technology leadership inclinations and activities over the course of the school year. The PTLA is based upon the NETS-A domains developed through the International Society for Technology in Education (ISTE) (Knezek, 2008). This survey is psychometrically validated by the American Institutes for Research (AIR). The AIR piloted the survey to seventy-four (74) school administrators within seven states and Canadian providences. The PTLA was developed by and for University Council for Educational Administration (UCEA) Center for the Advanced Study of Technology Leadership in Education (CASTLE). Funding came from a grant from United States Department of Education Fund for the Improvement of Postsecondary Education.

**Paradigms of Blended Learning**

The term blended learning can be used synonymously with hybrid learning or web enhanced learning. There is no single type of blended learning, only varying degrees of integration along a continuum. On one end of the continuum is a fully online course where all of the learning is at a distance with little to no face-to-face component. The
other end of the continuum is traditional classroom instruction that has incorporated a few online resources but has no requirements for students to be online. Just as online learning represents a fundamental shift in the delivery and instructional model of distance learning, blended learning offers the possibility to change how teachers and administrators view online learning in the face-to-face setting (Watson, 2008). Irrespective of the degree of integration, there is consensus that the blended approach is valid.

Several research studies have demonstrated that courses using blended learning as a delivery method contributed to improved learning outcomes for students (Boyle, Bradley, Chalk, Jones, & Pickard, 2003; Dziuban et al., 2006; Garnham & Kaleta, 2002; Lim & Morris, 2009). The blended approach enables teachers to address academic and other concerns on an individual basis (Watson, 2008). The end result is that students go on to college or the work place more familiar with computers and technology while still obtaining the structure and support offered with face to face instruction. Teachers have found that technology plays an important role in identifying students’ instructional needs and helping them differentiate instruction to meet those needs. This emerged primarily in two ways: the open-ended nature of technology productivity software and the ability of some technology programs to diagnose problems and provide targeted instruction in those areas (Edmunds, 2008). Wenglinsky’s (1998) study of the 1996 NAEP dataset, for example, revealed that students whose teachers use technology to teach higher-order thinking skills had higher achievement in mathematics.

In other words, to ask if technology works is almost the equivalent of saying “Do textbooks work?” Yes, some textbooks work, in some conditions, with some
teachers, with some students, but these same textbooks may not work in another education context. The question of technology effectiveness requires us to be clear in what results we seek, how we measure success, and how we define effectiveness (Fulton, 1998, p. 1).

It is clear that technology holds great promise for many in education. It is regarded as a tool that can work wonders: improve student achievement, increase student engagement, and close the digital divide (Edwards, 2003; Gray et al., 2001; Swain & Pearson, 2003)

How does blended learning look in a classroom? Again, there is no one correct answer. The use of computers and online learning in education requires a much larger shift in thinking than simply adding a few computers to classrooms (Watson, 2008). What is known is that the paradigm of a typical instruction must be altered. Truly blended learning requires that teachers approach their role differently, as guides and mentors instead of purveyors of information (Watson, 2008). The teacher’s role changes from being the primary source for knowledge and direction to become more like a facilitator of learning or a kind of ringmaster in a circus of learning (Blomeyer, 2002). For this shift to take place, it needs to be supported by professional development for teachers and administrators as well as pre-service training for future teachers.

Some educators argue that the increased prominence of computer based instruction will decrease the relevance and importance of the teacher as well as remove the socialization aspect of education. There is research to suggest that this is not always the case. Research into online or distance learning shows consistently that students look for teacher intervention more directly in an online environment than in a face-to-face
environment (Reynard, 2007). Regarding the social aspect, the current trend is to move toward blended learning as an option to the rapidly increasing use of purely online content. In K-12 schools, especially at the primary and middle school levels, the social and emotional development of students is an important aspect of the overall school experience; so, student readiness is of equal if not of greater concern. A blended approach can ease this concern by providing some face-to-face time (Picciano & Seaman, 2008). In blended learning situations, social interaction is increased because it breaks down the lack of social contact that many online and web-based courses often have among student and instructors at a distance (Gutierrez, 2006).

**ALEKS: The Web-Based Program**

ALEKS is a web-based, artificially intelligent assessment and learning system. The program has instructional modules in more than fifty subjects from third grade to higher education. Since multiple choice answer formats can lead to invalid assessment, the ALEKS program uses constructed responses. Multiple choice format also allows the correct response to a question occasionally to be guessed by a student lacking any real understanding of the question asked (Doignon & Falmagne, 2011). Instead of multiple choice questions, ALEKS uses open ended or constructed responses requiring students to provide authentic input and provides more accurate feedback.

ALEKS was developed over several decades by researchers at New York University and University of California, Irvine and derived from Knowledge Space Theory (ALEKS Corp., 2012). Knowledge Space Theory (KST) is a set-theoretical framework, which proposes mathematical formalisms to operationalize knowledge structures in a particular domain (Doignon & Falmagne, 1999). KST is the framework
underlying ALEKS’s design. KST explains how to reveal a learner’s knowledge structures and achievement in a particular subject domain, in this case mathematics (Falmagne et al., 2004). All the feasible knowledge states for a given subject are organized into a learning space, which is a mathematical structure specifying the precedence relation between such knowledge states; that is, which knowledge states may precede or follow other states in the learning process (ALEKS Corp., 2012). Key to its effectiveness, ALEKS uses the principles of the KST to determine the knowledge state of the student in the subject domain and ultimately creates a knowledge structure from that knowledge state. ALEKS assesses the student’s current course knowledge by asking the student 20 – 30 content area questions. ALEKS does not use multiple-choice questions. It chooses each question on the basis of the student’s answers to all the previous questions. Once the student has completed the assessment, ALEKS developed an accurate assessment of the student’s knowledge of the course material, knowing which topics the student has mastered and which topics the student is ready to learn. To ensure knowledge retention, ALEKS periodically reassesses the student, using the results to adjust the student’s knowledge of the course.

Current research on the effectiveness of ALEKS (Allen, 2007; Hagerty & Smith, 2005; Lavergne, 2007) has shown an increased average success learning rate in different learning contexts and subjects. Most of these studies conducted on ALEKS have been on its use as a supplemental or remediation tool in a traditional, web-enhanced, or hybrid environment. A number of studies show that ALEKS users have performed equally or better in mathematics achievement than the group who did not use ALEKS (Allen, 2007; Hagerty & Smith, 2005; Lavergne, 2007). With all the challenges facing the teaching and
learning of mathematics, the use of ALEKS has shown to be effective to students learning mathematics in a traditional manner and in a hybrid learning environment (Nwaogu, 2012). Based on the findings of the 2007 Perkins report which presented results of a five-semester study, it would appear that ALEKS was able to assist less prepared students reach success in elementary algebra (Allen, 2007). LaVergne (2007) also stated,

Based on data collected on the use of the ALEKS Web-Based Learning System with Algebra IA students, ALEKS had a significant impact on students’ standardized math test scores. Students who used ALEKS two class periods per week showed a much larger gain on the Measures of Academic Progress (MAP) Test compared to the national average (p. 8).

Based on the aforementioned studies, it can be concluded that the intelligent tutoring system ALEKS is effective in improving standardized test scores in algebra.

**Summary**

Chapter 2 presented a comprehensive review of the literature in the area of blended learning, the web-based program ALEKS, the roles of the principal, the principal as the technology leader, barriers to implementation, and the technology standards that govern implementation of a blended learning course. Based on this review of literature, it is clear that previous studies affirm that leadership in technology initiatives requires a strong vision, a deliberate and structured plan for teacher development, and the ability to manage the changes that are associated with the implementation of the technology. This study seeks to contribute to the literature on both the principal’s technology leadership
and the implementation of new technology in the public school setting. Chapter 3 will introduce the mixed method study, the data requirement and research methodology, sample population, setting, the survey instrument, data collection and analysis methods, and variables grid.
Chapter 3

Methodology

The purpose of the study was to examine how the principal can influence the effectiveness of blended learning on current and repeating 9th grade students enrolled in an Algebra I course supplemented with the ALEKS program in South Carolina public schools. The following research questions were addressed to support this purpose:

1. What is the self-perceived role of the principal in effective implementation of a blended learning course in Algebra I in South Carolina public high schools?

2. What leader behaviors do principals believe are associated with successful implementation of a blended learning course in Algebra I in South Carolina public high schools?

3. How do principals believe their goals shape the implementation of a blended learning course in Algebra I in South Carolina public high schools?

For this study, the mixed methods approach is appropriate. Johnson, Onwuegbuzie, and Turner (2007) define mixed methods research as “an intellectual and practical synthesis based on qualitative and quantitative research…It recognizes the importance of traditional quantitative and qualitative research but also offers a powerful third paradigm choice that often will provide the most informative, complete, balanced, and useful research results” (p.129). The third paradigm being the mixed method approach instead of the traditional quantitative or qualitative study.
The quantitative data were gathered from the PTLA survey and used to investigate the research questions 1 and 2 regarding principal leadership for technology integration.

To identify and describe the leadership factors and behaviors that address the three research questions, the descriptive nature of qualitative research was employed using principal interviews. When seeking to understand the perceptions of the participants in a naturalistic setting, the qualitative paradigm is appropriate (Patton, 1990). The qualitative design will provide insight into the process of blended learning implementation from the perspective of high school principals.

This chapter provides an overview of the methodology including the data requirement and research methods, permission to conduct the study, sample population, population setting, and the survey instrument. Table 3.1 shows the relationship between the research questions, the data source, the instrument used for collection, and ways the information was analyzed. The alignment graphic following table 3.1 depicts the relationship between the research questions, the interview questions, and the PTLA dimensions.
Table 3.1 Variables Grid

<table>
<thead>
<tr>
<th>Research Question</th>
<th>Data Source</th>
<th>Instrument</th>
<th>Analysis</th>
</tr>
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<tbody>
<tr>
<td>1. What is the self-perceived role of the principal in effective implementation of a blended learning course in Algebra I in South Carolina public high schools?</td>
<td>Principal interview and PTLA Survey Transcriptions of interview questions (2,3,5,13) and survey results</td>
<td>Indexing, coding, and labeling of the interview transcript and survey response dimensional mean, item mean, and standard deviation analysis</td>
<td></td>
</tr>
<tr>
<td>2. What leader behaviors do principals believe are associated with successful implementation of a blended learning course?</td>
<td>Principal interview and PTLA Survey Transcriptions of interview questions (7,8,9,11,12) and survey results</td>
<td>Indexing, coding, and labeling of the interview transcript and survey response dimensional mean, item mean, and standard deviation analysis</td>
<td></td>
</tr>
<tr>
<td>3. How do the principals believe their goals shape the implementation of a blended learning course in Algebra I in South Carolina public high schools?</td>
<td>Principal interview Transcriptions of interview questions (4,6,10)</td>
<td>Indexing, coding, and labeling of the interview transcript</td>
<td></td>
</tr>
</tbody>
</table>
Table 3.2 Alignment Graphic

**Question 1**
What is the self-perceived role of the principal in effective implementation of a blended learning course in Algebra I in South Carolina public high schools

**Interview Questions**
2, 3, 5, 13

**PTLA Dimension 1**
Leadership and Vision

**PTLA Dimension 3**
Productivity and professional practice

**PTLA Dimension 6**
Social, Legal and Ethical Decisions

**Question 2**
What leader behaviors do principals believe are associated with successful implementation of computer aided instruction/web enhanced course in Algebra I in South Carolina public high schools

**Interview Questions**
7, 8, 9, 11, 12

**PTLA Dimension 2**
Learning and Teaching

**PTLA Dimension 4**
Support Management and operations

**PTLA Dimension 5**
Assessment and Evaluation

**Question 3**
How do principals believe their goals shape the implementation of a blended learning course in Algebra I in South Carolina public high schools

**Interview Questions**
4, 6, 10
Data Requirements and Research Methods

This research was conducted using the Principals Technology Leadership Assessment (PTLA) survey and principal interviews. The PTLA is included in Appendix A. The purpose of the PTLA is to provide principals with detailed information about their technology leadership. This information was viewed in conjunction with the principals’ perceptions of their leadership in implementing a hybrid course. The sample was limited to South Carolina high school principals who implemented the math program ALEKS in a blended learning model for Algebra I within the past five years. There are currently eight school districts in the state that are considered high usage districts by the ALEKS Corporation. High usage districts are defined as having more than five schools in the district that are utilizing the program. From these eight districts, 15 high schools were found to have implemented the program in the classroom setting within the past five years. These 15 schools were included in the PTLA survey.

The mixed methods approach was chosen in lieu of quantitative research alone because the goal is to understand the role of the principal as perceived by the principals as well as enrich the quantitative data reported on the PTLA. Where quantitative researchers seek only the causal determination, prediction, and generalization of findings, qualitative researchers seek instead illumination, understanding, and extrapolation to similar situations (Journal of Technology Education, 1997). This approach seeks to provide both insight into the process of implementation of hybrid learning through the perspective of the high school principal and a quantitative assessment of the principal’s technology leadership during implementation.
Permission to Conduct the Study

Since this study involved interviewing principals directly as well as conducting an electronic assessment, a request was made to the Institutional Review Board of the Office for Research Compliance. The request included the purpose of the study, procedures, risks and benefits, an informed consent statement, and a copy of the letter to the participants.

A letter was sent to the superintendent of each school district involved in the study requesting permission to conduct the PTLA and interviews in their school district. Upon approval by the superintendent, a subsequent letter was sent to each principal requesting permission to conduct the study at his or her school.

Sample Population

The purpose of this study was to examine the role of the principal as technology leader and how the principal can influence the effectiveness of blended learning on current and repeating 9th grade students enrolled in Algebra I in South Carolina public schools. Based on the information provided by the ALEKS Corporation, 28 South Carolina public high schools from the eight high usage districts have implemented ALEKS in Algebra I classes within the past five years. For this study, 15 public high schools were selected from this population based on their regional location and the principal’s availability to participate in the study. From this group of 15 high schools, eight principals were then purposefully selected to provide regionally and demographically balanced feedback to determine their perceptions of their roles and behaviors in implementing the hybrid course.
**Setting for the Study**

The following paragraphs describe each school setting. The information for the setting descriptions was obtained through personal interviews with the building principals and archival data retrieved from the South Carolina Department of Education. Because standard interviewing techniques may present ethical issues, the use of pseudonyms protects the identities of the schools and principals (Merriam, 1998).

Avant High School is 1 of 19 schools in a county school system that serves approximately 9,700 students. The county has a population of 60,000. It is located in the coastal region of South Carolina and serves grades 9 through 12. The school has an enrollment of approximately 520 students with 85.6% qualifying for free or reduced-price lunches. Avant High has a 21 to 1 student to teacher ratio in core classes. Approximately 17% of the senior class of 2014 earned the South Carolina Life Scholarship and the on-time graduation rate was 72.7%. Approximately 75.3% of their tested students scored a 70 or above on the end of course test for Algebra I/Math for the Technologies.

Beard High School is 1 of 54 schools in a county school system that serves approximately 41,000 students. The county has a population of 290,000. It is located in the coastal region of South Carolina and serves grades 9 through 12. The school has an enrollment of approximately 2,100 students with 61% qualifying for free or reduced-price lunches. Beard High has a 31.3 to 1 student to teacher ratio in core classes. Approximately 33% of the senior class of 2014 earned the South Carolina Life Scholarship and the on-time graduation rate was 76.3%. Approximately 91.9% of their
tested students scored a 70 or above on the end of course test for Algebra I/Math for the Technologies.

Beatrice High School is 1 of 19 schools in a county school system that serves approximately 9,700 students. The county has a population of 60,000. It is located in the coastal region of South Carolina and serves grades 9 through 12. The school has an enrollment of approximately 400 students with 91% qualifying for free or reduced-price lunches. Beatrice High has an 18.4 to 1 student to teacher ratio in core classes. Approximately 30% of the senior class of 2014 earned the South Carolina Life Scholarship and the on-time graduation rate was 89.1%. Approximately 88.6% of their tested students scored a 70 or above on the end of course test for Algebra I/Math for the Technologies.

Blackhall High School is 1 of 20 schools in a county school system that serves approximately 16,500 students. The county has a population of 270,000. It is located in the midlands region of South Carolina and serves grades 9 through 12. The school has an enrollment of approximately 1,900 students with 41% qualifying for free or reduced-price lunches. Blackhall High has a 28.1 to 1 student to teacher ratio in core classes. Approximately 52% of the senior class of 2014 earned the South Carolina Life Scholarship and the on-time graduation rate was 89.5%. Approximately 84.3% of their tested students scored a 70 or above on the end of course test for Algebra I/Math for the Technologies.

Dominguez High School is 1 of 19 schools in a county school system that serves approximately 9,700 students. The county has a population of 60,000. It is located in the
coastal region of South Carolina and serves grades 9 through 12. The school has an enrollment of approximately 950 students with 78% qualifying for free or reduced-price lunches. Dominguez High has a 24.6 to 1 student to teacher ratio in core classes. Approximately 29% of the senior class of 2014 earned the South Carolina Life Scholarship and the on-time graduation rate was 89.3%. Approximately 78.9% of their tested students scored a 70 or above on the end of course test for Algebra I/Math for the Technologies.

Fairby High School is 1 of 20 schools in a county school system that serves approximately 16,500 students. The county has a population of 270,000. It is located in the midlands region of South Carolina and serves grades 9 through 12. The school has an enrollment of approximately 1,500 students with 62% qualifying for free or reduced-price lunches. Fairby High has a 21.8 to 1 student to teacher ratio in core classes. Approximately 56% of the senior class of 2014 earned the South Carolina Life Scholarship and the on-time graduation rate was 77.7%. Approximately 72.9% of their tested students scored a 70 or above on the end of course test for Algebra I/Math for the Technologies.

Greendale High School is 1 of 14 schools in a county school system that serves approximately 9,400 students. The county has a population of 190,000. It is located in the upstate region of South Carolina and serves grades 9 through 12. The school has an enrollment of approximately 950 students with 67.8% qualifying for free or reduced-price lunches. Greendale High has a 28.9 to 1 student to teacher ratio in core classes. Approximately 29% of the senior class of 2014 earned the South Carolina Life Scholarship and the on-time graduation rate was 84.1%. Approximately 97.4% of their
tested students scored a 70 or above on the end of course test for Algebra I/Math for the Technologies.

Horrell High School is 1 of 14 schools in a county school system that serves approximately 9,400 students. The county has a population of 190,000. It is located in the upstate region of South Carolina and serves grades 9 through 12. The school has an enrollment of approximately 750 students with 45% qualifying for free or reduced-price lunches. Horrell High has a 30.5 to 1 student to teacher ratio in core classes. Approximately 71% of the senior class of 2014 earned the South Carolina Life Scholarship and the on-time graduation rate was 93.1%. Approximately 93.1% of their tested students scored a 70 or above on the end of course test for Algebra I/Math for the Technologies.

Mayer High School is 1 of 34 schools in a county school system that serves approximately 26,700 students. The county has a population of 400,000. It is located in the midlands region of South Carolina and serves grades 9 through 12. The school has an enrollment of approximately 1,900 students with 49% qualifying for free or reduced-price lunches. Mayer High has a 29.9 to 1 student to teacher ratio in core classes. Approximately 34% of the senior class of 2014 earned the South Carolina Life Scholarship and the on-time graduation rate was 86%. Approximately 88.7% of their tested students scored a 70 or above on the end of course test for Algebra I/Math for the Technologies.

Meadowcastle High School is 1 of 54 schools in a county school system that serves approximately 41,000 students. The county has a population of 60,000. It is
located in the coastal region of South Carolina and serves grades 9 through 12. The school has an enrollment of approximately 1,400 students with 60% qualifying for free or reduced-price lunches. Meadowcastle High has a 31 to 1 student to teacher ratio in core classes. Approximately 29% of the senior class of 2014 earned the South Carolina Life Scholarship and the on-time graduation rate was 81.6%. Approximately 96% of their tested students scored a 70 or above on the end of course test for Algebra I/Math for the Technologies.

Merriford High School is 1 of 19 schools in a county school system that serves approximately 9,700 students. The county has a population of 60,000. It is located in the coastal region of South Carolina and serves grades 9 through 12. The school has an enrollment of approximately 800 students with 41% qualifying for free or reduced-price lunches. Merriford High has a 23.5 to 1 student to teacher ratio in core classes. Approximately 39% of the senior class of 2014 earned the South Carolina Life Scholarship and the on-time graduation rate was 87.1%. Approximately 74.5% of their tested students scored a 70 or above on the end of course test for Algebra I/Math for the Technologies.

Springford High School is 1 of 19 schools in a county school system that serves approximately 12,800 students. The county has a population of 190,000. It is located in the upstate region of South Carolina and serves grades 9 through 12. The school has an enrollment of approximately 1,800 students with 50% qualifying for free or reduced-price lunches. Springford High has a 31 to 1 student to teacher ratio in core classes. Approximately 30% of the senior class of 2014 earned the South Carolina Life Scholarship and the on-time graduation rate was 88.1%. Approximately 83.8% of their
tested students scored a 70 or above on the end of course test for Algebra I/Math for the Technologies.

Summerway High School is 1 of 54 schools in a county school system that serves approximately 41,000 students. The county has a population of 60,000. It is located in the coastal region of South Carolina and serves grades 9 through 12. The school has an enrollment of approximately 1,500 students with 78% qualifying for free or reduced-price lunches. Summerway High has a 27 to 1 student to teacher ratio in core classes. Approximately 29% of the senior class of 2014 earned the South Carolina Life Scholarship and the on-time graduation rate was 74.2%. Approximately 85.5% of their tested students scored a 70 or above on the end of course test for Algebra I/Math for the Technologies.

Wildecastle High School is 1 of 54 schools in a county school system that serves approximately 41,000 students. The county has a population of 60,000. It is located in the coastal region of South Carolina and serves grades 9 through 12. The school has an enrollment of approximately 1,200 students with 72% qualifying for free or reduced-price lunches. Wildecastle High has a 34 to 1 student to teacher ratio in core classes. Approximately 26% of the senior class of 2014 earned the South Carolina Life Scholarship and the on-time graduation rate was 76.6%. Approximately 92.6% of their tested students scored a 70 or above on the end of course test for Algebra I/Math for the Technologies.

Wynne High School is 1 of 54 schools in a county school system that serves approximately 41,000 students. The county has a population of 60,000. It is located in
the coastal region of South Carolina and serves grades 9 through 12. The school has an enrollment of approximately 1,500 students with 61% qualifying for free or reduced-price lunches. Wynne High has a 27 to 1 student to teacher ratio in core classes. Approximately 40% of the senior class of 2014 earned the South Carolina Life Scholarship and the on-time graduation rate was 83%. Approximately 92.6% of their tested students scored a 70 or above on the end of course test for Algebra I/Math for the Technologies.

The 15 schools in the study ranged in size from 400 to 2100 students. The schools were located in one of three regions of South Carolina. The coastal region which spans the eastern part of the state bordering the Atlantic Ocean. The midlands region which is the centermost area of the state. And the upstate region that encompasses the northern and north western portions that border the Blue Ridge Mountains. All of the high schools serve grades 9 through 12. Table 3.3 summarizes these qualities based on the archival data retrieved from the South Carolina Department of Education.

Table 3.3 Characteristics of Schools

<table>
<thead>
<tr>
<th>School</th>
<th>Schools in District</th>
<th>District Population</th>
<th>Region</th>
<th>School Enrollment</th>
<th>Free/Reduced Lunch</th>
<th>On Time Graduation</th>
<th>Algebra EOC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avant High School</td>
<td>19</td>
<td>9,700</td>
<td>coastal</td>
<td>520</td>
<td>85.6%</td>
<td>72.7%</td>
<td>75.3%</td>
</tr>
<tr>
<td>Beard High School</td>
<td>54</td>
<td>41,000</td>
<td>coastal</td>
<td>2,100</td>
<td>61%</td>
<td>76.3%</td>
<td>91.9%</td>
</tr>
<tr>
<td>Beatrice High School</td>
<td>19</td>
<td>9,700</td>
<td>coastal</td>
<td>400</td>
<td>91%</td>
<td>89.1%</td>
<td>88.6%</td>
</tr>
<tr>
<td>Blackhall High School</td>
<td>20</td>
<td>16,500</td>
<td>midlands</td>
<td>1,900</td>
<td>41%</td>
<td>89.5%</td>
<td>84.3%</td>
</tr>
<tr>
<td>Dominguez High School</td>
<td>19</td>
<td>9,700</td>
<td>coastal</td>
<td>950</td>
<td>78%</td>
<td>89.3%</td>
<td>78.9%</td>
</tr>
<tr>
<td>Fairby High School</td>
<td>20</td>
<td>16,500</td>
<td>midlands</td>
<td>1,500</td>
<td>62%</td>
<td>77.7%</td>
<td>72.9%</td>
</tr>
</tbody>
</table>
Characteristics of Participants

The 15 principals in this study are all practicing principals in South Carolina. They include both male and female participants of various ethnic backgrounds. The experience level of the participants in educational administration ranged from 3 to 29 years. Table 3.4 summarizes the personal demographic characteristics of the principals.

<table>
<thead>
<tr>
<th>School</th>
<th>Male</th>
<th>Female</th>
<th>Fewer than 10</th>
<th>10 or more</th>
<th>White</th>
<th>African American</th>
<th>Doctoral Degree</th>
<th>No Doctoral Degree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greendale High School</td>
<td>14</td>
<td>9,400</td>
<td>upstate</td>
<td>950</td>
<td>67.8%</td>
<td>84.1%</td>
<td>97.4%</td>
<td></td>
</tr>
<tr>
<td>Horrell High School</td>
<td>14</td>
<td>9,400</td>
<td>upstate</td>
<td>750</td>
<td>45%</td>
<td>93.1%</td>
<td>93.1%</td>
<td></td>
</tr>
<tr>
<td>Mayer High School</td>
<td>34</td>
<td>26,700</td>
<td>midlands</td>
<td>1,900</td>
<td>49%</td>
<td>86%</td>
<td>88.7%</td>
<td></td>
</tr>
<tr>
<td>Meadowcastle High School</td>
<td>54</td>
<td>41,000</td>
<td>coastal</td>
<td>1,400</td>
<td>60%</td>
<td>81.6%</td>
<td>96%</td>
<td></td>
</tr>
<tr>
<td>Merriford High School</td>
<td>19</td>
<td>9,700</td>
<td>coastal</td>
<td>800</td>
<td>41%</td>
<td>87.1%</td>
<td>74.5%</td>
<td></td>
</tr>
<tr>
<td>Springford High School</td>
<td>19</td>
<td>12,800</td>
<td>upstate</td>
<td>1,800</td>
<td>50%</td>
<td>88.1%</td>
<td>83.8%</td>
<td></td>
</tr>
<tr>
<td>Summerway High School</td>
<td>54</td>
<td>41,000</td>
<td>coastal</td>
<td>1,500</td>
<td>78%</td>
<td>74.2%</td>
<td>85.5%</td>
<td></td>
</tr>
<tr>
<td>Wildecastle High School</td>
<td>54</td>
<td>41,000</td>
<td>coastal</td>
<td>1,200</td>
<td>72%</td>
<td>76.6%</td>
<td>92.6%</td>
<td></td>
</tr>
<tr>
<td>Wynne High School</td>
<td>54</td>
<td>41,000</td>
<td>coastal</td>
<td>1,500</td>
<td>61%</td>
<td>83%</td>
<td>92.6%</td>
<td></td>
</tr>
</tbody>
</table>

Table 3.4 Demographics of Participants
Data Collection

Data were collected using the Principals Technology Leadership Assessment (PTLA) and principal interview. The PTLA is intended to assess principals’ technology leadership inclinations and activities over the course of the last school year or some other fixed period of time (McLeod, 2008). According to Creswell (2003), the survey design provides a quantitative or numeric description of trends, attitudes, or opinions of a population by studying a sample of that population. This survey is based on the National Educational Technology Standards for Administrators (NETS-A) and is psychometrically validated by the American Institutes for Research (AIR). The survey was selected after reviewing other existing instruments in the area of technology leadership. It is designed to address the following five standards associated with a technology savvy leader:

1. Visionary leadership
2. Digital age learning culture
3. Excellence in professional practice
4. Systematic improvement
5. Digital citizenship

The PTLA instrument evidences high reliability which is not to be further enhanced or decreased by the removal of individual items. According to the overall analysis, no item appears to function poorly or warrants removal. The PTLA instrument
appears to measure appropriately the desired construct of school technology leadership (McLeod, 2008).

High school principals involved in this study were given an online version of the PTLA. The assessment is free to K-12 school organizations from the Center for the Advanced Study of Technology Leadership in Education (CASTLE). The goal in developing the PTLA was to produce a short, multiple-choice assessment to measure the school technology leadership of an individual principal or school administrator (McLeod, 2008). The individual items in the assessment ask about the extent specific actions and behaviors have been implemented in the school. The purpose of the assessment is to provide building-level administrators with detailed and comparative information about their technology leadership (McLeod, 2008). The PTLA consists of 35 questions covering 6 different dimensions of technology leadership. The PTLA survey asked principals to rate the extent of each item within each of the five domains of technology leadership using a 5-point Likert-type scale. The numeric values assigned to the scale were: fully (5), significantly (4), somewhat (3), minimally (2), and not at all (1). A link to the online version of the assessment was sent to each of the 15 high school principals participating in this study. The time required to complete the survey was approximately 15 to 25 minutes.

**Principal Interviews**

The primary method of collecting data was the PTLA survey and the interviews with principals. From the group of 15 schools, eight principals were then purposefully selected to provide balanced feedback based on group demographics to determine their perceptions of their roles and behaviors in implementing the hybrid course. The
principals selected for interview were also chosen to provide a good representation of perspectives from three geographic regions of South Carolina: Coastal, Midlands, and Upstate. The selection criteria also included race, gender, and years of experience in order to provide a balance as much as possible given the population.

Prior to contacting the principals selected for interview, permission was requested from each district superintendent. Upon receiving approval, a request to schedule the interview was sent to each principal. Since all principals were actively leading their respective schools, scheduling proved to be the most time consuming aspect of the interview process. Communicating and scheduling a time that would enable each principal to focus and reflect on the implementation of the hybrid course consumed the greatest portion of the three-month interview window. One principal attempted to delegate the interview to an assistant principal. His concern was that the interview would involve the technical aspects of implementation. By forwarding the interview questions prior to the interview, their concerns were assuaged. Two other principals proved to be elusive and required several follow up calls with their administrative assistants prior to communicating directly with them. One principal from the original selection was excluded since he was newly appointed and did not lead the integration of blended learning in the school. The interviews were conducted individually over a three-month period in the fall of 2015. The interviews consisted of 12 open-ended questions formulated to provide consistency among different participants. All of the interviews were conducted via teleconference. The interviews were digitally recorded for accuracy, transcription, and subsequent analysis of the data. Each interview required less than an hour to complete. Seven of the eight interviews took place during the week day between
3:00 and 6:00PM. One principal agreed to conduct his interview on a Saturday afternoon due to a personal scheduling conflict.

**Analysis of Data**

This study examined the role of a high school principal in implementing a blended learning course in Algebra I in a South Carolina public school. Information from the PTLA was considered as well as semi-structured interview information to gain insight to the behaviors and perceptions of high school principals currently utilizing this instructional model. The process of data collection and analysis was simultaneous, enabling the researcher to gain insight into the roles of the principals as they implemented the blended course. This process enabled the researcher to analyze the content of the interviews (Merriam, 1998).

The transcripts of the interviews were analyzed using Descriptive Coding. Descriptive Coding summarizes in a word or short phrase the basic topic of a passage of qualitative data (Saldana, 2009). According to Saldana (2009), Descriptive Coding is appropriate for virtually all qualitative studies but particularly for beginning qualitative researchers learning how to code data (p. 70).

ATLAS.ti computer software provided electronic storage and facilitated the process of coding the transcriptions of the recorded interviews (Muhr, 2004). ATLAS.ti was used to scan the individual respondents’ verbatim transcriptions using two coding features: Code In Vivo and Open Coding. Code In Vivo aided in scanning and highlighting quotations from the textual transcripts that relate to the topic and the interview questions. Open Coding facilitated the process of labeling the codes of the quotations highlighted by Coding In Vivo (Muhr, 2004).
Limitations of the Study

There are three main limitations involved in the PTLA associated with the self-reporting of survey respondents. According to CASTLE (2009), when assessing the performance and behaviors of individuals, there is a tendency to make several types of errors. Leniency errors occur when individuals rate themselves higher. Possible reasons are (a) the individual has relatively low-performance standards, (b) the individual assumes that other individuals also inflate their ratings, and (c) for social or political reasons the individual feels that it would be better not to get a poor assessment.

Another limitation from CASTLE (2009) refers to halo error. Halo errors occur when individuals assess their performance or behavior using a general impression that disproportionately influences all the other assessment items. An example of a halo error would be when individuals rate themselves highly on every assessment item. It is rare that individuals perform at exactly the same level on every dimension of leadership. It is more likely that an individual performs better in some areas than on others.

One final limitation from CASTLE (2009) is recency errors. Recency errors occur when an individual bases an assessment on the most recent behavior, as opposed to the entire behavior over some fixed period of time. This assessment should be based on the behavior over the entire year or in this case, the implementation period.

Summary

Chapter 3 outlined the details of the study. The sample, population, and setting were clearly defined and described. This chapter provided supporting documentation of the validity and reliability of the survey instrument as well as details about the semi-structured interview and protocol. Chapter 4 will present the results of the study.
Chapter 4

Results and Analysis

The purpose of the study was to examine how the principal can influence the effectiveness of blended learning on current and repeating 9th grade students enrolled in an Algebra I course supplemented with the ALEKS program in South Carolina public schools.

The study was guided by the following research questions:

1. What is the self-perceived role of the principal in effective implementation of a blended learning course in Algebra I in South Carolina public high schools?

2. What leader behaviors do principals believe are associated with successful implementation of a blended learning course in Algebra I in South Carolina public high schools?

3. How do principals believe their goals shape the implementation of a blended learning course in Algebra I in South Carolina public high schools?

The first section of this chapter presents results of the data analysis of the PTLA and how they address research questions one and two. The latter section will present the qualitative data analysis of the open ended interviews of eight high school principals identified for follow-up interviews.
**PTLA Survey Results**

The instrument used for the quantitative phase of this study was the Principals Technology Leadership Assessment (PTLA). The PTLA is designed to measure principal’s technology leadership inclinations and activities throughout the process of implementation and sustainment of technology based initiatives. The technology initiative examined in this study was the intelligent tutoring program ALEKS. There are currently eight school districts in the state that are considered high usage districts by the ALEKS Corporation. High usage districts are defined as having more than five schools in the district that are utilizing the program. From these eight districts, 15 high schools have implemented the program in the classroom setting within the past five years. These 15 schools were invited to participate in the PTLA survey. The overall response rate was 93.3% (N=14). Fourteen schools responded and were included in the survey results. One school identified to participate in the survey has recently appointed a new principal and therefore was not included.

The PTLA measures technology leadership across six dimensions. The survey asked principals to rate the extent of each item within each of the five domains of technology leadership using a 5-point Likert-type scale. The numeric values assigned to the scale were: *fully* (5), *significantly* (4), *somewhat* (3), *minimally* (2), and *not at all* (1). Each of these dimensions was assessed using mean, range, and standard deviations (Table 4.1).
Table 4.1 Descriptive Statistics of Six Dimensions of Survey

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Mean</th>
<th>Range</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leadership and Vision</td>
<td>3.82</td>
<td>3.43 – 4.14</td>
<td>1.00</td>
</tr>
<tr>
<td>Learning and Teaching</td>
<td>4.16</td>
<td>4.08 – 4.23</td>
<td>.77</td>
</tr>
<tr>
<td>Productivity and Professional Practice</td>
<td>3.98</td>
<td>3.29 – 4.62</td>
<td>.94</td>
</tr>
<tr>
<td>Support, Management, and Operations</td>
<td>4.07</td>
<td>3.57 – 4.64</td>
<td>.94</td>
</tr>
<tr>
<td>Assessment and Evaluation</td>
<td>3.87</td>
<td>3.00 – 4.29</td>
<td>1.00</td>
</tr>
<tr>
<td>Social, Legal, and Ethical Issues</td>
<td>3.86</td>
<td>2.57 – 4.50</td>
<td>.85</td>
</tr>
</tbody>
</table>

Note. n = 14

The mean results for the dimensions “Leadership and Vision” (3.82); “Learning and Teaching” (4.16); “Productivity and Professional Practice” (3.98); “Support, Management, and Operations” (4.07); “Assessment and Evaluation” (3.87); and “Social, Legal, and Ethical Issues” (3.86) indicate that the average response was “significantly,” meeting the description of the behaviors associated with technology leadership.

The dimension with the widest range of responses was “Social, Legal, and Ethical Issues” which spanned from 2.57 to 4.5. The high average came from question 1, “To what extend did you work to ensure equity of technology access and use in your school?”

The low average was recorded for question 7, “To what extent did you disseminate information about health concerns related to technology and computer usage in classrooms and offices?”

**Research Question 1**

**What is the self-perceived role of the principal in effective implementation of a blended learning course in Algebra I in South Carolina public high schools?**
The three dimensions of the survey that addressed this research question include “Leadership and Vision,” “Social, Legal, and Ethical Issues,” and “Productivity and Professional Practice.” For “Leadership and Vision,” the participants generally reported that they believed they participated “significantly” in various planning and implementation processes. For “Social, Legal, and Ethical Issues” the participants generally reported “significantly” which also indicates that the administrators in this study self-report this dimension as an area that is strong or an area of frequent activity. For the “Productivity and Professional Practice,” the participants also generally reported “significantly” participating in professional development regarding technology; using technology to accomplish their daily tasks and other responsibilities; and encouraging staff to utilize technology as well.

For the three dimensions of the survey that addressed research question 1, the self-reported level of activity from all of the principals was “significantly.” The principals selected to participate came from high ALEKS usage schools that are considered to have successfully implemented and maintained utilization of the program. Principal bias in self-reporting may have been a factor in the lack of discrimination in overall activity ratings in three dimensions.

**Leadership and Vision Dimension.** The first dimension of the survey that addressed research question 1 was the questions regarding “Leadership and Vision.” This standard addressed the ability of school leaders to inspire a shared vision of school technology integration and technology use among school stakeholders. The principal’s participation in the technology planning process, communication with school district stakeholders, alignment of technology plans and school improvement
plans, advocacy of technology use, and participation in professional development were surveyed. The mean of 3.82 for “Leadership and Vision” indicates that the average response was approximately “4” (significantly) indicating that the participants possess a strong degree of skill, knowledge, and ability within this dimension. This ranking denotes the extent to which administrators self-reported their level of meeting the behaviors of the dimension. This mean also indicates that the administrators in this study self-report this dimension as an area that is strong or as an area of frequent activity.

The individual questions along with their means and standard deviations are presented in table 4.2 which indicates that all but question 4 had a large standard deviation. The means for these questions ranged from 3.43 to 4.14. Principal D reported that he did not participate at all in the district’s or school’s technology planning process. Principal F reported that he did not promote stakeholder participation in technology planning and that he did not engage in activities to identify best practices in technology usage. The highest mean of 4.14 was reported for survey questions 2 and 4 and indicates that the principals in this population believe that they provide strong communication with stakeholders as well as extensive alignment of the technology plan with existing school improvement plans.

Table 4.2 Descriptive Statistics of Leadership and Vision Questions

<table>
<thead>
<tr>
<th>Question</th>
<th>Mean</th>
<th>SD</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. To what extent did you participate in your district’s or school’s</td>
<td>3.43</td>
<td>1.09</td>
<td>14</td>
</tr>
<tr>
<td>most recent technology planning process?</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
2. To what extent did you communicate information about your district’s or school’s technology planning and implementation efforts to your school’s stakeholders?  
   4.14 .95 14

3. To what extent did you promote participation of your school’s stakeholders in the technology planning process of your school or district?  
   3.43 1.16 14

4. To what extent did you compare and align your district or school technology plan with other plans, including district strategic plans, your school improvement plan, or other instructional plans?  
   4.14 .66 14

5. To what extent did you advocate for inclusion of research based technology practices in your school improvement plan?  
   3.93 .92 14

6. To what extent did you engage in activities to identify best practices in the use of technology (e.g., reviews of literature, attendance at relevant conferences, or meeting of professional organizations)?  
   3.86 1.03 14

Social, Legal, and Ethical Issues Dimension. The second dimension of the survey that addressed research question 1 was the questions regarding “Social, Legal, and Ethical Issues.” This standard addresses how administrators understand and model ethical, social, and legal use of technology. The principal’s involvement in equal accessibility, policy and procedures for social, legal, and ethical use, copyright and intellectual property, privacy and safety, needs of special education, use of technology with individualized education programs, and health concerns related to
technology use was surveyed. The mean of 3.86 for “Social, Legal, and Ethical Issues” indicates that the average response was approximately “4” (significantly) meeting the dimension, a strong degree of skill, knowledge and ability. This ranking denotes the extent to which administrators self-reported their level of meeting the behaviors of the dimension. This mean also indicates that the administrators in this study self-report this dimension as an area that is strong or as an area of frequent activity.

The individual questions along with their means and standard deviations are presented in table 4.3 and indicate that both question 1 and question 5 had the lowest standard deviation of .65. The means from this dimension ranged from 4.43 to 2.57. The highest mean in this dimension was question 5 (4.43) which indicates that the principals in this study believe that they strongly support the use of technology to help meet the needs of special education students. The lowest mean (2.57) of all six dimensions was reported for question 7. Three principals indicated no dissemination of information about health concerns related to technology and four indicated only minimally doing so. Only Principal E indicated that he frequently displays the behavior described in this question.

Table 4.3 Descriptive Statistics of Social, Legal, and Ethical Issues Questions

<table>
<thead>
<tr>
<th>Question</th>
<th>Mean</th>
<th>SD</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. To what extent did you work to ensure equity of technology access and use in your school?</td>
<td>3.50</td>
<td>.65</td>
<td>14</td>
</tr>
</tbody>
</table>
2. To what extent did you implement policies or programs meant to raise awareness of technology-related social, ethical, and legal issues for staff and students?  
   4.07 .83 14

3. To what extent were you involved in enforcing policies related to copyright and intellectual property?  
   3.57 .94 14

4. To what extent were you involved in addressing issues related to privacy and online safety?  
   3.71 .73 14

5. To what extent did you support the use of technology to help meet the needs of special education students?  
   4.43 .65 14

6. To what extent did you support the use of technology to assist in the delivery of individualized education programs for all students?  
   4.15 .99 13

7. To what extent did you disseminate information about health concerns related to technology and computer usage in classrooms and offices?  
   2.57 1.28 14

Productivity and Professional Practice Dimension. The third dimension of the survey that addressed research question 1 was the questions regarding “Productivity and Professional Practice.” This standard addressed how administrators apply technology use to enhance their own productivity and the productivity of others. The principal’s participation in professional development, principal’s modeling of technology use, the use of management information systems for students and personnel, and the use of technology to communicate to the school
stakeholders were surveyed. The mean of 3.98 for “Productivity and Professional Practice” indicates that the average response was approximately “4” (significantly) meeting the dimension, a strong degree of skill, knowledge and ability. This ranking denotes the extent to which administrators self-reported their level of meeting the behaviors of the dimension. This mean also indicates that the administrators in this study believe this dimension as an area that is strong or an area of frequent activity.

The individual questions along with their means and standard deviations are presented in table 4.4. The results indicate that three questions had standard deviations of .65 or less. Question 3 had the highest standard deviation of 1.27. The means from this dimension ranged from 3.29 to 4.62. Principal J reported no use of technology based management systems while 3 other principals (A, G, and L) reported minimal usage. The highest mean of in this dimension was question 4 (4.62) and indicates that the principals in this population believe that they rely on a high use of technology based management systems to access student records.

Table 4.4 Descriptive Statistics of Productivity and Professional Practice Questions

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>SD</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. To what extent did you participate in professional development activities meant to improve or expand your use of technology?</td>
<td>3.79</td>
<td>.58</td>
<td>14</td>
</tr>
<tr>
<td>2. To what extent did you use technology to help complete your day-to-day tasks (e.g., developing budgets, communicating with others, gathering information)?</td>
<td>4.29</td>
<td>.61</td>
<td>14</td>
</tr>
<tr>
<td>3. To what extent did you use technology-based management systems to access staff/faculty personnel records?</td>
<td>3.29</td>
<td>1.27</td>
<td>14</td>
</tr>
</tbody>
</table>
4. To what extent did you use technology-based management systems to access student records?

5. To what extent did you encourage and use technology (e.g., e-mail, blogs, and videoconferences) as a means of communicating with education stakeholders, including peers, experts, students, parents/guardians, and the community?

Research Question 2

What leader behaviors do principals believe are associated with successful implementation of a blended learning course in Algebra I in South Carolina public high schools?

The three dimensions of the survey that most directly addressed this research question include “Learning and Teaching,” “Assessment and Evaluation,” and “Support, Management, and Operations.” For “Learning and Teaching,” the participants generally reported that they believed they participated “significantly” in various behaviors related directly to this dimension. For “Assessment and Evaluation,” the participants reported the highest level of activity. The average response was higher than “significantly and closer to “fully” meeting the dimension. For “Support, Management, and Operations”, the participants generally reported that they believed they participated “significantly” in meeting the behaviors and activities of the dimension.

Learning and Teaching Dimension. The mean of 4.16 for “Learning and Teaching” indicates that the average response was approximately “4” (significantly) meeting the dimension and indicating a strong degree of skill, knowledge and ability. This
standard addressed the integration of appropriate technologies into curriculum, learning environments, and instructional strategies. This dimension’s mean was the highest reported in this study. The principal’s use of student assessment data, assisting teachers with use of assessment data, modeling use of technology in learning and teaching, support of teachers and staff to share technology practices, and the assessment and availability of professional development were surveyed. This ranking denotes the extent to which administrators self-reported their level of meeting the behaviors of the dimension. This mean also indicates that the administrators in this study self-report this dimension as an area that is strong or as an area of frequent activity.

The individual questions along with their means and standard deviations are presented in table 4.5 and indicate that these questions had smaller standard deviations than the Leadership and Vision dimension. The means from this dimension ranged from 4.08 to 4.23. The highest mean of 4.23 was duplicated for questions 2 and question 4 and indicates that the principals in this population report strong assistance to teachers in using student assessment data to modify instruction as well as a high level of support for teachers sharing information about technology. It should be noted that Principal F failed or declined to answer questions 2,3, and 4. The total responses for those particular questions were 13.
Table 4.5 Descriptive Statistics of Learning and Teaching Questions

<table>
<thead>
<tr>
<th>Question</th>
<th>Mean</th>
<th>SD</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. To what extent did you provide or make available assistance to</td>
<td>4.14</td>
<td>.77</td>
<td>14</td>
</tr>
<tr>
<td>teachers to use technology for interpreting and analyzing student</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>assessment data?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. To what extent did you provide or make available assistance to</td>
<td>4.23</td>
<td>.83</td>
<td>13</td>
</tr>
<tr>
<td>teachers for using student assessment data to modify instruction?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. To what extent did you disseminate or model best practices in learning</td>
<td>4.08</td>
<td>.86</td>
<td>13</td>
</tr>
<tr>
<td>and teaching with technology to faculty and staff?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. To what extent did you provide support (e.g., release time, budget</td>
<td>4.23</td>
<td>.60</td>
<td>13</td>
</tr>
<tr>
<td>allowance) to teachers or staff who were attempting to share</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>information about technology practices, issues, and concerns?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. To what extent did you organize or conduct assessments of staff</td>
<td>4.14</td>
<td>.86</td>
<td>14</td>
</tr>
<tr>
<td>needs related to professional development on the use of technology?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. To what extent did you facilitate or ensure the delivery of</td>
<td>4.14</td>
<td>.77</td>
<td>14</td>
</tr>
<tr>
<td>professional development on the use of technology to faculty and staff?</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Assessment and Evaluation Dimension. The “Assessment and Evaluation”
dimension of the PTLA measures the principal’s use of technology-based student
assessment data, evaluation of technology-based instructional practices, evaluation
of technology-based management information systems, assessment of professional
development, and the assessment of faculty in technology use. The mean of 3.87 for
“Assessment and Evaluation” indicates that the average response was
approximately “4” (significantly) meeting the dimension and indicating a strong
degree of skill, knowledge, and ability. This ranking denotes the extent to which administrators self-reported their level of meeting the behaviors of the dimension.

This mean also indicates that the administrators in this study self-report this dimension as an area that is strong or as an area of frequent activity.

The individual questions along with their means and standard deviations are presented in table 4.6 which indicates that question 3 had the greatest degree of variation in this dimension. The means from this dimension ranged from 3.00 to 4.29. The lowest mean was question 3. Principal F reported not evaluating existing technology systems for modification or upgrade. Principals A, D, H, J, L all stated that they minimally evaluated the technology based systems. The highest mean of 4.29 was reported for question 1 and indicates that the principals in this population believe that they implemented strong promotion and modeling of technology-based systems to collect student assessment data.

Table 4.6 Descriptive Statistics of Assessment and Evaluation Questions

<table>
<thead>
<tr>
<th>Question</th>
<th>Mean</th>
<th>SD</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. To what extent did you promote or model technology-based systems to</td>
<td>4.29</td>
<td>.73</td>
<td>14</td>
</tr>
<tr>
<td>collect student assessment data?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. To what extent did you promote the evaluation of instructional</td>
<td>4.07</td>
<td>.73</td>
<td>14</td>
</tr>
<tr>
<td>practices, including technology based practices, to assess their</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>effectiveness?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. To what extent did you assess and evaluate existing technology-based</td>
<td>3.00</td>
<td>1.24</td>
<td>14</td>
</tr>
<tr>
<td>administrative and operations systems for modification or upgrade?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. To what extent did you evaluate the effectiveness of</td>
<td>4.15</td>
<td>.69</td>
<td>13</td>
</tr>
</tbody>
</table>
professional development offerings in your school to meet the
needs of teachers and their use of technology?

5. To what extent did you include the effective use of technology as a criterion for assessing the performance of faculty?

Support, Management, and Operations Dimension. This standard addresses how administrators integrate technology into productivity systems to support administration and instruction. The mean of 4.07 for “Support, Management, and Operations” indicates that the average response was approximately “4” (significantly) meeting the dimension and indicating a strong degree of skill, knowledge and ability. This ranking denotes the extent to which administrators self-reported their level of meeting the behaviors of the dimension. The principal’s use of management information systems, allocation of funds, the pursuit of additional funding for technology, understanding of technology replacement cycles, and level of adequate technical support were surveyed. This mean also indicates that the administrators in this study self-report this dimension as an area that is strong or as an area of frequent activity.

The individual questions along with their means and standard deviations are presented in table 4.7 which indicates that the highest variability of responses was reported on questions 4 and 5. The means from this dimension ranged from 3.57 to 4.64. The lowest mean reported in this domain was question 3. Both Principal G and Principal H reported minimal pursuing of supplemental funding to help meet the technology needs of the school. The highest mean of 4.64 was reported for question 1 and indicates that all
but four of the principals in this population report that they believe that they strongly support their faculty and staff in connectivity to and using district and building level technology systems for management and operations.

Table 4.7 Descriptive Statistics of Support, Management, and Operations Questions

<table>
<thead>
<tr>
<th>Mean</th>
<th>SD</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.64</td>
<td>.63</td>
<td>14</td>
</tr>
<tr>
<td>3.86</td>
<td>.86</td>
<td>14</td>
</tr>
<tr>
<td>3.57</td>
<td>1.02</td>
<td>14</td>
</tr>
<tr>
<td>4.00</td>
<td>1.11</td>
<td>14</td>
</tr>
<tr>
<td>4.21</td>
<td>1.12</td>
<td>14</td>
</tr>
<tr>
<td>4.14</td>
<td>.53</td>
<td>14</td>
</tr>
</tbody>
</table>
**Interview Data Analysis**

The following section outlines each of the research questions guiding this study and presents the themes identified from the interview questions asked of each principal along with the results from the corresponding dimension from the PTLA. Each interview question was designed to address one of the three research questions that guided this study. Table 4.8 identifies which research question corresponds with each interview question and Table 4.9 identifies the pseudonym of each principal interviewed.

Table 4.8 Interview Question Matrix

<table>
<thead>
<tr>
<th>Research Question</th>
<th>Interview Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. What is the self-perceived role of the principal in effective implementation of a blended learning course in Algebra I in South Carolina public high schools?</td>
<td>2, 3, 5, 13</td>
</tr>
<tr>
<td>2. What leader behaviors do principals believe are associated with successful implementation of a blended learning course in Algebra I?</td>
<td>7, 8, 9, 11, 12</td>
</tr>
<tr>
<td>3. How do the principals believe their goals shape the implementation of a blended learning course in Algebra I in South Carolina public high schools?</td>
<td>4, 6, 10</td>
</tr>
</tbody>
</table>
Table 4.9 Interview Participants

<table>
<thead>
<tr>
<th>Principal</th>
<th>Gender</th>
<th>Race</th>
<th>Years as principal</th>
<th>Doctoral Degree</th>
<th>School</th>
</tr>
</thead>
<tbody>
<tr>
<td>Principal A</td>
<td>M</td>
<td>AA</td>
<td>3</td>
<td>N</td>
<td>Mayer High School</td>
</tr>
<tr>
<td>Principal B</td>
<td>M</td>
<td>W</td>
<td>5</td>
<td>Y</td>
<td>Horrell High School</td>
</tr>
<tr>
<td>Principal C</td>
<td>F</td>
<td>AA</td>
<td>8</td>
<td>N</td>
<td>Fairby High School</td>
</tr>
<tr>
<td>Principal D</td>
<td>M</td>
<td>W</td>
<td>5</td>
<td>N</td>
<td>Greendale High School</td>
</tr>
<tr>
<td>Principal E</td>
<td>M</td>
<td>W</td>
<td>24</td>
<td>Y</td>
<td>Blackhall High School</td>
</tr>
<tr>
<td>Principal F</td>
<td>M</td>
<td>W</td>
<td>28</td>
<td>N</td>
<td>Meadowcastle High School</td>
</tr>
<tr>
<td>Principal G</td>
<td>F</td>
<td>W</td>
<td>4</td>
<td>N</td>
<td>Beard High School</td>
</tr>
<tr>
<td>Principal H</td>
<td>F</td>
<td>W</td>
<td>3</td>
<td>N</td>
<td>Wildecastle High School</td>
</tr>
</tbody>
</table>

Each individual principal’s answers to the questions produced data, which were first codified and then analyzed to identify similarities and themes. Descriptive codes were assigned that reflected each response's basic topic. Tesch (1990) states, “It is important that these codes are identifications of the topic, not abbreviations of the content. The topic is what is talked or written about. The content is the substance of the message” (p. 119).

Using Atlas.ti, the researcher was able to generate a list of 6 primary topic codes that appeared most often in the responses from the 8 semi-structured interviews (Table 4.10) conducted with principals. These codes include the following: implementation processes, professional development, training, technology and student achievement, teacher resistance and barriers to implementation. Each code was then linked to a
specific dimension from the survey in which the code addressed some part or all parts of that specific dimension.

Analysis of the primary topic codes presented multiple themes. Lincoln and Guba (1985) stated three ways themes can be identified: consensus themes – when the majority of the principals stated the same theme; supported themes – when approximately half of the principals stated the same theme; and individual themes – when only one or two principals stated the same theme. The consensus themes were operationally defined by the researcher, as between five to eight principals supporting it. Supported themes were operationally defined as between three to five principals stating the same theme. Finally, individual themes were operationally defined by the researcher as having only one or two principals making statements supporting the theme.

Table 4.10 Interview Coding Summary

<table>
<thead>
<tr>
<th></th>
<th>Mayer High</th>
<th>Horrell High</th>
<th>Fairby High</th>
<th>Green dale High</th>
<th>Black hall High</th>
<th>Meadow castle High</th>
<th>Beard High</th>
<th>Wilde castle High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Implementation processes</td>
<td>0</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Professional development</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Training</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>0</td>
<td>3</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>Technology and student achievement</td>
<td>1</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Teacher resistance</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Barriers to Implementation</td>
<td>1</td>
<td>0</td>
<td>4</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>
Note. Numbers indicate the references to the primary topic code in the interview response.

Additionally, Table 4.11 shows how the topic codes align to the PTLA Dimension that most closely identifies the area or skill that emerged from the analysis. This table also depicts the relationship between the individual topic codes and the research question that the code most directly addresses.

### Table 4.11 Topic Code Alignment

<table>
<thead>
<tr>
<th>Topic Code</th>
<th>PTLA Dimension</th>
<th>Research Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Implementation</td>
<td>Leadership and Vision</td>
<td>What is the role of the principal in effective implementation?</td>
</tr>
<tr>
<td>Training</td>
<td>Productivity and Professional Practice</td>
<td>principal in effective implementation?</td>
</tr>
<tr>
<td>Barriers to Implementation</td>
<td>Social, Legal, and Ethical Decisions</td>
<td></td>
</tr>
<tr>
<td>Professional Development</td>
<td>Learning and Teaching</td>
<td>What principal behaviors are associated with successful implementation of computer aided instruction in Algebra I?</td>
</tr>
<tr>
<td>Teacher Resistance</td>
<td>Support, Management, and Operations</td>
<td></td>
</tr>
<tr>
<td>Technology and Student</td>
<td>Assessment and Evaluation</td>
<td></td>
</tr>
<tr>
<td>Achievement</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**Research Question 1**

**What is the self-perceived role of the principal in effective implementation of a blended learning course in Algebra I in South Carolina public high schools?**

**PTLA Dimension 1: Leadership and Vision.** The most frequently used topic code that was related directly to Leadership and Vision was “implementation processes.” Implementation refers to the process of putting a decision or plan into effect. Seven of
eight of the principals referred to this topic at least once. (Table 13) A consensus theme that emerged was that the decision to adopt the program was most often made at the district level. Principal C stated:

We have a couple of different tutorials that we use, we use an electronic tutorial, and we also use ALEKS. It was a district decision to use ALEKS; however, the decision at our site was based on a grant that we received. The grant was a state innovative programs grant to implement after-school intervention, and we decided to use ALEKS in connection with that for our students who were needing extra support.

Another consensus theme from the topic of implementation was the concept of a small group training embedded in the school day. Principal B stated:

As we have gone through past two years, we have had some staff development once a month. We have a technology specialist that comes to our school once a month during our planning periods and works with teachers. She actually comes and works with them individually. So even those reluctant teachers have been able to use the technology in their classrooms in some form or fashion that has helped.

Principal G stated:

We also have a technology integration specialist from the district that would come in. She comes in twice a month and now she is working with a specific blended learning group. Our staff is about 109 teachers. Trying to work with every teacher was a little challenging for us so what we decided to do is focus on about one third of our teachers, those who were interested in the program and those who
would be good models for other teachers. Our technology integration specialist is working with those teachers to use small groups, using data from ALEKS, and then those teachers will serve as models for others.

PTLA Dimension 3: Productivity and Professional Practice. The most frequently used topic code that was related directly to Productivity and Professional Practice was “training.” For this study, training refers to the short term process used to acquire the skills, formal or informal, related to the implementation or monitoring of the blended learning course. Five of the eight principals interviewed made comments related to this topic at least once. A supported theme that emerged was the use of preservice or summer training sessions to prepare the teachers prior to the start of the school year. Principal F stated:

It came from the district, their staff had been trained by the vendors and during our summer workshops principals were introduced to ALEKS. Then they came out to the schools and did the individual department workshops. Also during the summer our county has three days of mandatory training and the teachers can pick and choose which session they go to. We required our math teachers to go to the ALEKS workshops. So the district adopted it and had staff development during the summer.

Principal G stated:

Prior to beginning ALEKS at our district administrative team meetings, they introduced ALEKS to all the principals so I got some information there. Our teachers received training during the summer, right before school started. Most
of our information on ALEKS comes from our instructional coaches, so they receive training with ALEKS as well.

**PTLA Dimension 6: Social, Legal, and Ethical Issues.** The most frequently used topic code that was related directly to Social, Legal, and Ethical Issues was “barriers to implementation.” For this study, barriers to implementation refers to any obstacle that could potentially prevent or slow progress towards employment of a blended learning course. Six of the eight principals interviewed made comments related to this topic at least once. A consensus theme that emerged was the managing of unwanted student behaviors. Principal C stated:

> Another barrier is that even though it is a great solution, with benefits, the blended learning can be a distraction to the students. We have really had to work with our teachers to understand how to manage devices in the classroom so that they can be used effectively and not become a distraction to learning.

Principal F stated,

> One other issue was that students tended to be on games and going to sites they should not by finding ways around the filters. Some were hiding inappropriate pictures behind icons. At that point, we had not fully figured out how to discipline students in these scenarios. We should have spent some more time and forethought to it. I think we should have had more planning before roll-out.

Principal G remarked:

> And still getting students to buy in to the program is also a concern. Some of these students have been working with ALEKS since middle school so it is a
little monotonous for them. Going forward, our discussion will be how can we get students motivated with working in the program?

A supported theme about barriers that arose were logistical concerns with the implementation of the course. Principal A stated:

One barrier is always time, when you are trying to move a whole school and try to increase integration of blended learning or any kind of course like this. Two is changing habits. Teachers have been doing things one way for a while. And then the third obstacle, I would say, is communicating the resources we have that kids can work on at home. We need to work on making parents more aware so that they can help and encourage their child at home and get them looking at the teachers’ notes that are online or going to iExcell or other programs to continuing the learning outside of the classroom. And then the fourth piece would be computers and the fact that kids are on task. You have to fight them on the music and you have to fight them chatting…so those are some of those challenges that come with the integration of technology.

Principal C stated:

As I previously mentioned, we have not been able to schedule it in the way I think is necessary for it to be successful. That is just a function of being a large high school with lots of course offerings. It is difficult to design a master schedule to make these thing work.

Principal H stated:

Initially it was all server issues. Logging in for the first time it would go up
and it would go down. We had the technicians looking at bandwidth and capacity. I think they had to beef up server capacity. The district had to increase the overall bandwidth. Once they got a grip on those things, we never heard that the server was down or the Wi-Fi is down. It was step by step process but very quickly we worked out the majority of those bugs.

Research Question 2

What leader behaviors do principals believe are associated with successful implementation of a blended learning course in Algebra I?

PTLA Dimension 2: Learning and Teaching. The most frequently used topic code that was related directly to Learning and Teaching was “professional development.” Professional development refers to the long term and continuous process for improving and increasing the capabilities of the school’s faculty. Each of the eight of the principals referred to this topic at least twice in their interview responses. A consensus theme that emerged was the employment of an individual specifically trained to assist teachers working with the program in an ongoing fashion. Principal F states:

More staff development with teachers on how to handle the problems with the devices themselves. The first year I hired a full-time technology person, so when they broke (referring to the devices used in the blended learning course), they were able to turn them in and get them fixed. This year I hired a second technology person and they both stay busy.

Principal H stated,

By bringing in the digital content specialist and showing them how to set up the program, I think it went a long way toward alleviating that fear which then broke
down any resistance we had. What I am seeing now is we are saying to the teachers OK, you have got this now you need to include it more. You need to incorporate it more so it becomes more embedded into what you do on a daily basis.

Principal D also reported,

We have one person that focuses on an online support system called Read 180, for reading and this other teacher is more of a math person so she focused on the ALEKS to support math.

Another theme that emerged was to have a person already working in the building designated as a subject matter expert and a local trainer for the rest of the school.

Principal D stated:

Primarily we had two resource teachers that did some training through the district. The district had someone go through the process with them. We have streamlined it since then, we had two folks trained but we have since put it on one person

Principal D went on to say this about how the individuals were selected:

I think our district professional development has been the most useful. Like I said, we are in our second year and one thing our district office did was to identify a bunch of teachers, two or three at each school, not necessarily for their comfort with technology but because they were willing to try some different things in the classroom. Before we gave the devices to all the teachers, we identified those individuals and got devices in their hands and asked them to go ahead and start figuring out ways to use it in the classroom.
Principal C stated:

I have not received any training. My math teachers received training and that was put together by my assistant principal for instruction (API) so I do not know how that was done. But my math teachers were trained in using ALEKS.

Principal A stated:

One thing is to let people know what we expect with the integration of technology, giving them time to practice and share ideas, using the professionals that are in the building to work with other teachers. We have teachers who are not comfortable with the technology, but most of our new teachers are very comfortable so we are using them as leaders to work with the faculty.

Lastly, Principal G stated,

Probably the best form of professional development you can do is provide teachers with the experience of seeing it in action in their content area. They want concrete examples of the technology in use in their specific areas of content. We had to go at it all or nothing so when we started the blended learning part it was more of an instructional mode change. We needed to introduce teachers to thinking a little differently. In terms of digital integration; teachers need to see how this falls into what they need to do. How is this going to enhance what I do in my classroom? So what we need to do is to show teachers specifically modeled lesson plans. Then allow teachers to do classroom walks to visit teachers who are doing well with their digital integration to see how they incorporate that into their classes. We do not want teachers to think this is one more thing I have to do. It has to be an organic part of classroom management.
PTLA Dimension 4: Support and Management Operations. The most frequently used topic code that was related directly to Support and Management Operations was “teacher resistance.” For this study, teacher resistance refers to the attitudes and behaviors exhibited by faculty involved in implementation of the hybrid course that were either non-supportive or negative. Seven of the eight principals in this study referred to this topic at least once. A consensus theme that emerged was the hesitance of veteran teachers to adopt the blended learning platform. Principal B stated:

My experience has been that we have to understand that students today learn in different ways than we did. It does not mean that students today cannot learn, it just means that they learn in ways that we are not accustomed to. We need to get teachers to embrace that, and it is difficult because teachers hold on to the way they were taught in high school or the way that they feel they learned best. Most teachers were fairly successful in high school so they think that is the right way to teach. So getting teachers to understand there are different ways to learn, and to embrace the technology and to understand that technology allows kids to show us what they know in different ways besides just a test.

Principal D stated:

The primary issue was one of the teachers that was getting trained and ended up being our main person for it, is a veteran teacher, very close to retirement, probably retiring this year, there was some push back from her. She was not crazy about going away from inclusion to doing that.

In speaking of the hesitance of veteran teachers, Principal F responded:
When you bring in something new, the first thing is what is in it for me and next is fear. We had a couple of teachers retire. They are good people and good teachers but they felt that the technology had just passed them by and they either did not want to learn it at this time or they were scared of it.

**PTLA Dimension 5: Assessment and Evaluation.** The most frequently used topic code that was related directly to Assessment and Evaluation was “technology and student achievement.” For this study, technology and student achievement refers to the perception of the principals in this study that using ALEKS will have a positive effect on student learning in the area of math. Six out of the eight principals interviewed made statements on this topic. A consensus theme that emerged was the belief that successful implementation of a blended learning course using ALEKS is effective in addressing deficits in math. Principal B stated:

> We are using it to improve the skills of those students with math deficits because we really just started using it in that capacity last year. We have had one year using it in this setting and we have another coming, as so at this point that data is out there but we have not looked at it yet.

Principal F stated,

> I hope they will be able to have a stronger base to build off of for their math, to go from one level to the other, to get enough credits to be sufficient to go to the work force without a whole lot of tutoring. That is our mission statement to be able to graduate in four years without a lot of tutoring, to go to college or into the workforce without extra help. The teachers have found that using ALEKS gives a
great foundation supporting the weak areas as designated and the teachers who are using ALEKS – it has helped our EOC scores. Especially those lower end kids. Principal H reported,

We wanted to focus on ELA and math and we decided to go with the ALEKS for math and at the high school level to go with Achieve3000 and NoRedInk for ELA. ALEKS was brought in for math to be a gap filler to provide student instruction in areas they may be weak, regardless of where they were in the math curriculum.

Research Question 3

How do the principals believe their goals shape the implementation of a blended learning course in Algebra I in South Carolina public high schools?

To address research question 3, interview questions 4, 6, and 10 from the principal interviews were utilized. The PTLA was not used to address the topic of the individual principal’s goals for blended learning. (Table 1 and Table 11)

Interview Question 4: What are your desired outcomes from the blended learning courses you have implemented? When responding to question 4, each of the eight principals interviewed reported an overall consensus theme of wanting to address and improve student achievement as measured by either the End of Course Test or the student’s ability to go into the work force without considerable remediation. Principal A directly stated:

The main goal is to increase student achievement. Say they do not get a concept in class, they can work at home, on their own, or with their families on the weekends. That is one of the benefits of the blended learning, they can learn at
school but they can also learn at home. So increased achievement is the main piece for me.

Principal C stated, “Our desired outcomes are higher passage rates in Algebra 1 and geometry as well as the EOC in Algebra 1.” Principal D indirectly stated the desire to improve passage rates on the EOC by stating:

The main thing we are looking at, when we looked at the program to begin with, we are really impressed with the fact that it required students to master a certain concept and would give feedback that OK you have completed or mastered these concepts. The main thing we were looking for was the opportunity to be able to keep these students out of an Algebra 1 class and say Ok this is where they are weak so let’s get them in ALEKS and start spending a little more time on certain skills from the diagnostic data we get from ALEKS.

A consensus theme that emerged was using ALEKS to provide for differentiation in the classroom based on the student’s ability level. Principal G stated:

What I hope to see happen is definitely students getting a better grasp of the math concepts. I know my teachers work hard to instruct, but we all understand that students are at different levels. I hope ALEKS will help them differentiate instruction and allow the students who cannot go on, who are not understanding what is going on can remediate and the other students can continue.

Principal H stated:

We wanted ALEKS to give gap instruction, specifically students coming into Algebra 1 and Math Tech 2, the ones that were in the EOC courses. We have a transient population coming from all over. When you have students coming in at
different times of the year, they are on different areas of the content. We wanted to provide the teachers with a way to fill in the gaps for foundational information. We also saw the potential for enrichment. As we are moving into the blended rotational models we wanted students to have that independent time in the classroom and with small group instruction. We feel like the independent component is being filled very well by ALEKS. The students can work at their pace, it gives them more control over pace and content, based on level sets when entering the program. It gives them the opportunity to move through the content at an individualized pace and it actually helps the teacher.

Principal E stated:

Hopefully we will give our kids that maybe are struggling a different avenue that they can learn with. We do have a couple of classes that have low numbers and they have a number of kids that are resource in that class. So we have two teachers that are co-teaching so we go over the different problems and then one teacher will take the group to the lab and work on ALEKS and bring those kids back and rotate them. We try to give them a different learning environment. I like the support, sometimes you are learning one way and maybe you learn a different way and it can help you with problems you have along the way.

**Interview Question 6: How did you communicate your goals for the blended learning courses you have implemented?**

When responding to question 6, there was no overall consensus as with question 4. Principal A, B, and D remarked that the goals
were established at the school or district level and were a mandate to the teachers.

Principal C stated:

I do not specifically have goals for blended learning. I have goals for actual student outcome. Blended learning is just a tool that we use to reach the goals that we have for Algebra 1. So our goals are communicated in terms of success for students in Algebra 1 and on the EOC.

A supported theme from interview question 6 is that of stakeholder buy-in.

Principal F stated:

Basically, I tried to get ownership and buy-in from the teachers. We did a very good job of introducing it to them, showing them the benefits and the rewards of it for the kids and EOC scores and graduation rate. The increase in rates has been a motivating factor, the kids pass rate and the graduation rate. I find that teachers will do what they are told but to get actual buy-in they need to know the benefits to themselves and to their students.

Principal H stated:

I took an organic approach. I did not tell my teachers they had to follow a specific rotational cycle. We have actually encouraged teachers to think outside of the box with it. Some are finding that they have success with a split class, 60/40 or 30/70 or something like that. Others find more success with three rotations, where they have a direct group, an independent group, and a collaborative group all working at the same time. We wanted to give teachers flexibility based on their content, what content they were in and where they were within that content.
Interview Question 10: Where is blended learning moving to in the future?

How will it affect education and what can school principals do to ensure the success of their students and teachers? There was an overall consensus theme to the responses to question 10. Seven out of 8 of the principals responded to this question referring to the topic of individualized learning for students. Principal B stated:

My experience has been that we have to understand that students today learn in different ways than we did. It does not mean that students today cannot learn, it just means that they learn in ways that we are not accustomed to. We need to get teachers to embrace that, and it is difficult because teachers hold on to the way they were taught in high school or the way that they feel they learned best.

Principal C stated:

I am not sure how it will affect education but the beauty of it is the ability of it to individualize instruction for students. I think that is where ALEKs can be the most valuable. Especially in a large high school, we need to find ways to make small personalized instruction that is tailored to students’ specific needs. That is the greatest value for the blended approach.

Principal G stated:

I see blended learning not going away. I see teachers getting more comfortable working with small groups of students because that is what they do now. Some teachers are just having a hard time dealing with classroom management, understand that yes, you can work with this group of students and you can have another group of students doing this activity and it is OK, you are still in control. I do not see blended learning going away. I see it being more effective to our
students. Once more teachers get an understanding of how to design their classes and what they can do.

Lastly, Principal H stated,

I think we are going to see a true integration with the ability to take some classes online and some in the classroom. That will help us to provide a more individualized, personalized educational opportunity for those students. As principals we are going to have to be sensitive to trying new things. I say all the time, doctors practice medicine and we need to practice teaching because it is constantly changing. We have to change and evolve with it or we are not going to be able to meet the needs of what they are doing. We are going to use more and more technology. As it becomes cheaper, we can put it in more hands. We are going to encourage those students to excel and to define career opportunities that they never imagined in a million years and now all of the sudden the doors are open to them. We have to be open to the idea that a traditional brick and mortar school must evolve. Brick and mortar is not going to go away as it fills a specific need as far a student social maturity is concerned but at the high school level, technology opens up areas for careers that are nationwide and worldwide. So we have to be sensitive to that and open up those venues to everybody.

A supported theme that emerged in the responses to question 10 was the acknowledgement that blended learning is not going to replace the classroom teacher. Principal A stated,

I think we have to be careful, there is nothing like a teacher and student relationship. We have to have a balance and there are some schools right now in
our nation and across our world that are strictly online or strictly blended, and I think through computers you lose that connection, you lose the development that goes on so much that it can’t be measured. The teacher interaction with the students, student interaction with each other, but there has to be a balance that I think is very difficult though there are schools that have found a way. There are some kids that are just, this is what I want and you have to have options. I think blended learning can give us some options because the world is not going to stay the same. I think for us is that realization, that technology is here and we need to use it effectively.

Principal E stated this about blended learning:

Well, I think with all of the technology we have now, it is just another tool that we can use to that is available to us to help those kids be successful. So I think if we do not use that, we are neglecting a valuable component of what we are trying to do. So I think we need to push it but I do not think it is everything. I think the teacher in the classroom is the most effective. But I think the teacher in the classroom, with ALEKS going around and watching these kids, going around and helping these kids is a good program.

**Summary**

Chapter 4 presented the results and analysis of the PTLA survey as well as analysis of the eight principal interviews. The data revealed that the “Learning and Teaching” dimension had the highest mean average of 4.16. While the lowest average of the six dimensions was the “Leadership and Vision” dimension, its mean of 3.82 still
indicates that principals reported a “significant” amount of activity in this area. From the descriptive coding, six primary topic codes appeared most often in the responses: implementation processes, professional development, training, technology and student achievement, teacher resistance, and barriers to implementation. Each code was then linked to a specific dimension from the survey in which the code addressed some part or all parts of that specific dimension. From this analysis, several consensus and supported themes emerged including: the use of a preservice or summer training sessions, the suggested use of small group training embedded in the school day, and the struggle to manage unwanted student behaviors while using internet-enabled devices to access the online material. Chapter 5 will present the conclusions of this study, a discussion of the conclusions, and the recommendations for further research.
Chapter 5

Conclusions, Discussion, and Recommendations

This study examines how the principal can influence the effectiveness of blended learning on current and repeating 9th grade students enrolled in an Algebra I course supplemented with the ALEKS program in South Carolina public schools.

The study was guided by the following research questions:

1. What is the self-perceived role of the principal in effective implementation of a blended learning course in Algebra I in South Carolina public high schools?

2. What leader behaviors do principals believe are associated with successful implementation of a blended learning course in Algebra I in South Carolina public high schools?

3. How do principals believe their goals shape the implementation of a blended learning course in Algebra I in South Carolina public high schools?

Conclusions

A main concept explored in the literature review was the principal as technology leader. Anderson and Dexter (2005) stated, “The mere presence of a hybrid course or other technology intensive hardware does not assure meaningful learning for students” p.51). In general, the findings confirm that although technology infrastructure is important, technology leadership is even more necessary for effective utilization of technology in schooling. The survey instrument was the Principals Technology Leadership Assessment (PTLA) which is designed to measure principals’ technology
leadership inclinations and activities over the course of the school year. The PTLA measures technology leadership across six dimensions. From this study, it was revealed that each of the 14 participating principals reported meeting all 6 dimensions of this survey. The means for the dimensions “Leadership and Vision” (3.82); “Learning and Teaching” (4.16); “Productivity and Professional Practice” (3.98); “Support, Management, and Operations” (4.07); “Assessment and Evaluation” (3.87); and “Social, Legal, and Ethical Issues” (3.86) show that the average response was “significantly,” meaning a strong degree of skill, knowledge, and ability, meeting the description of the behaviors associated with technology leadership. According to the survey results, principals reported that technology leadership is an area of frequent activity.

The dimension with the highest reported level of activity was “Learning and Teaching” at 4.16 with a standard deviation of .77. The high mean and low standard deviation for this dimension indicate that the principals in this study believe they strongly met the standard for Learning and Teaching. This finding is supported by Creighton (2003) who stated, “The core issue is: The principal as technology leader must remain visible and involved in guiding the process of implementing technology, with teaching and learning as the driving force” (p. 23).

The findings also suggest that the principal as technology leader needs to seek buy in from the school’s stakeholders to combat teacher resistance. Principal B from Horrell High stated,

It is difficult because teachers hold on to the way they were taught in high school or the way that they feel they learned best….so getting teachers to understand that there are different ways to learn, and to embrace the technology and to
understand that technology allows kids to show us what they know in different ways besides just a test.

Principal F from Meadowcastle High also stated,

Basically, I tried to get ownership and buy-in from the teachers. We did a very good job of introducing it to them, showing them the benefits and rewards of it for the kids and EOC scores and graduation rate…. I find that teachers will do what they are told but to get actual buy-in, they need to know the benefits to themselves and to their students.

Lastly, Principal D stated,

The classroom math teachers were on board once they figured out the diagnostic data we were getting back and the specific feedback on a kid getting this concept or that concept, the actual content teachers, the math teachers were 100% on board for that.

Getting teachers involved was also referenced in the PTLA under the “Leadership and Vision” dimension. Question 3 on the PTLA asked, “To what extent did you promote participation of your school’s stakeholders in the technology planning process of your school district?” The mean response to this question was 3.43, which indicates that the average response was between “Somewhat” and “significantly” from the 14 principals in this study. From the literature review, Creighton (2003) also acknowledged that principals may encounter faculty members resistant to change. He argued that the best way to combat potential “resisters” and “saboteurs” is by involving all stakeholders in technology implementation. If teachers understand where they are going with technology, they are less likely to oppose the journey.
Another notable cause of teacher resistance discussed in the literature that emerged in the study were teachers’ attitude toward technology. Brinkerhoff (2006) discussed “attitudinal barriers,” which include anxiety about a lack of knowledge in using technology, current technological trends, and teachers’ perceptions of their computer competency and the adequacy of their technology preparation. This topic emerged several times throughout the interviews. Principal F stated:

We had a couple of teachers retire. They are good people and good teachers but they felt that the technology had just passed them by and they either did not want to learn it at this time or they were scared of it.

Principal G from Beard High remarked,

I will say that the teacher’s perception of blended learning, and (lack of) willingness to try blended learning, was a big barrier…. there was resistance and even people on my staff who retired because they did not want to deal with the change.

Adequate professional development was the consensus remedy to the attitudinal barrier. Unless teachers are provided with a long-term support for learning to use and implement technology, they are unlikely to use it in their classrooms (Chance et al., 2007). Principal B stated,

Even the teachers who had some resistance to technology, I think, have embraced some of the things that blended learning has allowed them to do. Anytime you are talking about integrating technology there needs to be some staff development.

Principal H stated,

By bringing in the digital content specialists and showing them how to set up the
program, I think it went a long way toward alleviating that fear which then broke down any resistance that we had.

The benefits of providing adequate professional development were also confirmed by the results of the PTLA. Question 5 in the “Learning and Teaching” dimension asked, “To what extent did you organize or conduct assessments of staff needs related to professional development on the use of technology?” The mean of the 14 responses was 4.14. This mean indicates that the average response was slightly higher than “significantly.” Question 6 in the “Learning and Teaching” dimension asked, “To what extent did you facilitate or ensure the delivery of professional development on the use of technology to faculty and staff?” Again, the mean of the 14 responses was 4.14. This mean indicates that the average response was slightly higher than “significantly.” These results confirm that the literature, survey, and interviews are in agreement.

Vision is an essential component of technology leadership. Johnston and Cooley (2001) stated that school leaders must first understand and be able to articulate a vision of how technology fits into the broader framework of school reform…and why and how they are promoting the effective and meaningful use of instructional technology to elevate student achievement. Successful communication of the vision describes the end state or goals the school wants to accomplish. The “Leadership and Vision” dimension from the PTLA had a mean of 3.82 which was the lowest of the 6 dimensions. Although the lowest mean reported in this study, this mean indicates that the average response was “significantly” meeting the dimension and that this area is one of strong or frequent activity. This result correlates with the literature.
The literature also revealed that successful implementation of blended learning courses contributed to improved learning outcomes for students (Boyle, Bradley, Chalk, Jones, & Pickard, 2003; Dziuban et al., 2006; Garnham & Kaleta, 2002; Lim & Morris, 2009). The blended approach enables teachers to address academic and other concerns on an individual basis (Watson, 2008). This concept is reaffirmed by the findings of this study. Analysis of the data revealed the principals’ interviewed in this study have the perception that blended learning will lead to increased achievement. Each of the eight principals interviewed reported an overall consensus theme of wanting to address and improve student achievement as the reason for implementing the blended learning course using ALEKS. The goals for the increased achievement were higher passage rates on the End of Course Test, higher graduation rates, and higher number of career ready high school graduates.

Discussion

Research questions 1 and 2 were addressed using both the results from the PTLA and principal interviews:

Research Question 1. What is the self-perceived role of the principal in effective implementation of a blended learning course in Algebra I in South Carolina public high schools?

Research Question 2. What leader behaviors do principals believe are associated with successful implementation of a blended learning course in Algebra I?

Two primary roles emerged for a principal implementing blended learning: Principal as Technology Leader and Principal as Manager. The two roles can be thought
of from this perspective: Once the principal as technology leader is able to communicate
the vision, the principal as manager then must be able to create the plan for sustaining the
vision (Kozloski, 2006). In discussing these roles, the behaviors associated with these
roles will also be outlined.

**Principal as Technology Leader**

The principal as the technology leader is a major role in the successful
integration and implementation of a blended learning course. Leadership and
administrators’ ability to lead is an important factor in determining the success of
implementing a new technology (Anderson & Dexter, 2005; Hayes, 2006). Gibson
(2001) said, “The number one issue in the effective integration of educational technology
into the learning environment is not the preparation of teachers for technology usage, but
the presence of informed and effective leadership” (p. 1). This study affirms that the
most important aspect of the principal’s technology leadership aligns with Dimension 2
of the PTLA, “Learning and Teaching.” This dimension focuses primarily on the
principal’s role in providing professional development to the teachers who will
implement the blended learning. The principals in this study self-reported this dimension
as 4.16, which indicates that they feel they “significantly” display the behaviors of this
dimension. Creighton (2003) stated that the principal’s mission should now include
designing and implementing new strategies to help teachers recognize, understand, and
integrate technology with teaching and learning for students. Meeting teachers’ needs for
additional professional development was also a high priority based on the semi structured
interview responses. Principal H said this about professional development, “We wanted
to be able to give the teachers as much support as possible so we used teacher leaders,
department chairs, and instructional coaches.” Accordingly, to meet needs in this area, principals should seek to create professional development opportunities that involve local trainers who have established credibility in the school.

A behavior associated with professional development that emerged as a supported theme was the use of preservice or summer training sessions to prepare the teachers prior to the start of the school year. This allows teachers to learn how to use the technology prior to implementing the course. This type of pre-service training can be done with either district level specialists or with vendor contracted trainers.

Another behavior associated with professional development that was supported by this research was the practice of embedding the long term training into the school day. Darling-Hammond and Richardson (2009) also suggest providing sustained and ongoing, embedded professional development that is fully integrated into teachers’ daily activities. This onsite training should be based on the individual teachers’ competency level: a novice group for new users and a more advanced group for those who have familiarity with the platform. It is important that this training be led by local teacher leaders who have familiarity with the content as well. Principal E most notably remarked this about local trainers,

“I think it was absolutely more effective than bringing in someone from the outside. They consider this person more of an elbow to elbow colleague, because they are working with the same demographics, or close to the same demographics…”

Lastly Principal H emphatically stated,

“Probably the best form of professional development you can do is provide
Technology leadership also involves the communication of a strong vision. According to ISTE (2009), “Educational Administrators inspire and lead development and implementation of a shared vision for comprehensive integration of technology to promote excellence and support transformation throughout the organization” (p. 1). This was also measured in Dimension 1, “Leadership and Vision” of the PTLA. While the mean of 3.82 was the lowest reported dimensional mean in this study, it still indicates a strong degree of skill, knowledge, and ability as well as being an area of frequent activity. More specifically, under this dimension, the PTLA asks:

To what extent did you communicate information about your district’s or school’s technology planning and implementation efforts to your stakeholders?

The mean of the responses from the participants was 4.14. This would suggest that the principals believe they have frequently identified with this behavior.

The final behavior that can be associated with the role of Principal as Technology Leader is to be a model for your teachers. A consensus theme that emerged was the hesitance of veteran teachers to adopt the blended learning platform. Creighton (2003) suggested that leaders ensure teachers understand where they are going with technology so that they are less likely to oppose the journey. Afshari et al. (2010) concluded that modeling the use of technology provides an effective method for exposing teachers to new strategies and demonstrating to the staff that it is acceptable to take risks and make mistakes, without the fear of retribution. The principals in this study also showed strong activity with this behavior. For the “Learning and Teaching” dimension, the principals in
this study self-reported this dimension at a 4.16 which is the highest for this study. Specifically question 3 of this dimension asks:

To what extent did you disseminate or model best practices in learning and teaching with technology to faculty and staff?
The mean for the principals that responded to this question was 4.08 or “significantly” on the 5 point Likert scale. This suggested that they all self-report modeling frequently throughout the implementation of the blended learning course. To have successful implementation, the principal must ensure that they also utilized the platform and can guide their teachers through the adoption and daily use of the program.

As leaders who communicated a clear vision, the principals in this study strived to craft and communicate a clear vision for what a blended learning course should look like within the bounds of their school. They also assisted in crafting a culture that supports both teachers and technology by modeling technology use and offering professional development along with the appropriate technical and instructional technology assistance.

**Principal as Manager**

The principal as manager also is a major role in the successful implementation of a blended learning course. Some educational leaders may feel that management may be the lesser of the two roles since it does not involve the more technical aspects of successful implementations. However, successful principals learn to seamlessly blend their roles as managers and leaders and understand the importance of both tasks (Robbins...
& Alvy, 2004). The two primary behaviors of a principal as manager that emerged from this study were staff management and student management.

The behavior associated with principal as manager with regard to staff management was the proper hiring and employment of technical support staff. From the descriptive coding of the semi-structured interview, a consensus theme clearly emerged, supporting the employment of either digital integration specialists, technology integration specialists or simply technology specialists. Notably, Principal H remarked, “Our district created new positions, Digital Integration Specialists, and they meet with teachers once a month as professional learning communities.”

Dimension 4 from the PTLA directly addresses this behavior as well. Question 5 asks:

To what extent did you advocate at the district level for adequate, timely, and high-quality technology support services?

The mean response from the 14 principals surveyed was 4.21, which evidences “significant” or strong activity in this area. The principal as manager should seek to hire and utilize a support person who can assist teachers with the implementation of the blended learning course on an ongoing basis.

The behavior associated with principal as manager with regard to student management was assistance in keeping students constructively engaged in the blended learning platform. Simply placing students in front of a device and logging them into the system does not ensure that they will receive the maximum benefit from the program. Teachers must be trained in best practices in implementation and sustainment of the blended learning course with regard to classroom management. Care must also be taken
not to allow the students to use the technology in unintended ways or to get off-task.

Principal C warned,

“Another barrier is that even though it is a great solution, with benefits, blended learning can be a distraction to the students. We have really had to work with our teachers to understand how to manage devices in the classroom so that they can be used effectively and not become a distraction to learning.”

Likewise, Principal F noted,

“One other issue was that students tended to be on games and going to sites they should not by finding ways around the filters.”

Therefore, the principal as manager should anticipate students being off task and unmotivated to learn and formulate a plan to address this concern. There was no consensus recommended method for student management but individual principals mentioned the use of the following:

- Small group instruction
- Extrinsic motivation for completion of units (token economy)
- Free time with the device
- Monitoring software
- Strategic desk placement to ensure monitors are visible

While there was overall agreement between the PTLA and the responses from the interviews, there were some areas in which there were relatively high means of activity reported by the principals but not much evidence provided during the interviews. Specifically, some principals rated themselves higher in their confidence to lead educational technology within their schools and their level of skill using technology for
professional purposes. This discrepancy could be attributed to leniency, halo, or recency errors within the PTLA survey.

The third of the three research questions that guided this study was addressed using the results from the semi-structured interview and the existing research:

**Research Question 3. How do the principals believe their goals shape the implementation of a blended learning course in Algebra I in South Carolina public high schools?**

Based on the responses from the 8 principals interviewed, the consensus goal for implementing a blended learning course in Algebra I is to improve student achievement, primarily on the Algebra I End of Course Test. Principal A directly stated, “The main goal is student achievement.” A secondary goal that emerged was to offer differentiation for students who were not meeting expectations. Principal E stated, “Hopefully we will give our kids that maybe struggling a different avenue that they can learn with.” For the principals in this study, these goals guided the implementation process and were critical in attaining stakeholder buy-in.

A finite resource for all principals is time. During the implementation process, the principals in this study reported that to meet their goals, they made the decision to allocate critical time during the summer and throughout the school day to allow teachers to train on the proper utilization of the program. As an alternative to one-shot training from a vendor, the consensus was to employ local teacher leaders and subject matter experts to conduct systematic and ongoing training and professional development. Principal A mentioned a “Blended Learning Fair” and Principal E spoke of “Block Parties” for embedded and ongoing professional development. From this study, it is
apparent that principals must commit to the allocation of time, resources, and training that is ongoing to have successful implementation of blended learning.

Lastly, the principal’s goals, as well as their communication of goals, shaped the implementation process by assisting in getting the teacher buy-in that is critical to the long term success of the program. When discussing his implementation strategy, Principal F stated, “Basically, I tried to get ownership and buy-in from the teachers. We did a very good job of introducing it to them, showing them the benefits and rewards of it for the kids, EOC scores and graduation rate.” He and other principals from this study refer to articulating their goals clearly and explaining the benefits to both the students and teachers themselves as necessary in the implementation of a blended learning course.

**Recommendations for Further Study**

Additional areas were found during this study in which future research could potentially add important insight to understanding the principal’s role in implementing a blended learning course. The following recommendations for researchers in the area of technology leadership are suggested:

1. Further analysis of the differences in implementation in schools of differing size, location, and economic levels may yield identification of situational best practices. Small rural schools may have logistical barriers far different from larger urban schools.

2. Use of a larger sample and examining districts with differing demographics to determine if the data can be generalized across states and regions of the U.S.
There may be geographically unique recommendations for implementation of hybrid courses.

3. Identify each participant to allow the researcher to compare and contrast data from each participant across the quantitative and qualitative phases to provide a richer picture of each participant in relation to their feedback. Each principal brings in a unique perspective and more background information could inform the reader of the rationale behind their views.

4. Conduct further research of principal’s leadership behaviors in other technology based initiatives such as 1:1 device deployment or online course delivery. Similarities and best practice with regard to technology initiatives could be identified and refined.

5. Use of a revised PTLA instrument, to incorporate minimally the most current NETS-A standards or the creation of a new survey instrument which provides more precise response options. Technology standards are rapidly evolving along with the emergence of new and more cost effective technology solutions. The survey instrument needs to be relevant to the latest trends as well.

The following recommendations for practitioners in the area of technology leadership are suggested:

1. Survey teachers’ perceptions of effective implementation behaviors and practices in high school blended learning courses. Insight from the
perspective of those actually delivering the instruction and interfacing with the software could inform recommendation for best practices and future study.

2. Identification of appropriate professional development for principals seeking to implement blended learning courses in their schools. This professional development should be focused on instructional strategies and not just training on the use of hardware or software.

3. Identification of other intelligent tutoring platforms that may provide a more cost effective solution for school or organization. Each platform will have inherent benefits and disadvantages that should be evaluated against the needs of both the students and the school.

Summary

The purpose of this mixed methods study was to examine the instructional, managerial, and leadership roles of the principal as technology leader of his respective school. More specifically, this study examined how the principal can influence the effectiveness of blended learning on current and repeating 9th grade students enrolled in an Algebra I course supplemented with the ALEKS program in South Carolina public schools. Research was conducted into the leadership practices of 14 principals throughout 3 different regions of South Carolina. The principals were employed in districts serving from 9,400 to 41,000 students.

Two primary roles emerged for a principal implementing blended learning: Principal as Technology Leader and Principal as Manager. The two roles can be thought of from this perspective: Once the principal as technology leader is
able to communicate the vision, the principal as manager then must be able to create the plan for sustaining the vision (Kozloski, 2006). While there were many behaviors that emerged from both roles, the most frequently noted and impactful behavior is the ability of the principal to communicate a strong vision. When there is a great ability to share the vision, there is also a greater opportunity for successful implementation of the blended learning course.

The findings of this study revealed agreement with the existing literature on technology leadership and implementation practices. Most notably, the work of Anderson and Dexter (2000, 2005) affirms that although technology infrastructure is important, technology leadership is even more necessary for effective utilization of technology in schooling. The findings also support the previous work by Creighton (2011), which stated the central mission for school leaders is not whether technology is needed in schools but how it will be integrated effectively into instruction. The findings suggested that technology leaders in leading school reform must put rigorous thought in the overall role that technology plays in the enhancement of student learning. Ultimately, to increase student achievement, principals should be willing to investigate new technologies and paradigms in customization of learning. Blended learning is but one construct in this ever-expanding technological horizon.
References


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Appendix A: Principals Technology Leadership Assessment

Instructions

You are being given this technology leadership assessment at the request of your school or district, which will use the results to guide its leadership training and professional development programming. Assessment items are based on the International Society for Technology in Education’s (ISTE) National Educational Technology Standards for Administrators (NETS-A). The purpose of the assessment is to provide building-level administrators with detailed and comparative information about their technology leadership. The individual items in the assessment ask you about the extent to which you have engaged in certain behaviors that relate to K-12 school technology leadership. Answer as many of the questions as possible. If a specific question is not applicable, leave it blank. For example, if a question asks about technology planning activities in your district, and your district has not engaged in any such activities, leave the item blank. Note that leaving multiple items blank may limit the usefulness of the assessment results.

As you answer the questions, think of your actual behavior over the course of the last school year (or some other fixed period of time). Do not take into account planned or intended behavior. As you select the appropriate response to each question, it may be helpful to keep in mind the performance of other principals that you know.

Please note that the accuracy and usefulness of this assessment is largely dependent upon your candor. If done with care, the results can provide you with valuable information as you seek to extend or improve your leadership skills. When assessing behaviors and performance, individuals have a tendency to make several types of errors. You should familiarize yourself with the following errors:

Leniency error. This occurs when an individual gives himself an assessment higher than he deserves. This could occur for several reasons: the individual has relatively low
performance standards for himself; the individual assumes that other individuals also inflate their ratings; or, for social or political reasons, the individual judges that it would be better not to give a poor assessment. As you assess yourself, you should understand that accurate feedback will provide you with the best information from which to base further improvement.

*Halo error.* This occurs when an individual assesses herself based on a general impression of her performance or behavior, and the general impression is allowed to unduly influence all the assessments given. An example of halo error would be an individual who rates herself highly on every single assessment item. It is rare that individuals perform at exactly the same level on every dimension of leadership. It is more likely that an individual performs better in some areas than on others.

*Recency error.* This occurs when an individual bases an assessment on his most recent behavior, as opposed to his entire behavior over some fixed period of time (e.g., the last year). This assessment should be based on your behavior over the entire year (or other fixed period of time).

The following terms appear throughout the assessment. Keep these definitions in mind as you read the items and make your response.

*Technology.* Generally refers to personal computers, networking devices and other computing devices (e.g., electronic whiteboards and personal digital assistants (PDAs)); also includes software, digital media, and communications tools such as the Internet, e-mail, CD-ROMs, and video conferencing.

*Technology planning.* Any process by which multiple stakeholder groups (e.g., district administration, school administration, faculty, and parents) convene to develop a strategy for the use or expanded use of technology in instruction and operations. Technology planning need not be separate from other planning efforts, but should be a recurring theme if integrated within a more comprehensive planning process.
Research-based. A practice that employs systematic, empirical methods that draw on observation or experiment to provide reliable data. Research-based work uses research designs and methods appropriate to the research question posed and are presented in sufficient detail for replication. The strongest research-based practices typically obtain acceptance through peer-reviewed journals or expert panels.

Assessment. A method of measurement used to evaluate progress. Student assessment typically refers to a method of evaluating student performance and attainment to determine whether or not a student is achieving the expected outcome(s).

Average time to complete the assessment is about 15 minutes.

I. Leadership & Vision

1. To what extent did you participate in your district’s or school’s most recent technology planning process?

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2. To what extent did you communicate information about your district’s or school’s technology planning and implementation efforts to your school’s stakeholders?

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3. To what extent did you promote participation of your school’s stakeholders in the technology planning process of your school or district?

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4. To what extent did you compare and align your district or school technology plan with other plans, including district strategic plans, your school improvement plan, or other instructional plans?

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5. To what extent did you advocate for inclusion of research-based technology practices in your school improvement plan?

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6. To what extent did you engage in activities to identify best practices in the use of technology (e.g., reviews of literature, attendance at relevant conferences, or meetings of professional organizations)?

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II. Learning and Teaching

1. To what extent did you provide or make available assistance to teachers to use technology for interpreting and analyzing student assessment data?

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2. To what extent did you provide or make available assistance to teachers for using student assessment data to modify instruction?

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3. To what extent did you disseminate or model best practices in learning and teaching with technology to faculty and staff?

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4. To what extent did you provide support (e.g., release time, budget allowance) to teachers or staff who were attempting to share information about technology practices, issues, and concerns?

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5. To what extent did you organize or conduct assessments of staff needs related to professional development on the use of technology?

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6. To what extent did you facilitate or ensure the delivery of professional development on the use of technology to faculty and staff?
III. Productivity & Professional Practice

1. To what extent did you participate in professional development activities meant to improve or expand your use of technology?

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2. To what extent did you use technology to help complete your day-to-day tasks (e.g., developing budgets, communicating with others, gathering information)?

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3. To what extent did you use technology-based management systems to access staff/faculty personnel records?

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4. To what extent did you use technology-based management systems to access student records?

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5. To what extent did you encourage and use technology (e.g., e-mail, blogs, videoconferences) as a means of communicating with education stakeholders, including peers, experts, students, parents/guardians, and the community?

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IV. Support, Management, & Operations

1. Support faculty and staff in connecting to and using district- and building-level technology systems for management and operations (e.g., student information system, electronic grade book, curriculum management system)?

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2. To what extent did you allocate campus discretionary funds to help meet the school’s technology needs?
3. To what extent did you pursue supplemental funding to help meet the technology needs of your school?

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4. To what extent did you ensure that hardware and software replacement/upgrades were incorporated into school technology plans?

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5. To what extent did you advocate at the district level for adequate, timely, and high-quality technology support services?

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6. To what extent did you investigate how satisfied faculty and staff were with the technology support services provided by your district/school?

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V. Assessment & Evaluation

1. To what extent did you promote or model technology-based systems to collect student assessment data?

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2. To what extent did you promote the evaluation of instructional practices, including technology-based practices, to assess their effectiveness?

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3. To what extent did you assess and evaluate existing technology-based administrative and operations systems for modification or upgrade?

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4. To what extent did you evaluate the effectiveness of professional development offerings in your school to meet the needs of teachers and their use of technology?
5. To what extent did you include the effective use of technology as a criterion for assessing the performance of faculty?

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VI. Social, Legal, & Ethical Issues

1. To what extent did you work to ensure equity of technology access and use in your school?

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2. To what extent did you implement policies or programs meant to raise awareness of technology-related social, ethical, and legal issues for staff and students?

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3. To what extent were you involved in enforcing policies related to copyright and intellectual property?

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4. To what extent were you involved in addressing issues related to privacy and online safety?

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5. To what extent did you support the use of technology to help meet the needs of special education students?

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6. To what extent did you support the use of technology to assist in the delivery of individualized education programs for all students?

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7. To what extent did you disseminate information about health concerns related to technology and computer usage in classrooms and offices?

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Appendix B: Interview Protocol

Date: ____________________  Time: ________________

Place:__________________________________________

Interviewer:___________________________________

Interviewee:__________________________________

1. How long have you been a principal and how long have you been principal of this school?

2. How did you arrive at the decision to utilize the ALEKS intelligent tutoring system in a blended learning environment?

3. What type of training did you and your staff attend prior to your implementation?

4. What are your desired outcomes from the blended learning courses you have implemented?

5. What have you done since the initial implementation to ensure your desired outcomes are realized?

6. How did you communicate your goals for the blended learning course to your teachers and students?

7. What kind of structural changes were necessary at your school for implementation of a blended learning course?
8. What are the weaknesses or barriers that you have encountered when implementing and integrating the blended learning course?

9. What specific professional development appears to be most effective when integrating technology?

10. Where is blended learning moving to in the future? How will it affect education, and what can school principals do to ensure success of their students and teachers?

11. What methods and strategies did you utilize to facilitate technology integration in your building?

12. Were any members of your faculty resistant to implementing this course? Were there common concerns or issues that arose? How did you address them?

13. How do you ensure that your blended learning teachers are implementing the program effectively?
INSTITUTIONAL REVIEW BOARD FOR HUMAN RESEARCH

APPROVAL LETTER for EXEMPT REVIEW

This is to certify that the research proposal: Pro00044711

Entitled: *Role of Principals In Implementing Blended Learning In South Carolina Public Schools*

Submitted by:

Principal Investigator: Corey Murphy

College: Education

Department: Education Leadership & Policies

Wardlaw 310

Columbia, SC 29208
was reviewed in accordance with 45 CFR 46.101(b)(2), the referenced study received an exemption from Human Research Subject Regulations on 5/19/2015. No further action or Institutional Review Board (IRB) oversight is required, as long as the project remains the same. However, the Principal Investigator must inform the Office of Research Compliance of any changes in procedures involving human subjects. Changes to the current research protocol could result in a reclassification of the study and further review by the IRB.

Because this project was determined to be exempt from further IRB oversight, consent document(s), if applicable, are not stamped with an expiration date.

Research related records should be retained for a minimum of three (3) years after termination of the study.

The Office of Research Compliance is an administrative office that supports the University of South Carolina Institutional Review Board (USC IRB). If you have questions, contact Arlene McWhorter at arlenem@sc.edu or (803) 777-7095.

Sincerely,

Lisa M. Johnson
IRB Manager
Appendix D: Letter to Superintendent

Dear (Superintendent),

My name is Corey Murphy. I am a doctoral candidate at the University of South Carolina and conducting a study entitled “The Principal’s Role in Implementing Blended Learning in South Carolina Public Schools.” Specifically, I am looking at high schools that have utilized the intelligent tutoring program ALEKS within the last five years. I am requesting your permission to include the principals of the following schools in my study:

(School(s)

The instrument that was used for my study is the Principals Technology Leadership Assessment (PTLA). The survey is designed to measure principals’ technology leadership inclinations and activities. Participation in this survey is completely voluntary and you may opt out at any time. The survey should only take 15 minutes to complete. In some cases, I will also follow up the survey with a brief interview to gain further insight into the principals’ perspective. I assure you that all information collected will be completely confidential. Pseudonyms will be used for both principal and school identifications.

For your convenience, I have included a permission slip with a return envelope. Also included is the approval to conduct this study from the University of South Carolina’s Institutional Review Board. If you have any questions please feel free to contact me at 843-812-0063 or corey.murphy@beaufort.k12.sc.us.

Thank you in advance for your time and consideration.

Sincerely,
Corey J. Murphy, Ed. S.