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Administrator Perceptions of Their Preparedness to Lead Digital Learning Initiatives Through Observing, Modeling, and Providing Feedback for the Effective Utilization of Technology in a Digitally Rich Environment

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ADMINISTRATOR PERCEPTIONS OF THEIR PREPAREDNESS TO LEAD DIGITAL LEARNING INITIATIVES THROUGH OBSERVING, MODELING, AND PROVIDING FEEDBACK FOR THE EFFECTIVE UTILIZATION OF TECHNOLOGY IN A DIGITALLY RICH ENVIRONMENT

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This dissertation was submitted by Kristin L. Edwards under the direction of the persons listed below. It was submitted to the Gardner-Webb University School of Education and approved in partial fulfillment of the requirements for the degree of Doctor of Education at Gardner-Webb University.

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Abstract

ADMINISTRATOR PERCEPTIONS OF THEIR PREPAREDNESS TO LEAD DIGITAL LEARNING INITIATIVES THROUGH OBSERVING, MODELING, AND PROVIDING FEEDBACK FOR THE EFFECTIVE UTILIZATION OF TECHNOLOGY IN A DIGITALLY RICH ENVIRONMENT. Edwards, Kristin L., 2019: Dissertation, Gardner-Webb University.

With the rapid increase in device usage in classrooms, it is imperative that administrators know and understand pedagogical principles within digitally rich environments. This qualitative study sought to understand administrator preparedness for leading digital learning initiatives in the areas of observing, modeling, and offering constructive feedback in digitally rich environments. The Principals Technology Leadership Assessment (PTLA) and focus groups were used to conduct the research. A chi-square goodness of fit was used to compare the responses of the PTLA to the original PTLA study. Focus group results were analyzed for emerging themes. Gaps were identified as indicated by the ISTE-A standards for administrators in the following areas: (a) visionary leadership, (b) digital-age learning culture, (c) systemic improvement, and (d) digital citizenship. Focus groups results revealed three emerging themes: (a) administrators rely on the instructional technology facilitator (ITF) to model instructional strategies for improving technology-pedagogical practices, (b) administrators use a district provided walkthrough protocol for providing feedback, and (c) local professional development efforts have impacted administrator preparedness to provide feedback regarding technology integration. The researcher concluded that administrator preparedness to lead digital learning relates to positive interactions and support from the ITF and is positively

impacted by professional development. Recommendations for further research include updating the PTLA to include the North Carolina Digital Learning Competencies, review of a district provided walkthrough protocol for providing feedback to teachers, and studies to determine the effectiveness of the ITF related to the amount of time they serve in the school.

Keywords: content knowledge, digital native, digitally rich environment, feedback, instructional leadership, International Society for Technology in Education (ISTE), ISTE National Educational Technology Standards for Administrators (NETS-A), National Education Technology Plan (NETP), North Carolina Standards for School Executives, Principals Technology Leadership Assessment (PTLA), professional development, self-efficacy, teacher evaluation, technology integration, technology leadership

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Chapter 1: Introduction

In his 1996 State of the Union Address, President Bill Clinton addressed the area of technology in education by stating,

> Every classroom in America must be connected to the information superhighway, with computers, good software, and well-trained teachers. We are working with the telecommunications industry, educators and parents to connect 20% of the classrooms in California by this spring, and every classroom and library in America by the year 2000. I ask Congress to support our education technology initiative to make this national partnership successful. (para. 30)

In February of the same year, President Clinton and Vice President Al Gore introduced their Technology Literacy Challenge. In response to the President's desire to increase technology integration in public education, Richard W. Riley, U.S. Department of Education Secretary, unveiled a national, long range technology plan in his June 1996 letter to Congress. This long-range plan ensured all teachers had the training necessary to teach students using computers and the information superhighway currently known as the Internet. The plan ensured modern computers were available inside classrooms; every classroom was connected to the Internet; and last, current software and online resources were included in curriculum. The role of the federal, local, and community governments and the role of higher education were discussed in this long range technology plan ensuring technology was available to all students. Professional development for teachers was addressed as well in making certain they were adequately prepared for utilizing technology for instructional purposes (Clinton, 1996).

Continuing the national push for improvement in education, President George W.

Bush established the No Child Left Behind Act (NCLB) following his election in 2001 as president. Enhancing Education Through Technology (EETT) was part of NCLB which addressed what was known as 21st century learning in the classroom. The primary goal of EETT was to improve student academic achievement through the use of technology in elementary and secondary schools. Two additional goals of EETT were to ensure that all students, regardless of race or socioeconomic status, were technologically literate by the time they finished the eighth grade and to use research-based instructional methods for encouraging the effective integration of technology in the classroom through providing teachers with training in technology integration into curriculum development. EETT also addressed the area of building principal and administrator capacity for effective integration of technology into the curriculum (EETT, 2004).

While the nation addressed educational technology through reform, states have been adopting initiatives to ensure teachers within each district meet the federal standards. In 2000, North Carolina released *IMPACT*: Guidelines for North Carolina Media and Technology Programs. This program's focus was to impact teaching, learning, motivation, and student achievement through a focus on improving collaboration between the classroom teacher and the media and technology specialists (North Carolina Department of Public Instruction [NCDPI], 2005).

Fast forward to 2017, the United States government continued to emphasize the transformative impact technology has in the classroom through the National Education Technology Plan (NETP) which was first drafted in 2010 by the U.S. Department of Education's Office of Educational Technology. The current plan addresses five key areas of education: learning, teaching, leadership, assessment, and infrastructure. The 2017

draft expressed a strong emphasis on teacher preparation, stating,

> Effective use of technology is not an optional add-on or a skill that we simply can expect teachers to pick up once they get into the classroom. Teachers need to know how to use technology to realize each state's learning standards from day one." ("Reimagining," 2017, p. 35)

The current plan also indicates educational leaders, at both the school and district level, need to be a part of the education technology process through ensuring professional development opportunities are aligned with school and district goals and by learning alongside teachers and other staff members to ensure effective integration is sustainable. "Leaders who believe they can delegate the articulation of a vision for how technology can support their learning goals to a chief information officer or chief technology officer fundamentally misunderstand how technology can impact learning" ("Reimagining," 2017, p. 42). School and district leaders need to understand that technology does not transform learning; rather, learning can be transformative through the use of technology.

A Brief History of Technology in Education

From the day of one-room schoolhouses, different methods, resources, and innovative technologies have been used in educating students. Technology refers to the branch of knowledge that deals with the creation and use of technical means and their interrelation with life, society, and the environment, drawing upon such subjects as industrial arts, engineering, applied science, and pure science. According to Saettler (2006), educational technology encompasses the two significant historical concepts of physical sciences (focus on devices) and behavioral sciences (focus on learning and instruction). "The process of educational technology must not be guided solely by the

criterion of efficiency, but by our highest ideals of education as a means of dealing with the whole person" (Saettler, 2006, p. 7).

Dating back to the 1600s, different technologies have been adopted with the primary focus of improving instructional practices. The 1800s saw the invention of The Magic Lantern, a device which enables teachers to project images on glass plates to enhance instruction (Haran, 2015). The turn of the 20th century brought many technologies into the education setting: lead pencils, paper, and the ability to view three dimensional images made available by use of the stereoscope (Wilson, Orellana, & Meek, 2015). Educational film produced by Charles Urban made its debut in the early 1900s. Thomas Edison also contributed to the educational film collection of the early 1900s with his American Revolution films. In 1910, Rochester, New York's Board of Education adopted educational film for instructional use; and by 1931, 25 states had branches of their Board of Education devoted to film and media (Haran, 2015).

Radio broadcasting and the typewriter were introduced to classroom practices in the 1920s; the overhead projector which was enhanced over the years and used in American classrooms through the turn of the 21st century became available in the 1930s (Haran, 2015); and 1940 brought the mimeograph to American schools. This device made copies available with the turn of a crank. In 1950, the Language Lab Headset was brought into classrooms to teach students language through drill and repetition (Wilson et al., 2015).

Throughout the late 1950s and well into the 1970s, educational technologies began developing more rapidly: 1958 brought educational television, 1965 brought the personalized filmstrip viewer; and 1972 brought the Scantron which would industrialize

grading multiple choice assessments (Wilson et al., 2015). Another technology phenomenon introduced to education in the 1960s was the computer. This device would adapt and grow in popularity well into present day. In 1980, the Plato computer was introduced, and by 1984 there was an average of one computer to every 94 students in the United States. During the 1980s and 1990s, color monitors and content-based software packages were introduced to schools and classrooms across the country (Haran, 2015).

Since its debut to public education in the early 1990s, the Internet has brought the availability of countless digital resources into the classroom from Learning Management Systems to the mysterious Cloud (Haran, 2015). Statistics gathered in 2005 showed that in 1994, only 3% of American classrooms had Internet access; but 11 years later in 2005, 94% of American classrooms had Internet access (Lewis & Wells, 2006). The interactive whiteboard was introduced into classrooms in 1994 and is still being widely used today. In 2005, the iClicker, a device that allows teachers the ability to poll and quiz students and receive feedback in real time, was introduced. In 2006, the XO Laptop was brought into classrooms; and by 2010, technology had come full circle with the introduction of a school slate reimaged, Apple's iPad (Wilson et al., 2015).

Although the scope of this research is not to assess the rapid change in the availability of technology in the classroom over the past several decades, this rapid change does support the need for educators and administrators to stay abreast of current digital literacies as they relate to classroom practices. Technology in education has evolved throughout history, and the recent introduction of personal devices has made for improved efficiency for students and teachers; however, the effective utilization of technology to transform teaching and learning "must not be guided solely by the criterion

of efficiency, but by our highest ideals of education as a means of dealing with the whole person" (Saettler, 2006, p. 14) and "contribute to the overall self-fulfillment of the individual" (Saettler, 2006, p. 14).

The Role of the Administrator as Instructional Leader

Just as technology has evolved over time, so has the role of the school administrator. The North Carolina Standards for School Executives (NCSSE) discusses this evolving role from a school-based administrator to an executive. Formerly, schools were places to be managed. Now, they are complex organizations that must possess the potential to adapt, learn, and grow in an ever-changing environment (NCDPI, 2013). "[Principals] can no longer function simply as building managers, tasked with adhering to district rules, carrying out regulations and avoiding mistakes. They have to be (or become) leaders of learning who can develop a team delivering effective instruction" (Wallace Foundation, 2013, p. 6).

The NCSSE consists of eight standards that define the role of the school-based administrator. Each standard addresses a different leadership capacity an effective school leader should possess. Standard one addresses the strategic leadership of the administrator. Leading change and creating a school vision, mission, and goals are components of this standard (NCDPI, 2013). Studies have concluded the ability to effectively implement and carry out a vision is a critical component in leading digital learning initiatives (Bautista, 2014; Demski, 2012; Honeycutt, 2013).

The second standard as indicated in the NCSSE focuses on instructional leadership. According to this standard, the school-based administrator should set the standard for instruction and ensure that curriculum goals are being met. The instructional

leader should be savvy in analyzing student data, observing classroom practices, and providing effective feedback to teachers to improve instructional practices (NCDPI, 2013). An administrator's ability to provide timely and relevant feedback is essential to leading digital learning initiatives within schools (Gibson, 2015; Jenkins, 2009).

Cultural leadership focusing on collaboration, building teacher self-efficacy, and empowering teacher leaders is the third standard addressed in the NCSSE. Standard three also addresses building a sense of community through school identity and culture.

The fourth standard, human resource leadership, addressed in the NCSSE directly relates to standard three. Standard four addresses professional development and professional learning communities for teachers and principals alike. School administrators should pursue their continual growth in the profession as well as provide opportunities for professional growth for teachers (NCDPI, 2013). A study from the Wallace Foundation (2013) found that when administrators build a sense of community among teachers, student achievement is positively impacted. "Effective principals also encourage continual professional learning. They emphasize research-based strategies to improve teaching and learning and initiate discussions about instructional approaches, both in teams and with individual teachers" (Wallace Foundation, 2013, p. 11). Fullan (2014) echoed this in his book, as he called for principals to develop the professional capital of those they serve. Fullan stated, "The principal's role is to lead the school's teachers in a process of learning to improve their teaching" (p. 55).

The final four standards address the systems and structures that must be put into place and managed to effectively lead a school. Standard five in the NCSSE addresses managerial leadership in which the school-based administrator is responsible for

managing the budget, communicating with individuals inside and outside of the school, resolving conflict, and setting school expectations for staff and students. Standard six, external development leadership, addresses the area of community involvement with parents and outside partners. The school-based administrator's ability to sense concerns and manage conflict among staff is highlighted in standard seven, micro-political leadership. This standard also addresses the need for the administrator to be highly visible during the school day. Finally, standard eight addresses academic achievement leadership of the school administrator. Provided that the remaining standards are met to fidelity, the school as a whole will achieve academic growth, in which the school-based administrator is responsible (NCDPI, 2013).

Although the scope of this study is not to explore the school-based administrator's ability to meet the standards addressed in the NCSSE, his/her ability to create a vision, as indicated in standard one; improve instructional practices through their instructional leadership, as indicated in standard two; and build a culture that empowers teacher leaders, as indicated in standard three, is essential to leading digital learning initiatives at the school level. Principals who are instructional leaders have deeper involvement in teaching and learning with the primary focus being learning. They set clear goals, allocate resources to improve instruction, manage curriculum, monitor lesson plans, and evaluate teachers (Jenkins, 2009). Lunenburg (2010) echoed this by stating, "the instructional leadership of the principal is a critical factor in the success of a school's improvement initiatives and overall effectiveness of the school" (p. 5). According to Gibson (2015), instructional leaders are aware of the factors that impact teaching and learning and impact teacher and student performance.

Principals prioritize instructional quality, lead professional learning communities among teachers, and make adult learning a priority (Jenkins, 2009). Instructional leaders encourage collaboration among staff and strategically place teachers in teams, as opposed to working as silos in isolation. Within these teams, "regular assessment and analysis of student learning are key parts to the team's success" (Lunenburg, 2010, p. 2). Instructional leaders are resource providers and knowledgeable of effective instructional and assessment practices and stay current in their knowledge of issues related to curriculum. They are effective communicators and develop trust and establish a visible presence in classrooms and around the school (Jenkins, 2009).

"Instructional leaders need to work closely with students, developing teaching techniques and methods as a means for understanding teacher perspectives and for establishing a base on which to make curricular decisions" (Jenkins, 2009, p. 36). They have a unique skill set consisting of interpersonal skills, planning skills, observational skills, and research and evaluation skills. Teachers have an expectation in regard to the principal as an instructional leader. They expect corrective feedback, the ability to answer questions, and the capacity for modeling instructional practices when necessary (Gibson, 2015).

"Principals must develop and sustain school structures and cultures that foster individual and group learning" (Lunenburg, 2010, p. 2). Principals as instructional leaders focus on student learning through posing meaningful questions such as, "how will you know if the students are learning" or "what criteria will we use to evaluate student progress" (Lunenburg, 2010, p. 2)? They also use and encourage the use of student data to improve learning, provide support for teachers, and ensure they have all the resources

they need in order to guarantee student success (Lunenburg, 2010). The role of principal as instructional leader requires that principals ensure clear curriculum goals are established, ensure instruction is aligned to meet curriculum goals, and ensure assessments are aligned to the curriculum (Lunenburg, 2010).

Many states have adopted new principal evaluation rubrics that reflect instructional leadership standards; however, there are no clear day-to-day tasks or activities involved in being an instructional leader (Fink & Silverman, 2014). In an effort to support the shift of a principal into an instructional leader, the Bill and Melinda Gates foundation worked with 15 school districts across the United States to address three essential challenges principals face as instructional leaders. The challenges include creating "a shared vision of a principal as an instructional leader, a system of support for developing principals as instructional leaders and making it possible for principals to be instructional leaders" (Fink & Silverman, 2014, p. 24). Some districts have developed a system of support for administrators in order to improve their instructional leadership. This support is in the form of principal coaches and a principal support network. Other districts are requiring less district-level meetings in an effort to keep principals in their buildings, which allows more time to focus on the professional learning needs of their teachers (Fink & Silverman, 2014).

Studies show the actions of the principal are directly related to the actions of the teacher (DuFour & Marzano, 2011). A key factor in an administrator's ability to improve teaching and learning is through the dissemination of effective, impactful feedback to teachers. Feedback from administrators should be designed to grow teachers in their practice and be targeted, actionable, evidenced based, and part of a larger contextual

framework (Gibson, 2015); however, research conducted by Townsend (2013) indicated only a minimal number of administrators are prepared to give specific feedback for improving classroom instruction in the area of technology. "The school executive must be knowledgeable of best instructional and school practices and must use this knowledge to cause the creation of collaborative structures within the school for the design of highly engaging schoolwork for students" (NCDPI, 2013, p. 4). Research supports a fundamental piece of successful and effective technology integration is the capability of strong school-level leadership and the school-based administrator's expectation for students, which in turn drives student outcomes (Greaves, Hayes, Wilson, Gielniak, & Peterson, 2012); however, "when it comes to technology leadership, principals fail to take critical action that will lead to effective technology integration" (Depew, 2015, p. 102).

Although the scope of this research is not to determine the instructional leadership capacity of the school-based administrator, the administrator's instructional leadership does impact the teacher's effectiveness in integrating technology and supporting initiatives in a device-rich environment. In the role of instructional leader, administrators should offer direct support to teachers to aid in improving their classroom practices (Marzano & Toth, 2013).

National Technology Standards for Administrators – ISTE-A

The International Society for Technology in Education (ISTE) is an educational movement rather than an organization. From its roots in Oregon, a group of K-12 educators began questioning what school would be like if the computers of the 1980s were utilized at their max capacity to engage students in personalized learning, freeing up

the teacher to lead collaboration between students. The members of the ISTE community have continued that conversation over the years and developed the ISTE standards as a guide for students, educators, and administrators (ISTE, 2009). Student standards include being an empowered learner, a digital citizen, a constructor of knowledge, an innovative designer, a computational thinker, a creative communicator, and a global collaborator (ISTE, 2017c).

Educator standards include being a learner of new pedagogical practices, a leader of student empowerment, a digital citizen who models the use of technology in a digitally social society, a collaborator seeking input from both students and educators, and a designer of authentic student-centered lessons. The standards for educators are designed to help teachers achieve professional growth and design classroom instruction in a way that supports and empowers their students to master the ISTE student standards (ISTE, 2017b).

Similar to the ISTE standards for students and educators, the ISTE standards for administrators (ISTE-A) are designed to grow administrators in educational leadership practices supporting educator professional growth and student success in a digital age. ISTE-A standards consist of five strands including visionary leadership, digital age learning culture, excellence in professional practice, systemic improvement, and digital citizenship (ISTE, 2009). As a visionary leader, the administrator will collaborate with others to create a vision for technology integration in their building but also across their district through the communication of "technology-infused strategic plans aligned with a shared vision" (ISTE, 2009, p. 1). In an effort to support a culture centered around digital teaching and learning, the administrator will engage in modeling effective use of digital

resources across multiple curriculums. An ISTE-A administrator will stay informed of current best practices, lead systemic improvement, and promote and model digital citizenship in a global society (ISTE, 2009).

In a dissertation study, Brunson (2015) evaluated administrator leadership styles with the dispositions demonstrated in the ISTE-A standards. One hundred thirty-two elementary school principals in a large urban public school system were issued the Principals Technology Leadership Assessment (PTLA). This study found that transformational leaders were more likely to be developed in the ISTE-A standards and have the competency to evaluate and provide effective feedback regarding the integration of technology in a digitally rich environment (Brunson, 2015).

While the scope of this study is not to determine an administrator's perception of their leadership skills in relation to the ISTE-A standards, an administrator's knowledge of the ISTE-A standards supports their ability to provide teachers with feedback in effective technology integration.

North Carolina Digital Learning Competencies for School Administrators

In 2013, House Bill 23 was passed by the North Carolina General Assembly. This bill required the State Board of Education to develop a set of standards reflecting effective digital teaching and learning. The standards, or competencies, "provide a framework for schools of education, school administrators, and classroom teachers on the needed skills to provide high-quality, integrated digital teaching and learning" (NCDPI, 2017a, para. 1). In July 2016, the State Board of Education voted to approve the North Carolina Digital Learning Competencies. Among them were the North Carolina Digital Learning Competencies for Administrators (NCDPI, 2017a).

The North Carolina Digital Learning Competencies for Administrators are intended to parallel the NCSSE. "Throughout all of the competencies is the underlying assumption of leadership and excellence with regard to digital citizenship" (NCDPI, 2017b, p. 1). The five competencies include vision and strategy, content and instruction, human capacity and culture, personal growth and connectedness, and community. Each of the competencies also has a place in a school's strategic plan. According to the North Carolina Digital Learning Competencies for Administrators, the vision and strategy of the administrator should describe and convey his/her goals for digital teaching and learning, how the goals will be funded and sustained, and how the vision will advance school improvement in regard to personalized digital learning (NCDPI, 2017b, p. 1).

In regard to content and instruction, the North Carolina Digital Learning Competencies for Administrators requires the administrator to be the "lead learner," model effective instructional practices in regard to technology integration, assume the role of fostering digital citizenship, "promote digital competencies for teachers" (NCDPI, 2017b, p. 1), allow for teacher professional development in the area of digital literacies, and "establish and use systems for the acquisition, vetting, creation, and implementation of digital content as well as evaluation systems for effectiveness" (NCDPI, 2017b, p. 1).

The North Carolina Digital Learning Competencies for Administrators encourages building human capacity and developing a culture of ongoing professional growth and reflection among all stakeholders. The administrator will provide opportunities and resources to support and encourage digital teaching and learning. They will build educator capacity in the area of digital teaching and learning; and they will

support, model, and coach teachers through providing “learner-centered environments” (NCDPI, 2017b, p. 2).

In following the North Carolina Digital Learning Competencies for Administrators, school leaders will seek opportunities to connect with other administrators and educators for their own professional growth. They will reflect upon, model, share, and evaluate technology integration in a digitally rich environment; and finally, administrators following the competencies will establish a relationship that engages all stakeholders including those from the surrounding community. They will establish effective partnerships, utilize online communication, and sustain open conversations with the community that will enable students and other stakeholders to meet learning goals (NCDPI, 2017b).

Problem

With the paradigm shift in education to digital integration, there is a gap between an administrator’s understanding of content knowledge and technology integration into classroom practices (Depew, 2015). ISTE has developed a national set of standards for administrators in an effort to give support and guidance in leading their schools toward purposeful technology integration. The ISTE framework sets the standard for “rethinking education and creating innovative learning environments. The standards act as a roadmap for bold, innovative digital-aged learning” (ISTE, 2019, para. 1). In response, states have adopted standards to align with national goals. There is also a gap between the expectation and level of preparedness to support administrators in the area of leading and modeling effective technology integration (Morehead, Schuler, & Yokley, 2015). Research shows that administrators have strong content and pedagogical knowledge but a

limited amount of knowledge about technology integration in relation to the two (Depew, 2015).

A qualitative study conducted in Alabama assessed administrator perceptions of technology leadership. The administrators consistently referred to technology leadership in terms of modeling, mentoring, leading by example, and providing guidance; however, the administrators indicated a lack of preparation in leadership programs to adequately equip them to perform such tasks (Lewis, 2010). Studies in the states of Georgia (Metcalf & La-France, 2013), Missouri (Morehead et al., 2015), and Utah (Esplin, 2017) confirmed a lack of administrator preparation for leadership in technology integration as well. When observed by researchers, it was noted that administrators exhibited differences in their skill levels for modeling and evaluating technology integration in the classroom; and when interviewed, this same group of administrators expressed a concern for their lack of knowledge for effectively modeling technology integration (Morehead et al., 2015). Research indicates administrators are not equipped to be leaders of technology within their school through organizing the use of digital resources into content. The research also suggests administrators lack the knowledge to engage in the use of technology in their own learning (Depew, 2015).

Action research conducted by Bobbera (2013) supported the need to build the administrator's capacity and self-efficacy for leading a school towards digitally rich pedagogical practices. "As digital technologies become thoroughly integrated within today's schools and classrooms, the leadership paradigm of the school principal must adapt to a new and more complex role of the technology leader" (Bobbera, 2013, p. 140). Bautista's (2014) study echoed this, stating, "leadership support was the strongest

factor in the construct referred to as school site support for technology integration" (p. 84).

The perception of administrators as leaders in technology is at a minimal level (Esplin, 2017); however, there is a direct relationship between higher uses of technology integration among teachers when administrators are well prepared to support technology through leadership, school vision, and willingness to demonstrate the use of technology (Bautista, 2014). Principals and other building-level administrators must have a knowledge of the relationship between content and pedagogical practices in order to assume the role of the instructional leader that new standards call them to be; however, current research shows there is a gap between the administrator's understanding of technology integration and content knowledge (Depew, 2015; Esplin 2017).

Focus on technology adoption through training and professional development has placed limited emphasis on the development of an administrator in a device-rich environment, leaving administrators requesting training in this area (Esplin, 2017; Kara-Soteriou, 2009). A qualitative research study by Backor and Gordon (2015) found invested stakeholders consisting of university faculty, expert principals, and expert teachers believed principal preparation programs should focus heavily in the area of instructional leadership through preparing administrators in understanding curriculum development, evaluating teachers, and providing essential professional development for teachers that is consistent over a period of time. Participants in the study also discussed a need for development in an administrator's knowledge of effective instruction with a specific mention in regard to knowledge of instructional technology (Backor & Gordon, 2015; Esplin, 2017). School-level administrators value technology as an asset to

classroom instruction but recognize their deficits in understanding how to effectively utilize digital resources to support curriculum (Kara-Soteriou, 2009).

In an investigation of Technological Pedagogical Content Knowledge (TPACK) and Technology Leadership Capacities of K-12 Public School Principals, Depew (2015) found there was a significant need for administrative preparatory programs to address technology integration from the administrative perspective. Similarly, in a dissertation study conducted by Presby (2017), administrators identified their lack of training and professional development in the area of information and communication technology to be a barrier to the integration of technology in the classroom.

Education Market Research from 2014 indicated more than 13 million mobile devices have been deployed in schools across the United States (Simba Information, 2015). With the growing number of devices in K-12 classrooms and the limited knowledge school administrators possess concerning pedagogical practices involving technology integration to support curriculum, there can be an unclear vision in what they expect to see from teachers (Bautista, 2014). Digital resources have been integrated into the classroom at such a rapid pace, evaluation instruments can hardly keep up. The Levels of Technology Integration (LoTi) model offers depth to the evaluation process, but an administrator's preparedness for using this model is extremely limited (Farsaii, 2014).

Problem Statement

Administrators play a pivotal role in leading digital learning initiatives within their schools; however, research indicates they are not adequately prepared to offer constructive feedback, model digital integration, or lead digital learning initiatives in

their schools or districts. With the call for administrators to be instructional leaders among digital natives, there is a need to offer professional development for administrators in the area of technology to support best practices for curriculum and instruction (Kara-Soteriou, 2009).

Purpose

Research from the North Carolina Digital Learning Plan (NCDLP) initiative found school and district leadership faced challenges when leading a digital learning initiative. School and district leaders indicated, "they are looking to better understand models of effective digital teaching and learning, how to evaluate teachers' use of digital learning, and how to make informed decisions about technology infrastructure and devices" (NCDPI, 2015b, p. 31). The NCDLP also found, "principals play critical roles in leading digital learning transitions, supporting the teachers and other staff through the transition, and engaging the support of the school community" (NCDPI, 2015b, p. 33). This study also indicated administrators were seeking opportunities for professional growth in the area of digital learning and technology integration. Demski (2012) echoed the fact that administrators are seeking out opportunities for learning. Demski found administrators who were connected learners lead their schools through modeling the practice of digital learning and were "highly effective" in leading in digitally rich environments (p. 50). "The leadership in a school largely determines the outcome of technology integration; however, administrators cannot fully or effectively support technology if they do not understand it" (Dawson & Rakes, 2003, p. 33).

Mixed methods research conducted in Texas by Weber (2006) found that more than 40% of the study participants received no technology integration training in their

principal preparation courses, while 90% of the study participants indicated receiving local training in this area. Weber correlated the relationship between principal perceptions of technology leadership with their level of training related to technology integration. The results of Weber's study indicated that principals with more training in the area of technology integration are far more inclined to use technology leadership practices. "The need for continued training on providing technology integration leadership to principals would be considered a benefit to the enhancement of technology integration implementation in our schools" (Weber, 2006, p. 146). A dissertation study conducted by Bobbera (2013) echoed this, stating, "It can be concluded that a professional development program specifically targeting principals' technology leadership is critical to the effective implementation of instructional technologies into today's classroom" (p. 114). Action research conducted with K-12 administrators confirmed that professional development opportunities provided for administrators in the area of technology integration positively impact student engagement and technology integration in classrooms within their schools (Bobbera, 2013).

A study in Missouri conducted by Morehead et al. (2015) on administrator perceptions of preparation for technology integration in the classroom indicated that administrators did not perceive themselves to be prepared to lead and understand technology integration after receiving their certification in teaching or administration. This same group expressed a lack of knowledge to evaluate effective technology integration into classroom content and a lack of knowledge regarding federal, state, and local laws concerning technology in education upon completion of their administrative coursework; however, this same group of administrators rated themselves significantly

higher on their current perceptions regarding their ability to lead and understand technology integration and federal, state, and local laws. The administrators indicated they sought opportunities for growth in the area of educational technology on their own, they attended locally offered professional development in the area of technology integration, or they received training through a professional organization (Morehead et al., 2015). The professional development these administrators received impacted their understanding of digital integration in a positive way.

Based on the findings of this study the following recommendation was made: "School districts need to consider technology leadership and technology management as high a priority for principal professional development as other professional learning" (Morehead et al., 2015, p. 148). A quantitative and qualitative study conducted by Farsaii (2014) concluded that professional development for administrators in the area of observing technology use to promote higher order thinking and engaged learning is essential in developing the capacity of the administrator for observing classrooms with technology integration. "Investment in the competence and confidence of school administrators in the area of technology integration will improve their ability to be the technology leaders in their schoolhouse, and will help them lead students and teachers through the changing technological landscape" (Martin, 2016, p. 87).

Studies regarding the role of the administrator in the effective integration of technology have been conducted for years. Dawson and Rakes (2003) found that "schools led by principals who received training that focused on curriculum-specific technology and those who received training that was specific to their individual needs had higher levels of technology integration than other schools" (p. 45). A dissertation

study conducted by Gregory (2015) confirmed that professional development in the area of technology for administrators leads to greater self-efficacy which in turn lays the foundation for strong technology leadership and vision. "Meaningful change begins with professional development that develops principal's technology skills, builds on their understanding of current technology tools, and connects technology to pedagogy" (Gregory, 2015, p. 96).

A Florida study of elementary, middle, and high school principals confirmed the need for professional development regarding integrating technology into the curriculum at all levels. Administrators are called to be instructional leaders and should therefore take action to ensure that teachers are successful in integrating technology into pedagogical practices. The researchers made this statement in regard to technology integration: "Districts should ensure that principals have the knowledge and skills to visualize and facilitate its effective implementation into schools" (Brockmeier, Sermon, & Hope, 2005, p. 54). Bautista's (2014) study confirmed that when a principal's skill level for technology is increased, there is an increase in the leadership support and less teacher resistance to technology integration.

A dissertation study by Perkins-Jacobs (2015) indicated that when principals have received significant professional development in the area of technology integration and are confident in their knowledge of technology integration in a digitally rich environment, they can effectively support teachers in classroom delivery of content. A similar study by Martin (2016) suggested that administrators are more likely to have a positive attitude toward technology integration if they have received training in the area as it relates to modeling for instruction. Principals must be literate in evaluating lessons

and teacher delivery of content in a digitally rich classroom. The 10 administrators in this study expressed the need for administrators to stay "ahead of technology" (Perkins-Jacobs, 2015, p. 72), because they believe it is the responsibility of the administrator to "set the tone" (Perkins-Jacobs, 2015, p. 77) for technology integration through modeling its use.

> As the leader of the building, the principal can foster a culture of technology use among teachers and students that supports aggressive use of technology within and between school, community, and home by way of presentations, evaluations of programs, and teaching. (Perkins-Jacobs, 2015, p. 89)

A study conducted by Metcalf (2012) discussed the perception of 102 administrators in regard to their technology leadership preparation. The study was based on the NETS-A standards for administrators in relation to five key areas: (a) visionary leadership, (b) digital-age culture, (c) excellence in professional practice, (d) systemic improvement, and (e) digital citizenship. Results of the study found that the administrators who had participated in a supplemental leadership preparedness program considered themselves to be significantly more prepared to lead technology initiatives in their respective school, thus supporting the need for professional development for administrators in the area of technology integration (Metcalf, 2012). Hayashi and Fisher-Adams (2015) confirmed that supplementary professional development for educational leaders is needed in the area of leadership for the digital age. Their research "identified a need for additional preparation that specifically addresses the role of the principal as technology leader" (Hayashi & Fisher Adams, 2015, p. 64).

Purpose Statement

The purpose of this study was to identify gaps in administrative preparedness for evaluating the use of digital content in the classroom, specifically in the areas of offering constructive feedback, modeling instruction in a digitally rich environment, and building the administrators' capacities to lead digital learning initiatives at the school level. It is the responsibility of the school-based administrator to lead in setting the vision for teaching and learning in a device-rich environment. "Any educator will tell you the most successful implementation of technology programs takes place in schools where the principal sees him or herself as a technology leader" (Demski, 2012, p. 49).

Research Questions

The following research questions were used in order to determine the gaps and principal perceptions of preparedness as related to the five strands of the ISTE-A standards.

1. What gaps exist in an administrator's preparedness for leading digital learning initiatives, in each of the five strands of the ISTE-A standards, at the school level as indicated by the PTLA?
2. What are principal perceptions of their preparedness to evaluate teachers, provide constructive feedback, and model effective instruction in a digitally rich environment?
3. What relationship exists between an administrator's ability to provide feedback to teachers regarding digital learning integration and the administrator's participation in professional development on technology integration?

Significance of the Study

The amount of technology and digital resources available to teachers has increased dramatically over the past several years. Classroom instruction and pedagogical practices have been much slower to adapt. Administrators play a pivotal role in leading technology integration within their schools, as they are the primary source of leadership in schools (Wallace Foundation, 2013); however, research indicates they are not adequately prepared to offer constructive feedback, model digital integration, or lead digital learning initiatives in their schools or districts (Metcalf & LaFrance, 2013).

Research confirms that administrators who are offered professional development opportunities in the area of technology integration perceive themselves to be better prepared to lead digital learning initiatives (Weber, 2006), maintain a positive outlook concerning technology integration (Martin, 2016), and are better prepared to observe and model classroom teaching practices in a digitally rich environment (Farsaii, 2014). If administrators receive professional development to improve their ability to lead technology initiatives in digitally rich environments, conversations between administrators and teachers can begin to improve classroom practices.

Context

The study took place in a midsize school district located in the foothills of North Carolina. There are 27 total schools in the district: 15 elementary schools serving prekindergarten through fifth-grade students, five middle schools serving sixth- through eighth-grade students, four high schools serving ninth- through 12th-grade students, one alternative school, one cooperative innovative high school, and one school for exceptional children. There are currently 12,107 students, of which 63.83% come from

low-income households.

As shown in Table 1, the majority, 52%, of administrators serving this district have 3 years or less administrative experience; 37% of administrators have between 4-10 years of experience; and 11% of administrators have more than 10 years of experience. The demographics of the administrative population consist of 59% female, 41% male, 4% Black, and 96% White. Twenty-two percent of the administrators serving the district have advanced degrees, or degrees above the master's level.

Table 1

Administrator Demographics

	Administrator Demographics						Years of Experience		
	Female	Male	Black	White	Other	Advance Degree	0-3	4-10	10+
LEA	59%	41%	4%	96%	0%	22%	52%	37%	11%
State	60%	40%	24%	74%	3%	22%	43%	43%	14%

Delimitations

The researcher was considered a peer to the members of the focus group; therefore, the researcher sought the assistance of the director of digital teaching and learning to conduct the focus group sessions. Although participation was optional and the individual results remained anonymous, it is possible that the researcher's association with the researched district limited the study. The researcher did not participate in the survey or the focus groups.

A delimitation to the study was the research was limited to 15 elementary and five middle school principals and assistant principals in a rural school district located in the western foothills of North Carolina.

Definition of Terms

Content knowledge. Facts, information, or processes taught within a specific subject area or academic course.

Digital native. Someone born in the time period where digital technologies were prevalent and therefore they are familiar with them from an early age.

Digitally rich environment. A classroom or school that has ubiquitous access to digital devices used for the purpose of integrating content through digital resources into classroom instruction.

Feedback. In education, the observed data or suggestions for improvement given after a form of observation to improve a practice.

IMPACT: Guidelines for North Carolina Media and Technology Programs. A set of guidelines, released in 2000, for school library media coordinators and technology facilitators in North Carolina.

Instructional leadership. Being knowledgeable of best instructional and school practices. An instructional leader must use this knowledge to cause the creation of collaborative structures within the school for the design of highly engaging schoolwork for students, the ongoing peer review of this work, and the sharing of this work throughout the professional community (NCDPI, 2013).

ISTE. An association for educators and education leaders dedicated to the advancement of instruction and learning through the effective use of technology within the PK-12 and high education setting (ISTE, 2017a).

ISTE National Educational Technology Standards for Administrators (NETS-A). Technology standard for school administrators used to evaluate the skill and

knowledge necessary to facilitate digital age learning, technology implementation, and transformative practices within the educational landscape (ISTE, 2009).

NETP. A national vision and plan for learning enabled by technology through building on the work of leading education researchers; district, school, and higher education leaders; classroom teachers; developers; entrepreneurs; and nonprofit organizations ("Transforming," 2010).

NCSSE. A set of guidelines developed as a guide for principals and assistant principals as they continually reflect upon and improve their effectiveness as leaders throughout all of the stages of their careers (NCDPI, 2013).

PTLA. A survey, based on the ISTE-A standards, intended to assess a principal's technology leadership capacity over a period of time (Castle, 2009).

Professional development. Ongoing opportunities for specialized training aimed at building the capacity and professional knowledge of administrators, teachers, or other educators.

Self-efficacy. A person's belief in their ability to succeed or accomplish a desired outcome. This concept was originally studied by Albert Bandura.

Teacher evaluation. Annual assessment of a teacher's performance based on standards, captured on the completed Summary Rating Form (NCDPI, 2015a).

Technology integration. The intentional design and delivery of appropriately selected technology in instructional practices (Adams, 2015).

Technology leadership. Creating, engaging, facilitating, and exhibiting a passion for the school community in a shared vision for instructional technology practices and expectations (Adams, 2015).

Chapter 2: Review of the Literature

Overview

Administrators play a pivotal role in leading digital learning initiatives within their schools; however, research indicates they are not adequately prepared to offer constructive feedback, model digital integration, or lead digital learning initiatives in their schools or districts. With the call for administrators to be instructional leaders among digital natives, there is a need to offer professional development for administrators in the area of technology to support best practices for curriculum and instruction (Kara-Soteriou, 2009).

The following literature review provides information on effective leadership practices demonstrated by administrators. The review also explores current research supporting the role of the administrator in technology integration and research supporting the need for professional development for administrators. The professional development review has been researched in two separate categories: professional development in relation to understanding technology standards for administrators and professional development to improve administrator efficacy in leading digital learning initiatives. This literature review is essential to understanding the scope of the administrator's role in observing, modeling, and providing feedback in a digitally rich learning environment.

Characteristics of Effective Administrators

Effective school-based administrators play a pivotal role in sustaining digital learning initiatives within their schools (Curcio, 2016; Fisher, 2013); however, to gain greater understanding, it is important to determine the characteristics that define an effective administrator. Research from Mendels (2012) and Spiro (2013) supported five

key attributes of administrators who lead schools effectively. The first among those characteristics is not only the ability to shape a vision but also gain buy-in for the vision from all stakeholders (Mendels 2012). "Effective principals are responsible for establishing a schoolwide vision of commitment to high standards and the success of all students" (Wallace Foundation, 2013, p. 7).

The second characteristic of an effective administrator is having the skill to create a positive climate in which teachers collaborate and feel a sense of community (Mendels, 2012) and to nurture the climate so it can "shape the culture in which the vision can be achieved" (Spiro, 2013, p. 29). The positive climate established by an effective administrator encourages all stakeholders including students, teachers, and parents to have a voice and engages the community to support the efforts of the school (Wallace Foundation, 2013).

A third characteristic of an effective administrator is possessing the ability to cultivate leadership in others. Successful administrators cultivate leadership through capitalizing on the strengths of other stakeholders. "A good principal participates in the life of the school, more often than not shaping its course from inside the classroom and outside the office" (Spiro, 2013, p. 28). An effective administrator supports the development of leadership qualities in others. Teachers are included in conversations around curriculum alignment, the delivery of instruction, and conducting assessments (Wallace Foundation, 2013).

The fourth quality effective administrators possess is a focus on improving instructional practices within their schools. In order to improve instruction, the effective administrator focuses on the quality of lessons, implements research-based strategies,

understands the professional development needs of their teachers, and spends time observing and providing feedback for growth. Finally, an effective administrator can manage people and make the best use of data. They also have the ability to hire well. "Good principals are good administrators. But most important, they are instructional leaders, providing staff with guidance and a sense of mission and students with motivation to succeed" (Spiro, 2013, p. 28).

A research brief conducted by Krasnoff (2015) through the Northwest Comprehensive Center at Education Northwest confirmed the five effective leadership qualities found in school leaders. Like the research conducted by Mendels (2012) and Spiro (2013), Krasnoff found that principals must maintain the ability to lead others in creating a shared vision rooted in academic success and high expectations. School leaders must adhere to establishing a positive, trusting school climate that encourages a great amount of collaboration among staff as well as students, and they should have the distributive leadership quality that develops the leadership capacity of others. An effective school principal must also be an instructional leader within their school. They must be able to lead curriculum-based conversations that lead to improved instructional practices. Finally, Krasnoff's research revealed a principal's managerial leadership of people and student data as being the fifth quality of an effective school leader.

A dissertation study conducted by Honeycutt (2013) sought to examine leadership practices and their effect on sustaining technology innovation. This study echoed the research of Krasnoff (2015), Mendels (2012), and Spiro (2013) on effective leadership practices in the area of creating a vision and cultivating leadership. Honeycutt's study focused on four high schools across North Carolina and found creating a unified vision

and empowering leadership among teachers to be the two driving factors for sustaining digital learning initiatives. Honeycutt's study found that effective leaders empower teacher leaders within the school setting and have a strong vision for technology integration. The school administrators in the study successfully "created a vision that stressed the importance of improving and redesigning instruction" (Honeycutt, 2013, p. 84).

Although the scope of this research was not to examine the qualities of an effective administrator, understanding the capacity and characteristics of an administrator's efficacy in leading a school is critical in the reader's understanding of the role of the administrator in leading digital learning initiatives through providing quality feedback and modeling instruction with technology integration.

Administrator's Role in Effective Technology Integration in the Classroom

The responsibilities of a school-based administrator are great and not to be taken lightly. With the paradigm shift to digital learning, one of the responsibilities of the principal is encouraging digital literacy through promoting effective technology integration in the classroom. Strong administrator technology leadership positively relates to teacher ability to effectively integrate technology into the curriculum and classroom (Fisher, 2013).

In a quantitative study conducted by Fisher (2013), data from 328 principals and 303,950 teachers were reviewed. The study sought to analyze technology leadership proficiency among Texas K-12 principals, the difference between principal and teacher perceptions of teacher ability to integrate technology into classroom practices, and their perceptions of access to teacher technology-related professional development. Fisher's

study also analyzed the relationship between principal technology leadership proficiencies, teacher ability to integrate technology, and the correlation in relationship between principal technology leadership proficiency and teacher access to technology-related professional development opportunities (Fisher, 2013).

Administrators in this survey perceived themselves to be proficient in the areas of social, legal, and ethical issues related to technology and moderately proficient in their ability to apply technology in their professional practice. Principals rated themselves lowest in their ability to ensure effective integration of technology into curriculum design and instructional practices (Fisher, 2013).

When considering classroom integration of technology, teachers in Fisher's (2013) study perceived themselves lower than the administrators perceived them to be. On average, teachers rated themselves at 15.6 of 24 points, while administrators rated teachers at an integration level of 17.4 of 24 points. "Principals who possess the skills to recognize and evaluate the effective integration of technology on their campuses are better equipped to lead their teaching staff" (Fisher, 2013, p. 81). In this same study, principals perceived that professional development was offered in the area of technology integration more than teachers perceived they had access to such professional development (Fisher, 2013). This indicates a misconception of technology use and adequate professional development when administrators do not have a background in a digitally rich environment and confidence in their understanding of effective technology integration into curriculum and classroom practices (Fisher, 2013).

According to Fisher (2013), "principals with a strong vision for use and integration of technology have the greatest potential for promoting and increasing the

effective use of digital literacies within the classroom" (p. 84). The relationship between principal technology leadership and teacher ability to effectively integrate technology is positively supported in Fisher's study, indicating administrative knowledge and support for technology impacts teaching practices. "The savvy administrator who is well versed in strategies for technology integration will be able to evaluate new instructional methods and lead their teaching staff to employ the best instructional practices and technologies relevant to instructional objectives" (Fisher, 2013, p. 87).

A similar qualitative study conducted by Curcio (2016) explored the administrator's leadership role in the effective integration of technology in the classroom. Thirteen K-12 building-level administrators in northern New Jersey were surveyed via face-to-face interviews. The study analyzed the role of the school administrator in the following areas of integrating technology: "providing professional development to blend technology into the curriculum, providing technical maintenance for acquired technology, and providing a vision in support of technology to support curriculum" (Curcio, 2016, p. 45).

Several emerging themes transpired from Curcio's (2016) study in which the "interviewed subject considered him/herself to be a technology leader within his/her school" (p. 61). Each administrator indicated his/her efforts to demonstrate technology use encouraged teachers to integrate technology more seamlessly into classroom instruction; and as technology leaders, the administrators indicated their use of technology allowed for more effective forms of communication with all involved stakeholders. When the administrators from the study modeled the effective use of technology, a certain level of trust was built between staff members and administrators.

Leading by example and trust are indicated as leading factors in driving curriculum initiatives (Curcio, 2016).

Curcio's (2016) study found the administrator's self-efficacy to establish a vision for the use of technology integration in a digitally rich environment was crucial to their role as technology integration leader. Participants indicated a successful vision included an understanding of district initiatives, planning for sustainability, and input from teachers in order to support the curriculum. "Principals who provide a vision and leadership for technology integration by communicating and demonstrating the expectations of its use tend to inspire and empower staff members to use said technology in their classrooms" (Curcio, 2016, p. 64).

Grady's (2011) article from the Technology and Learning section of *Seen* magazine supports Curcio's (2016) study of the principal as the technology leader in the school. A principal's role as technology leader is to establish a vision, model and support the effective utilization of technology, engage themselves in student-focused professional development that focuses on technology integration, and provide the same professional development opportunities for the teachers in their school. Principal leaders in effective instructional technology practices work alongside their teachers to establish attainable goals for facilitating student learning in a device-rich environment, and they remove any potential barriers that may arise. Principal technology leaders also spotlight teacher-leaders who demonstrate effective technology usage (Grady, 2011). In an analysis of state policies and professional development regarding technology standards for administrators, Shirley and Lenk (2015) echoed the studies conducted by Fisher (2013) and Curcio (2016):

> To lead change focused on instructional technology, principals must be able to use technology and provide ongoing professional development for teachers who are implementing technology in the classroom. This includes the skills and knowledge needed to provide feedback and professional development focused on instructional technology integration. (p. 94)

Professional Development for Administrators: Understanding Technology Standards

A mixed methods dissertation study completed by Rivard (2010) examined the scope to which elementary school principals act as an instructional technology leader as indicated by the NETS-A standards. This study surveyed 280 public school principals and assistant principals including public charter school principals in Michigan. The majority of survey participants indicated their school was in a suburban location. Of the 280 public school principals, 10 were identified as leaders in technology integration and were selected for an in-depth interview process (Rivard, 2010).

Rivard's (2010) survey samples related to the NETS-A standards developed by ISTE. Respondents in the survey indicated NETS-A Standard-I relating to leadership and vision fell between the range of important to very important, and respondents indicated an interest in participating in professional development related to this NETS-A standard (Rivard, 2010). When conducting interviews, Rivard sought to identify the "level of importance that leadership and vision played in district-wide planning, developing a technology-rich school, and supporting a school-based technology committee" (p. 49). Each of the 10 interview participants indicated the role of the administrator was critical to the facilitation of technology use (Rivard, 2010).

Survey participants indicated "NETS-A Standard-II Learning and Teaching

related to promoting technology integration, providing technology to design, assess and modify student instruction, and participation in professional development with staff for technology integration as being very important" (Rivard, 2010, p. 54). They also indicated an interest in professional development in this area (Rivard, 2010). Shirley and Lenk (2015) concurred, saying, "aspiring educational leaders need training in how to lead a school in the area of instructional technology as well as ongoing professional development focused on leading a school through the stages of transformation focused on technology" (p. 97).

When interviewing participants concerning Standard II of NETS-A on teaching and learning, the common theme of shared vision and student engagement emerged. Participants indicated support for administrators and teachers as being necessary to effectively integrate technology for improving teaching and learning to increase student engagement. A second theme emerged regarding NETS-A Standard II in the area of utilizing technology to provide evidence for data-driven decision-making and data-driven instruction. The interviewed administrators indicated the need for continued meaningful professional development for administrators and teachers in the area of technology integration to support teaching and learning (Rivard, 2010). Shirley and Lenk's (2015) study supported the need for professional development for administrators in regard to teaching and learning: "Building leaders must have a working knowledge of how technology is used to facilitate learning in the twenty-first century" (p. 4).

NETS-A Standard III discusses productivity and professional practice surrounding the school-based administrator. Surveyed participants indicated this standard as being very important to the role of the administrator; however, the majority of

the surveyed participants indicated no need for professional development in this area (Rivard, 2010). Interviewed participants indicated similar results concerning NETS-A Standard III. They stated there was less of a need for professional development in this area due to their daily experiences using technology for managerial tasks (Rivard, 2010).

When surveyed, administrators viewed the area of NETS-A Standard IV Support, Management, and Operations as being important. Surveyed administrators were also interested in professional development in this area regarding sharing ideas and resources; however, fewer administrators were interested in professional development regarding allocation of discretionary funds. When interviewed, "participants discussed the use of district support or an online management system for tracking service requests" (Rivard, 2010, p. 66). Principals also discussed referring to a "tech-savvy" (Rivard, 2010, p. 66) staff member for troubleshooting and support before calling district support personnel. Funding for providing support personnel is limited. All interviewed administrators expressed an interest in "seeking additional support, resources, and funding for implementing technology endeavors" (Rivard, 2010, p. 67).

Rivard's (2010) study approached NETS-A Standard V Assessment and Evaluation in three areas. When surveyed,

> administrators believed promoting and modeling technology use was the most important, guiding teacher professional development towards individual growth was the second most important, and including effective technology use as a criterion in assessing performance of instructional staff was the least important. (Rivard, 2010, p. 68)

The majority of the administrators surveyed indicated an interest in professional

development opportunities in each of the three standards associated with NETS-A Standard V as indicated by Rivard's (2010) sample survey questions.

When interviewed regarding NETS-A Standard V, principals indicated they occasionally facilitated professional development and modeled the use of technology to analyze student data. Sixty percent of the interviewed administrators "indicated technology was not included on annual teacher evaluations"; however, 100% of the interviewees indicated that it should be. Eighty percent of the interviewed administrators "expressed the expectation for seeing technology integration within classrooms during informal classroom walkthroughs"(Rivard, 2010, p. 70), and each interviewed administrator expressed the "important role technology played in their school improvement plan" (Rivard, 2010, p. 70).

When surveyed concerning NETS-A Standard VI Social, Legal, and Ethical issues, administrators indicate the concepts within Standard VI to be very important; and the majority of the administrators surveyed expressed an interest in professional development in these areas (Rivard, 2010). Interviewed participants discussed district-wide acceptable use policies for students and staff, internet filter systems provided at the district level, and the importance of teaching students and teachers about copyright laws. Interviewed participants also indicated the usefulness of professional development in the area of Standard VI (Rivard, 2010). Rivard's (2010) study supported the importance of professional development in the area technology standards for administrators. "If the potential of educational technology in all schools is to be realized, now is the time to focus on and commit resources to professional development of principals in the area of educational technology" (Rivard, 2010, p. 108).

A similar dissertation study conducted by Cummings (2012) surveyed 29 elementary school principals in a suburban Texas independent school district, of which the majority had 10 years of administration experience. The respondents to the survey evaluated themselves through self-assessment of their proficiency and rated the importance of the NETS-A standards. The majority of respondents in the survey had acquired a minimum of one graduate course consisting of training in technology and three or more professional development sessions regarding technology integration (Cummings, 2012).

The survey data indicated the majority of participating administrators considered themselves most proficient in making data-driven decisions and least proficient in "advocating on state and national levels for policies, programs, and funding opportunities that support the implementation of the school district technology plan" (Cummings, 2012, p. 55). Survey participants perceived technology leadership to be important, placing most significance on leadership and vision and placing the least amount of significance on social, legal, and ethical issues (Cummings, 2012, p. 56).

Research from the surveyed administrators shows a need for technology related professional development and found although participants rated leadership and vision as an area of strength, they also requested further professional development in the area. Cummings (2012) summed up his findings, stating, "Now more than ever, it is crucial for principals to have the knowledge and skills needed to support, model, and use the technological tools necessary to prepare students for a global economy" (p. 92).

Grey-Bowen's (2010) quantitative study surveyed principals in Miami-Dade County, Florida. Miami-Dade County is the fourth largest school system in the nation,

consisting of 232 elementary schools serving approximately 350,000 students. One hundred three elementary public school principals participated in the survey. Using the Educational Technology for Principals Survey developed in 2003, Grey-Bowen intended to inform the district of professional development needs of the current elementary school administrators.

The majority of the administrators taking the survey indicated they were most proficient in productivity and professional practice such as "using technology for communication and collaboration among colleagues, staff, parents, students, and the larger community" (Grey-Bowen, 2010, p. 111). While the same administrators considered themselves to be least proficient in the areas of assessment and evaluation and support, management, and operations. Surveyed administrators also specified they valued leadership and vision the most and assessment and evaluation the least when it came to educational technology (Grey-Bowen, 2010).

Grey-Bowen's (2010) study supported the need for further professional development in the NETS-A standards, particularly in the areas of leadership and vision; support, management, and operations; and social, legal, and ethical issues. "Although principals are well aware of the importance of vision, technology, planning, and the need for technology integration in the classroom, they are not well-trained to the level of proficient in implementing and modeling standards" (Grey-Bowen, 2010, p. 116). A 2016 study surveying aspiring school administrators echoes the need for professional development to meet the NETS-A standards (Yu & Prince, 2016).

A mixed methods dissertation research study founded on the five NETS-A standards conducted by Klimczak (2015) examined "principal's perceptions of their

educational technology leadership skills and the frequency in which they lead and implement educational technology within their schools" (p. 8). Participants in the study had little to no prior knowledge of the NETS-A standards for school administrators. Significant findings from the study revealed the majority of survey participants perceived themselves to be somewhat or not at all prepared to align the school technology goals with instructional plans. While participants perceived themselves to be most confident in encouraging the use of technology to facilitate communication, they perceived themselves least prepared to include effective use of technology integration in teacher performance evaluations (Klimczak, 2015).

In regard to visionary leadership, the surveyed administrators did not have confidence in their ability to evaluate the effectiveness of professional development related to technology nor did they perceive themselves to be prepared to lead digital learning initiatives in their schools. Comprehensive findings of Klimczak's (2015) study revealed principals did not feel they received adequate education from their educational institution for administrative preparation in the area of technology integration in a school. "There are many factors that impact a principal's ability to lead and implement technology in their schools. Factors gleaned from this study indicate that principals are ill-prepared, unaware of the NETS-A, and educational technology is not a priority" (Klimczak, 2015, p. 145).

Professional Development for Administrators: Leading Digital Initiatives

In a mixed methods research study, Miller (2007) surveyed 41 elementary school principals in Virginia. The researcher used the Educational Technology for Principals Survey and sought to answer the following questions: (a) "What do elementary school

principals identify as essential components of technology leadership; (b) "How do principals of schools high in technology integration differ in their leadership practices from principals of schools low in technology integration; and (c) "What do elementary principals identify as the professional development needed to support effective technology leadership in schools?" (Miller, 2007, p. 67). The combined quantitative and qualitative survey results indicated that elementary school principals view learning and teaching as the most important standard in the NETS-A standards for school administrators.

Miller's (2007) qualitative survey consisted of six principals leading schools high in technology integration and six principals leading schools low in technology integration. The qualitative results showed that high technology integration leaders mentioned leadership and vision twice as many times as those classified as low technology integration. While both sets of administrators value leadership and vision as a top priority, the principals leading high technology integration schools focused more on this component in their interviews (Miller, 2007). Miller's research identified "staying current on new ideas and trends in technology and training on how to better utilize productivity tools" (p. 150) as the two most needed areas of professional development for administrators leading technology integration.

An action research study conducted by Carey (2010) involved utilizing the LoTi survey to preassess school administrator levels of proficiency in the area of technology integration. Based on the gathered information, Carey led the surveyed district administrators in specialized professional development relating to leadership in effective technology integration. The basis for the research is founded in the concept that "when

principals are provided with necessary development for technology implementation, they can become more effective leaders for technology. Their teaching staff will be positively supported and influenced to utilize and implement technology into the classroom on a daily basis" (Carey, 2010, p. 74).

Carey's (2010) action research was conducted in a large urban district consisting of 33 schools: five high schools, five middle schools, three alternative education schools, and 20 elementary schools. The district serves approximately 15,000 prekindergarten through 12th-grade students and consists of 166 district administrators, of which 33% lead at the school level. The school-level administrators were the focus of Carey's study. Of the 33%, six administrators participated in the action research study (Carey, 2010).

The study participants consisted of six African-American females who ranged from 0-14 years of school based administrative experience. Four of the participants were middle school principals, while the remaining two were principals in prekindergarten through eighth-grade buildings. Carey's (2010) initial presurvey results revealed four of the principals believed themselves to be novice users of technology, while the remaining two considered themselves to be intermediate technology users. The survey indicated four participants did not feel their district provided sufficient professional development opportunities for administrators in the area of leading technology initiatives, and there was a need for professional development support in order for administrators to become more proficient with utilizing technology within their district. The surveyed administrators also indicated valuing technology integration and exhibiting proficiency in modeling the use of technology on behalf of the administrator were paramount in conveying a positive message to teachers in regard to quality instructional uses of

technology (Carey, 2010).

Carey (2010) also utilized a focus group study to gain an understanding of administrator needs in regard to effectively leading technology initiatives in their respective schools. Focus group data revealed the theme of instructional leadership. "Effective instructional technology leadership was clearly the most critical element needed in creating a catalyst for technological change in the school environment" (Carey, 2010, p. 127). A second theme included administrator technology usage. "Principals have to become technology leaders and effective users of technology in their schools" (Carey, 2010, p. 128). The final two emerging themes revealed the need for professional development in the area of effective use of technology and the barriers in relation to technology integration, which were lack of funding and lack of quality professional development.

Carey's (2010) initial study and focus group led to the creation of four professional development modules, of which five of the six administrators were able to participate. Module one consisted of a "laptop refresher." The participating principals were provided with new laptops and given a "refresher" course for learning to navigate the new device (Carey, 2010, p. 131). Module two consisted of training in "discovery streaming." "The focus of this training was devoted to how to integrate technology into the curriculum" (Carey, 2010, p. 136). The second training consisted of the introduction of "video streaming" and utilization of digital media resources. Module three consisted of training in Microsoft Outlook Exchange software. This training enabled the participating principals to manage email through the Microsoft Outlook Exchange platform. The final training module consisted of an introduction to Web 2.0 tools. This

training aimed to provide an understanding of current Web 2.0 tools, including those used for social media networking (Carey, 2010).

Following the professional development given during the action research, follow-up surveys were issued to the participating administrators. The surveys revealed principals noted an "enhanced awareness" (Carey, 2010, p. 208) in their ability to observe and provide feedback for technology integration within classrooms. "This professional development training enabled participants to develop their personal technology skill sets, as well as, their ability to recognize effective technology utilization in the classroom" (Carey, 2010, p. 158). The survey participants recognized the impact of their "personal mastery" (Carey, 2010, p. 208) of digital literacies and the need for continuous professional development in the area of technology integration. "As a result of these sessions the principals began to consider how to initiate change within their buildings and help teachers raise their levels of performance in the implementation of technology in their school buildings" (Carey, 2010, p. 161).

A dissertation study conducted by Depew (2015) analyzed California public school principal self-efficacy and leadership capacity in the areas of technology, pedagogy, and content knowledge. The study surveyed noncharter, K-12 public school principals from the San Francisco Bay area. Major findings from Depew's research concluded principals have strong content knowledge and strong pedagogical knowledge; however, they lack an understanding of how content and pedagogy can be connected with effective technology integration. Surveyed principals placed themselves high on statements such as "I can demonstrate a wide range of teaching approaches in the classroom setting" (Depew, 2015, p. 95) and low on statements such as "I can

demonstrate teaching that appropriately combines content knowledge, technologies and teaching approaches" (Depew, 2015, p. 95).

Results from Depew's (2015) study indicate principals perceive themselves to be successful in promoting a vision with technology in mind, advocating for policies that support technology integration, and supporting initiatives for securing funding that embraces technology integration in relation to the ISTE-A standards; however, the results also indicate principals "lack the knowledge and skills to directly engage with the technology in their schools" (Depew, 2015, p 97). Principals in the survey indicated a lack of knowledge in the area of utilizing technology to understand and teach content which contributes to an inability to lead teachers within their schools in instructional practices blending content and technology (Depew, 2015).

Overall findings from Depew's (2015) study indicate principals with strong technology, pedagogy, and content knowledge are likely to demonstrate strong leadership qualities in regard to technology integration; however, "many principals lack important knowledge about technology and the ways technology can be employed to teach curriculum" (Depew, 2015, p. 101). Concluding his research, Depew emphasized the need for professional development for principals in the areas of instructional technology. "It is of critical importance that principals gain considerable experience with technology in general and with technology's effective use in the learning environment" (Depew, 2015, p. 102).

Conclusion

This literature review addresses the evolving role of the administrator as an instructional leader and the role he or she plays in leading digital learning initiatives

through the effective integration of technology in classrooms. "The successful integration of educational technology in schools hinges on school administrator's technology leadership abilities" (Yu & Prince, 2016, p. 239). Studies reveal that administrators are not prepared to offer critical feedback to teachers in regard to improving instructional practices in device rich environments (Bautista, 2014; Bobbera, 2013; Depew, 2015); however, research also indicates the important role the school-based administrator plays in leading technology initiatives (Curcio, 2016; Fisher, 2013; Grady, 2011).

> In their position as instructional leaders in organizations increasingly adopting the use of technology to achieve productivity, educational and learning gains, principals must model digital age learning and be prepared to make sound decisions regarding technology purchasing and policies based on academic research and best practices. (Depew, 2015, p. 104)

While the scope of this study was not designed to assess university preparation of administrators in the area of observing, modeling, and providing feedback in the area of technology integration, this study does provide further research to solidify the need for ongoing professional development for school principals in maintaining the role of instructional leader through observing, modeling, and providing instructional feedback to teachers in device-rich environments.

Chapter 3: Methodology

Introduction

The purpose of this study was to identify gaps in administrative preparedness for evaluating the use of digital resources in the classroom, specifically in the areas of offering constructive feedback, modeling instruction in a digitally rich environment, and building the administrator's capacity to lead digital learning initiatives at the school level. Administrators play a pivotal role in leading digital learning initiatives within their schools; however, research indicates they are not adequately prepared to offer constructive feedback, model digital integration, or lead digital learning initiatives in their schools or districts. With the call for administrators to be instructional leaders among digital natives, there is a need to offer professional development for administrators in the area of technology to support best practices for curriculum and instruction (Kara-Soteriou, 2009).

This chapter focuses on the methodology used in this qualitative study. Information detailing the rationale behind the research, study participants, and the instruments used for data collection and analysis will be discussed. The role of the researcher will also be established in this chapter.

Research Rationale

The review of the literature explored effective leadership practices demonstrated by administrators, current research supporting the role of the administrator in technology integration, the need for professional development in relation to understanding technology standards for administrators, and professional development to improve administrator efficacy in leading digital learning initiatives.

Research Questions

The following research questions were used to guide this qualitative study:

1. What gaps exist in an administrator's preparedness for leading digital learning initiatives, in each of the five strands of the ISTE-A standards, at the school level as indicated by the PTLA?
2. What are principal perceptions of their preparedness to evaluate teachers, provide constructive feedback, and model effective instruction in a digitally rich environment?
3. What relationship exists between an administrator's ability to provide feedback to teachers regarding digital learning integration and the administrator's participation in professional development on technology integration?

Participants

Participants in the study were full-time principals and assistant principals who were serving in an administrative capacity during the 2017-2018 school year. Participants were from 15 elementary schools and five middle schools in a midsize rural school district located in the foothills of western North Carolina. Twenty-four total administrators were invited to participate in both the online digital survey and one of three focus groups. Only those who continued to serve in the administrative capacity in the researched district were asked to participate. During the 2017-2018 school year, there were 27 total schools in the district: 15 elementary schools serving prekindergarten through fifth-grade students, five middle schools serving sixth- through eighth-grade students, four high schools serving ninth- through 12th-grade students, one alternative

school, one cooperative innovative high school, and one school for exceptional children. The district is comprised of 12,107 students, of which 63.83% come from low-income households.

At the time of data collection, the elementary and middle schools were operating with one device per student during the school day. The high school administrators were not included in this study due to not having one device per student. Additionally, 52% of the administrators in the district were in years 0-3 of their administrative career, 37% were in years 4-10 and 11% of the administrators have more than 10 years of experience as a school-based administrator. Twenty-two percent of the administrators within the district hold advanced degrees.

Research Methods

This study gathered data from two qualitative methods, one survey and two focus groups. "Focus groups are advantageous when the interaction among interviewees will likely yield the best information and when interviewees are similar to and cooperative with each other" (Creswell, 2015, p. 16). Qualitative data allow the researcher to "learn from the participants" (Creswell, 2015, p.17), as the data provides a deeper understanding of the central identified problem. This study sought to understand administrator perceptions of their effectiveness for leading digital learning initiatives, observing and providing teachers with feedback, and modeling the effective use of technology in a digitally rich environment.

Instruments

The PTLA was issued as an anonymous survey instrument (Appendix A). The questions in the PTLA are specific to the following areas: (a) leadership and vision; (b)

learning and teaching; (c) productivity and professional practice; (d) support, management, and operations; (e) assessment and evaluation; and (f) social, legal, and ethical. The reliability of the PTLA survey results was high with a Cronbach's alpha (a)=0.95 and with the range of item-test correlations from 0.39 to 0.80 (Castle, 2009). "Based on the validity and reliability test measures, the PTLA is considered to be an appropriate means for testing principal technology leadership competencies" (Brunson, 2015, p. 53). Table 2 shows the connection between the PTLA survey questions and the research questions to which they relate.

Table 2

Survey Question Crosswalk with Research Questions

	Research Question		
	1. Gaps in leading digital learning initiatives	2. Perception of preparedness	3. Providing feedback and participation in PD
PTLA Survey Part I Leadership & Vision	X		
PTLA Survey Part II Learning & Teaching		X	
PTLA Survey Part III Productivity & Professional Practice	X		X
PTLA Survey Part IV Support, Management & Operations	X		
PTLA Survey Part V Assessment & Evaluation		X	
PTLA Survey Part VI Social, Legal & Ethical Issues	X	X	X

Part 1 of the PTLA survey asked participating administrators to consider the extent to which they participated in leading digital learning initiatives in six areas through their leadership and vision. Participants considered their participation in district-level planning for technology initiatives as well as implementation of district-level initiatives within their school's technology planning processes (Castle, 2009). As noted in Table 2, Survey Question 1 correlated with and informed Research Question 1 in identifying gaps in administrator preparedness to lead digital learning initiatives in alignment with the ISTE-A standards.

Part 2 of the PTLA survey asked participants to consider the extent to which they supported teaching and learning practices within their school environment. This survey question analyzed administrator preparedness for modeling pedagogical best practices for instruction in a digitally rich environment and their involvement in assessing the needs of teachers concerning technology integration and providing constructive feedback for improvement in this area (Castle, 2009). Survey Question 2 correlated with and informed Research Question 2 in determining administrator perceptions of their ability to evaluate teachers, provide constructive feedback, and model effective instruction in digitally rich environments.

Part 3 of the PTLA survey asked participants to consider the extent to which they used digital resources to support their own productivity and develop their professional practices. This survey question analyzed administrator participation in professional development to improve and expand their use of technology, and it analyzed administrator perceptions of how they encourage the use of digital resources among the stakeholders in their building including teachers and students (Castle, 2009). Survey

Question 3 correlated with and informed Research Questions 1 and 3. Survey data informed the researcher of administrator preparedness to lead digital learning initiatives, correlating with Research Question 1. Survey data informed the researcher in determining administrator participation in professional development to expand their use of technology or model effective practices, correlating with Research Question 3.

Part 4 of the PTLA survey asked participants to consider the extent to which they support the management and operations of digital resources (Castle, 2009). This survey question directly relates to the ISTE-A standards for excellence in professional practice and systemic improvement and informed Research Question 1 in determining the gaps that exist in administrator preparation for leading digital learning initiatives in relation to the ISTE-A standards.

Part 5 of the PTLA survey asked participating administrators to consider the extent to which they model the use of digital resources, assess and evaluate instructional practices, and assess and evaluate teachers' effective use of technology (Castle, 2009). The information gathered from Survey Question 5 informed Research Question 2 in determining administrator perceptions of their preparedness to evaluate teachers, provide constructive feedback, and model effective instruction in digitally rich environments.

Part 6 of the PTLA survey asked participating administrators to consider the extent to which they ensured digital resources are equally accessible and implemented policies in relation to digital citizenship, online safety, and potential legal issues. Survey Question 6 also addressed the extent to which administrators support the use of digital resources to meet the needs of all learners through individualized instruction (Castle, 2009). Information gathered from this survey question was used to inform Research

Questions 1, 2, and 3 in identifying gaps that exists in administrator preparedness to lead digital learning initiatives directly correlating with the ISTE-A standards. Table 2 reviews the correlation between the survey question asked and the research question it informs.

Research Design

This study surveyed administrators, both principals and assistant principals, from elementary and middle schools in a rural school district in the western foothills of North Carolina. Twenty-four total administrators were invited to participate in both the online digital survey and one of three focus groups. Only those who continued to serve in the administrative capacity in the researched district were asked to participate. An invitation to participate in the anonymous digital study was sent out to 24 principals who served as an elementary or middle school principal or assistant principal during the 2017-2018 school year (Appendix B). The study used data from a qualitative survey in which administrators participated in a self-assessment of their technology leadership capabilities. The survey was provided in a digital format to participants and remained open for 4 weeks. A survey reminder was sent to participants on a weekly basis. The PTLA survey instrument is provided in Appendix A. The PTLA instrument was reviewed and validated by a panel of experts in school technology leadership. It has been tested in multiple states with descriptive statistics being run on the data. The overall data analysis showed correlation between the overall survey instrument and the individual survey items. Furthermore, the "internal reliability of the PTLA instrument evidences high reliability" (Anandan, Cederquist, & McLeod, 2005, p. 3).

Following the survey, two focus groups consisting of eight to 10 participants in

each group were also conducted. An invitation to participate in one of the focus groups was sent to the 24 principals who were invited to participate in the PTLA survey. The email invitation to participate in the confidential focus group was sent out by the chief information officer 2 weeks prior to the date of the first focus group (Appendix C). The qualitative data provided a rich analysis of the administrator's perceived ability to lead digital learning initiatives, provide constructive feedback to teachers in the area of digital teaching and learning, and model effective use of technology. Each focus group session was limited to 10 participants.

The objective of the focus groups was to collect qualitative data to inform each of the research questions. "In qualitative research, you ask open-ended questions so that the participants can best voice their experiences unconstrained by any perspectives of the researcher or past research findings" (Creswell, 2015, p. 216). Focus group interviews in the study were conducted to gain insight into administrator perceptions of their ability or lack of ability to lead digital learning initiatives through evaluating the use of digital resources in the classroom, specifically in the areas of offering constructive feedback, modeling instruction in a digitally rich environment, and building the administrator's capacity to lead digital learning initiatives at the school level. The focus group interviews consisted of five peer-reviewed questions. Table 3 shows the correlation between the focus group question and the research question it informs.

Focus Group Questions

1. How did you apply your understanding of the ISTE-A and NC Digital Learning Competencies for Administrators in leading digital learning initiatives during the 2017-2018 school year?

2. In what ways do you feel least prepared for leading digital learning initiatives within your school during the 2017-2018 school year?
3. In what ways do you model effective instructional practices involving technology integration?
4. When observing in a digitally rich classroom environment, what do you look for in instructional practices?
5. In what ways do you provide feedback for improved classroom practices to teachers in regards to instructional technology?

Table 3

Focus Group Question Crosswalk with Research Question

	Research Question		
	1. Gaps in leading digital learning initiatives	2. Perception of preparedness	3. Providing feedback and participation in PD
FG1. Application of technology standards for administrators	X		
FG2. Area least prepared to lead digital learning initiatives	X	X	X
FG3. Modeling effective instruction		X	X
FG4. Observing in a digitally rich environment		X	X
FG5. Providing feedback for improved practices		X	X

Focus Group Question 1 asked administrators to discuss the ways they have

applied their understanding of the ISTE-A and North Carolina Digital Learning Competencies for Administrators in leading digital learning initiatives during the 2017-2018 school year. The results from this question were used to inform and answer Research Question 1 as it provides insight into administrator knowledge of standards related to technology integration and leading digital learning initiatives.

Focus Group Question 2 asked administrators to discuss the ways they felt least prepared for leading digital learning initiatives within their school during the 2017-2018 school year? The discussion from Focus Group Question 2 informed and answered Research Questions 1, 2, and 3, as it provided insight into administrator capacity for initiating and leading digital learning initiatives at the school level.

Focus Group Question 3 asked administrators to reflect upon their own leadership practices in modeling effective instruction involving technology integration. Focus Group Question 3 informed and answered Research Questions 2 and 3, as it examined administrator perceptions of their ability to improve instructional practices by providing feedback and modeling effective instruction.

Focus Group Question 4 asked administrators to discuss the instructional practices looked for when observing in a digitally rich classroom environment. The discussion from this question was used to inform and answer Research Questions 2 and 3 and was used to engage participating administrators in discussions concerning classroom observations and teacher evaluations.

Focus Group Question 5 asked administrators to discuss different ways they provided feedback for improved classroom practices to teachers in regard to instructional technology. The discussion from this question was used to inform Research Questions 3

and 3, as it asked administrators to examine and discuss their strategies for providing feedback for improvement in the area of teaching in a digitally rich environment.

Procedures

The PTLA was formatted into a digital survey using Google Forms (Appendix A). Following the creation of the digital survey, an invitation to participate in the study was distributed via email to 24 administrators who were principals and assistant principals of 15 elementary schools and five middle schools during the 2017-2018 school year and continued to serve in an administrative role within the district. The candidate sent an email with a link to the PTLA survey to all 24 administrators (Appendix B). Weekly reminders to complete the digital PTLA survey were sent during a 4-week time period (Appendix D). The survey closed at the end of the 4-week period.

The chief information officer sent an email inviting the administrators to participate in a focus group (Appendix C). The email provided a link to collect contact information from the focus group participants. Three dates for focus groups were offered, allowing no more than 10 participants in each focus group session. The focus groups were held during the 2 weeks following the survey data collection. All data were collected within the 6-week time period. Each email invitation described an overview and purpose of the study as well as informed potential participants of the right to decline participation in the survey and focus group. The invitation to participate in the focus group was sent a second and third time (Appendix E). Prior to beginning the focus group sessions, participants completed the Focus Group Informed Consent (Appendix F).

Results from the digital PTLA survey were recorded via Google Forms and Google Sheets. The results from the Google Forms and Google Sheets were housed on a

secure encrypted server. Two-factor verification is required to access the data. No identifiable information was recorded by survey participants. Results from the focus group were recorded on two password-protected devices and will be destroyed within 2 years of the candidate's successful completion of the dissertation study.

Data Analysis

To examine each research question, a chi-square goodness of fit test was used to assess the results from the PTLA survey taken by administrators. The researcher used an original distribution of the PTLA survey taken from a study conducted by Page-Jones (2008). This study sought to determine the influence of school principals on the use of technology within their buildings (Page-Jones, 2008). The data gathered through the focus groups were analyzed, coded, and reviewed for emerging themes. The emerging themes were compared with existing research on administrator preparedness for leading digital learning initiatives. According to Creswell (2015), qualitative data reveal a "rich, complex picture" (p. 18), and

> from this complex picture, you make an interpretation of the meaning of the data by reflecting on how the findings relate to existing research, by stating a personal reflection about the significance of the lessons learned during the study or by drawing out larger, more abstract meanings. (p. 18)

Table 4 presents the statistical analyses that were used to address each research question.

Table 4

Research Design Outline

Research Questions	Data Collection	Data Analysis
1. What gaps exist in an administrator's preparedness for leading digital learning initiatives, in each of the five strands of the ISTE-A standards, at the school level as indicated by the PTLA?	Survey - P1, P3, P4, P6	Statistical Analysis Coding
	Focus Group - Q1, Q2	Descriptive Analysis Coding
2. What are principal perceptions of their preparedness to evaluate teachers, provide constructive feedback, and model effective instruction in a digitally rich environment?	Survey - P2, P5, P6	Statistical Analysis Coding
	Focus Group - Q2, Q3, Q4, Q5	Descriptive Analysis Coding
3. What relationship exists between administrators' ability to provide feedback to teachers regarding digital learning integration and administrators' participation in professional development on technology integration?	Survey - P3, P6	Statistical Analysis Coding
	Focus Group - Q2, Q3, Q4, Q5	Descriptive Analysis Coding

Role of the Researcher

The researcher has been employed in the district in which the research was conducted since 2005 and currently holds a position as an elementary school principal. Prior to becoming principal, the researcher was an assistant principal in a middle school for 1 year, an instructional technology facilitator (ITF) for 2.5 years, a middle school math and science teacher for 4.5 years, and an elementary teacher for 4.5 years. The researcher is one of 14 elementary principals employed by the researched district and did not participate in answering the survey or focus group interview questions. The researcher is considered a peer among the group of administrators and did not act as the moderator for the focus group. A script for the chief information officer, who served as

moderator for the focus group, has been provided in Appendix G.

In conjunction with this research study, the researcher considered her own background and knowledge as a former ITF aiding teachers in the effective integration of technology in the classroom and her experience with delivering professional development in this area. In addition to the technology background, she considered her background as a classroom teacher and her current role as an administrator with the responsibility of conducting teacher observations, delivering feedback, and modeling instruction in a device-rich environment. In considering each of these factors the knowledge gained from the research will contribute to understanding the needs of administrators in the area of leading digital learning initiatives at the school level.

Chapter 4: Results

Introduction

School-based administrators play a vital role in sustaining change and shaping the vision of a school in regard to effective technology integration. With the rapid growth in use and evolution of technology integration in the K-12 setting, providing adequate leadership and guidance can become difficult. The purpose of this study was to identify gaps in administrator preparedness for evaluating the use of digital resources in the classroom, specifically in the areas of offering constructive feedback, modeling instruction in a digitally rich environment, and building the administrator's capacity to lead digital learning initiatives at the school level.

The research questions to be answered through this study were

1. What gaps exist in an administrator's preparedness for leading digital learning initiatives, in each of the five strands of the ISTE-A standards, at the school level as indicated by the PTLA?
2. What are principal perceptions of their preparedness to evaluate teachers, provide constructive feedback, and model effective instruction in a digitally rich environment?
3. What relationship exists between an administrator's ability to provide feedback to teachers regarding digital learning integration and the administrator's participation in professional development on technology integration?

The study was open to principals and assistant principals who were serving as administrators in device-rich schools during the 2017-2018 school year. For the purpose

of this research, device-rich schools are those with a one to one device to student ratio; however, the devices do not travel between the school and home and they do not loop with the student from one grade level to the next as they do in a true one to one environment.

The study was conducted in two parts. First, the PTLA was delivered in digital format to 24 building-level principals who were administrators of a device-rich school during the 2017-2018 school year. Of the 24 administrators, 14 participated in the digital survey, yielding a 58.3% response rate. A chi-square goodness of fit test was used to determine whether observed sample frequencies differed significantly from expected frequencies obtained from the original distribution of survey results. Original distribution for the PTLA survey was taken from a study conducted by Page-Jones (2008) and can be found in Appendix H. This research sought to determine the influence of school principals on the use of technology within their buildings (Page-Jones, 2008).

The PTLA survey includes five responses in which survey participants may select: 1, not at all; 2, minimally; 3, somewhat; 4, significantly; and 5, fully. For the purpose of this study, a gap, or not prepared, is identified as any response below significantly on the PTLA; and the responses of significantly and fully are considered to have no gap, or prepared, in leading digital learning in a specific area.

The PTLA assesses administrator leadership in six areas: (a) leadership and vision; (b) learning and teaching; (c) productivity and professional practice; (d) support, management, and operations; (e) assessment and evaluation; and (f) social, legal, and ethical issues. Four of the six areas of the PTLA revealed notable differences between the collected survey data and the original distribution. There were no notable differences

in the surveyed administrators' data and the original distribution within the areas of productivity and professional practice and assessment and evaluation on the PTLA.

Focus groups were conducted as a second form of data collection. Of the 24 administrators invited to participate in the focus groups, nine agreed, yielding a 37.5% response rate. Participating administrators indicated having between 4-16 years of experience as an administrator. Results from the focus groups were transcribed by a professional transcriptionist and coded for recurring themes. Results from the focus groups and results from the PTLA survey have been combined to answer the research questions.

Research Question 1

What gaps exist in an administrator's preparedness for leading digital learning initiatives, in each of the five strands of the ISTE-A standards, at the school level as indicated by the PTLA?

Survey Data Summary

Research Question 1 was designed to determine gaps in administrative preparedness for leading digital learning initiatives as related to the ISTE-A standards. The ISTE-A standards include (a) visionary leadership, (b) digital age learning culture, (c) excellence in professional practice, (d) systemic improvement, and (e) digital citizenship.

Leadership and vision. The leadership and vision construct of the PTLA survey directly correlates to visionary leadership according to the ISTE-A standards. A visionary leader in regard to leading digital learning initiatives is one who has the capacity to advocate at local and state levels for best practices in technology integration.

Administrators with the qualities of visionary leadership engage all stakeholders in adopting practices that lead to a meaningful change in which digital resources are utilized to their maximum capacity in an effort to achieve targeted learning goals. Sustaining a vision for change with the ability to foresee potential barriers and challenge those barriers at both the district and local level is a quality a visionary leader must have when leading digital learning initiatives.

The survey data indicate a gap in preparedness for participants in the area of leadership and vision for leading digital learning initiatives at the school level. The chi-square results for the leadership and vision survey items are provided in Table 5. Three of the six survey items have distributions which differ from the original distribution at the 0.05 level of significance. Participating administrators indicated a lack of preparedness to (a) participate in the technology planning process at the district or school level, (b) communicate information to school stakeholders involving the district's or school's technology planning and implementation efforts, and (c) advocate for inclusion of research-based technology practices in the school improvement planning process. In each case, the number of principals indicating a lack of preparation was higher than expected. The full results for leadership and vision chi-square data analyses are provided in Appendix I.

Table 5

Leadership and Vision Chi-Square Goodness of Fit Data Analysis

Question	Category	Observed	Expected
1.1 To what extent did you participate in your district's or school's most recent technology planning process?	Not Prepared	11	6.72
	Prepared	3	7.28
		p value	0.02205
1.2 To what extent did you communicate information about your district's or school's technology planning and implementation efforts to your school's stakeholders?	Not Prepared	9	4.48
	Prepared	5	9.52
		p value	0.00961
1.3 To what extent did you promote participation of your school's stakeholders in technology planning process of your school or district?	Not Prepared	9	5.6
	Prepared	5	8.4
		p value	0.06362
1.4 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?	Not Prepared	5	5.6
	Prepared	9	8.4
		p value	0.74342
1.5 To what extent did you advocate for inclusion of researched-based technology practices in your school improvement plan?	Not Prepared	9	5.04
	Prepared	5	8.96
		p value	0.02746
1.6 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)?	Not Prepared	9	7.84
	Prepared	5	6.16
		p value	0.53226

Support, management, and operations. The support, management, and operations portion of the PTLA directly relates to systemic improvement as indicated by

the ISTE-A standards. Administrators yielding the capacity to inspire systemic improvement can navigate the hardware, software, and human capital components of leading digital learning initiatives. They understand the need for a robust infrastructure, interpret data, and provide guidance in reviewing the results to improve student learning outcomes. These administrators have a knowledge base that allows them to hire educators who have the capacity to utilize digital learning resources creatively and proficiently.

The chi-square results for the support, management, and operations survey items are provided in Table 6. Two of the six survey items have distributions which differ from the original distribution at the 0.05 level of significance. Participating administrators indicated a lack of preparedness to (a) support faculty and staff in connecting to and using district- and building-level technology systems for management and operations and (b) advocate at the district level for adequate, timely, and high-quality technology support services. The two areas participating administrators indicated a lack of preparedness in were related to the hardware component of technology integration. In both instances, the lack of preparation was higher than expected. The full results for each of the chi-square analyses are provided in Appendix J.

Table 6

Support, Management, and Operations Chi-Square Goodness of Fit Data Analysis

Question	Category	Observed	Expected
4.1 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)?	Not Prepared	4	0
	Prepared	10	14
		p value	0.00001
4.2 To what extent did you allocate campus discretionary funds to help meet the school's technology needs?	Not Prepared	7	6.72
	Prepared	7	7.28
		p value	0.87859
4.3 To what extent did you pursue supplemental funding to help meet the technology needs of your school?	Not Prepared	11	9.52
	Prepared	3	4.48
		p value	0.39647
4.4 To what extent did you ensure that hardware and software replacement/upgrades were incorporated into school technology plans?	Not Prepared	10	7.84
	Prepared	4	6.16
		p value	0.24482
4.5 To what extent did you advocate at the district level for adequate, timely, and high-quality technology support services?	Not Prepared	11	4.48
	Prepared	3	9.52
		p value	0.00019
4.6 To what extent did you investigate how satisfied faculty and staff were with technology support services provided by your district/school?	Not Prepared	10	8.4
	Prepared	4	5.6
		p value	0.38273

Social, legal, and ethical issues. The social, legal, and ethical issues portion of the PTLA directly relates to digital citizenship as indicated by the ISTE-A standards.

Digital citizenship encompasses a wide range of skills and knowledge within the digital teaching and learning continuum. Administrators with effective digital citizenship skills are savvy in the safety and use of modern communication tools and in various online collaboration platforms and can model the effective use of these tools both personally and in the education setting. These administrators are also familiar with associated policies and legal aspects of digital teaching and learning.

In the social, legal, and ethical issues portion of the PTLA, surveyed administrators indicated an overall lack of preparedness in many areas; however, this lack of preparation was similar to the original distribution. The chi-square results for the social, legal, and ethical issue survey items are provided in Table 7. Two of the seven survey items have distributions which differ from the original distribution at the 0.05 level of significance. Participating administrators indicated a lack of preparedness to (a) ensure equity of technology access and (b) support the use of technology to help meet the needs of special education students. For both, the number of principals indicating a lack of preparation was higher than expected. The full results for each of the chi-square analyses are provided in Appendix K.

Table 7

Social, Legal, and Ethical Issues Chi-Square Goodness of Fit Data Analysis

Question	Category	Observed	Expected
6.1 To what extent did you work to ensure equity of technology access and use in your school?	Not Prepared	5	1.82
	Prepared	9	12.18
		p value	0.0115
6.2 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?	Not Prepared	8	8.12
	Prepared	6	5.88
		p value	0.94819
6.3 To what extent were you in involved in enforcing policies related to copyright and intellectual property?	Not Prepared	11	8.82
	Prepared	3	5.18
		p value	0.22752
6.4 To what extent were you involved in addressing issues related to privacy and online safety?	Not Prepared	10	6.44
	Prepared	4	7.56
		p value	0.05626
6.5 To what extent did you support the use of technology to help meet the needs of special education students?	Not Prepared	6	1.82
	Prepared	8	12.18
		p value	0.00089
6.6 To what extent did you support the use of technology to assist in the delivery of individualized education programs for all students?	Not Prepared	6	4.06
	Prepared	8	9.94
		p value	0.25319
6.7 To what extent did you disseminate information about health concerns related to technology and computer usage in classrooms and offices?	Not Prepared	11	10.5
	Prepared	3	3.5
		p value	0.75762

Productivity and professional practice. The productivity and professional practice portion of the PTLA correlates with the digital age learning culture and

excellence in professional practice portions of the ISTE-A standards. Administrators exemplifying a digital age learning culture and excellence in professional practice in regard to digital teaching and learning are proficient in modeling best practices for the use of digital resources. They are also current in their research and knowledge of current trends in educational technology.

The chi-square results for the productivity and professional practice survey items are provided in Table 8. Each of the five survey items have distributions which do not differ from the original distribution at the 0.05 level of significance, meaning the number of principals indicating a lack of preparation was the same as expected. Although the results are the same as the expected outcome, administrators indicated an overall lack of preparedness in this area. The full results for each of the chi-square analyses are provided in Appendices L.

Table 8

Productivity & Professional Practice

Question	Category	Observed	Expected
3.1 To what extent did you participate in professional development activities meant to improve or expand your use of technology?	Not Prepared	6	5.04
	Prepared	8	8.96
		p value	0.59298
3.2 To what extent did you use technology to help complete your day-to-day tasks (e.g., developing budgets, communicating with others, gathering information)?	Not Prepared	0	2.24
	Prepared	14	11.76
		p value	0.10247
3.3 To what extent did you use technology-based management systems to access staff/faculty personnel records?	Not Prepared	3	1.68
	Prepared	11	12.32
		p value	0.27765
3.4 To what extent did you use technology-based management systems to access student records?	Not Prepared	1	1.68
	Prepared	13	12.32
		p value	0.57599
3.5 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?	Not Prepared	3	3.36
	Prepared	11	10.64
		p value	0.82176

Focus Group Summary

Focus group discussions revealed two gaps in the participating administrators' preparedness for leading digital learning initiatives at the school level. The gaps are consistent with the data collected from the PTLA survey. Participating administrators indicated a lack of support personnel, such as ITFs and a lack of technology-pedagogy

knowledge as limiting factors in leading digital learning initiatives. Discussions in the focus groups revealed principals rely on the knowledge of their ITF to assist in determining the appropriate digital tools for teaching different content areas; however, these support personnel are only in their buildings for a limited amount of time, either 1 or 2 days per week.

The administrators in the focus groups were principals in device-rich schools during the 2017-2018 school year. Focus group discussions indicated a certain level of partnership between participating administrators and the ITF in leading digital learning initiatives at the school level. Participants discussed using the information from needs assessments to point the ITF to areas where teachers indicated needing support. The administrators and ITF worked together to provide professional development during faculty meetings related to the needs assessment. The administrators agreed to having limited knowledge and understanding of software program details and limited knowledge of how to use digital learning platforms to their maximum capacity; therefore, the administrator relied heavily on the knowledge of the ITF in these areas. One administrator stated, "Having an amazing Instructional Technology Facilitator has been crucial. They know how to get in there with the teachers and can model lessons and show how to have the tools be a creative process for the students." Another administrator agreed having the support of an ITF was beneficial, stating, "to have someone else there with you, who is partnering with you, is so excited and wants to get other people on board. It makes a big difference." With the growing number of devices and available digital resources, participants agreed having the support of an ITF more often would be beneficial.

A lack of technology-pedagogy knowledge was the other identified gap in preparedness among the focus group participants. Discussion among the group members indicated a significant amount of time had passed since the participating administrators had been classroom teachers or attended official courses in administration. The amount of digital resources available to teachers today is significantly more than any of the administrators had as a classroom teacher, and the graduate courses the administrators participated in did not discuss or address the digitally rich classroom environment. There was discussion among the focus group participants of the continual change and advancement of digital resources and difficulty presented when attempting to match appropriate resources to teach curriculum. The gap presents a challenge for administrators in assisting teachers with integration of digital resources into pedagogical practices.

Research Question 1 Summary

Combined results from the PTLA survey data and focus groups indicate gaps in the participating administrators' preparedness for leading digital learning initiatives in the areas of visionary leadership, digital-age learning culture, systemic improvement, and digital citizenship, as related to the ISTE-A standards. Based on the discussions from the focus groups, it is evident the participating administrators rely heavily on the combined instructional and technology knowledge of support staff such as the ITF to assist in leading the digital learning initiatives and improving technology-pedagogical knowledge at the school level.

Research Question 2

What are principal perceptions of their preparedness to evaluate teachers, provide

constructive feedback, and model effective instruction in a digitally rich environment?

Survey Data Summary

Of the six areas addressed in the PTLA survey, two align to answer Research Question 2: learning and teaching and assessment and evaluation. Research Question 2 was designed to determine the participating administrators' perceptions of preparedness to evaluate teachers, provide constructive feedback, and model effective instruction in a digitally rich environment.

Learning and teaching. The learning and teaching construct is perhaps the most important portion of the PTLA survey and the most important piece of digital teaching and learning. An administrator with the capacity to lead pedagogical practices rich in technology integration and the capacity to ensure student learning through the digital teaching process possesses a level of preparedness for leading digital learning initiatives. The learning and teaching construct of the PTLA survey addresses pedagogical practices and evaluation of student data for making informed instructional decisions. The chi-square results for the learning and teaching survey items are provided in Table 9. Four of the six survey items have distributions which differ from the original distribution at the 0.05 level of significance. Participating administrators indicated a lack of preparedness to (a) provide or make available assistance to teachers to use technology for interpreting and analyzing student assessment data, (b) provide or make available assistance to teachers for using student assessment data to modify instruction, (c) disseminate or model best practices in learning and teaching with technology to faculty and staff, and (d) provide support to teachers or staff who were attempting to share information about technology practices, issues, and concerns. The number of principals indicating a lack of

preparation was higher than expected for all four items. The full results for each of the chi-square analyses are provided in Appendix M.

Table 9

Learning and Teaching Chi-Square Goodness of Fit Data Analysis

Question	Category	Observed	Expected
2.1 To what extent did you provide or make available assistance to teachers to use technology for interpreting and analyzing student assessment data?	Not Prepared	5	1.12
	Prepared	9	12.88
		p value	0.00013
2.2 To what extent did you provide or make available assistance to teachers for using student assessment data to modify instruction?	Not Prepared	7	1.68
	Prepared	7	12.32
		p value	0.00001
2.3 To what extent did you disseminate or model best practices in learning and teaching with technology to faculty and staff?	Not Prepared	9	4.06
	Prepared	5	9.94
		p value	0.00362
2.4 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?	Not Prepared	5	1.12
	Prepared	9	12.88
		p value	0.00013
2.5 To what extent did you organize or conduct assessments of staff needs related to professional development on the use of technology?	Not Prepared	8	6.16
	Prepared	6	7.84
		p value	0.32184
2.6 To what extent did you facilitate or ensure the delivery of professional development on the use of technology to faculty and staff?	Not Prepared	7	3.92
	Prepared	7	10.08
		p value	0.06675

Assessment and evaluation. After learning and teaching, assessment and evaluation is perhaps the second most important component of digital teaching and

learning. An administrator's ability to model effective practices and provide feedback for growth that improves teaching practices is essential in leading a sustained vision for digital learning initiatives.

The assessment and evaluation construct of the PTLA asks participating administrators to reflect upon their efforts to model, evaluate instructional practices, and provide feedback regarding best practices for technology integration. The chi-square results for the assessment and evaluation survey items are provided in Table 10. Each of the five survey items have distributions which do not differ from the original distribution at the 0.05 level of significance. Participating administrators indicated preparedness to (a) promote or model technology-based systems to collect student assessment data, (b) promote the evaluation of instructional practices, including technology-based practices, (c) evaluate the effectiveness of professional development offerings in their school to meet the needs of teachers and their use of technology, and (d) include the effective use of technology as a criterion for assessing the performance of faculty. Participating administrators indicated they were not prepared to assess and evaluate existing technology-based administrative and operations systems for modification or upgrade. This is consistent with the results from the original PTLA distributions in the support, management, and operations portion of the survey. In each case, the number of principals indicating preparedness or lack thereof was the same as the expected. The full results for each of the chi-square analyses are provided in Appendix N.

Table 10

Assessment and Evaluation

Question	Category	Observed	Expected
5.1 To what extent did you promote or model technology-based systems to collect student assessment data?	Not Prepared	4	2.8
	Prepared	10	11.2
		p value	0.42268
5.2 To what extent did you promote the evaluation of instructional practices, including technology-based practices, to assess their effectiveness?	Not Prepared	6	7.84
	Prepared	8	6.16
		p value	0.32184
5.3 To what extent did you assess and evaluate existing technology-based administrative and operations systems for modification or upgrade?	Not Prepared	10	9.94
	Prepared	4	4.06
		p value	0.97181
5.4 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?	Not Prepared	7	5.6
	Prepared	7	8.4
		p value	0.44501
5.5 To what extent did you include the effective use of technology as a criterion for assessing the performance of faculty?	Not Prepared	4	6.16
	Prepared	10	7.84
		p value	0.24484

Focus Group Summary

Focus group discussions indicated administrators used multiple strategies for modeling technology integration, provided feedback using several methods, and looked for the student use of technology when observing digitally rich classrooms. As indicated in Research Question 1, administrators relied on the knowledge of their ITF to assist with modeling instruction and providing feedback to teachers for the use of technology in the classroom.

Each of the nine administrators participating in the focus groups discussed different strategies used to model technology integration. Common methods of modeling included providing professional development during faculty meetings, using teacher leaders in technology integration, and providing teachers with the opportunity to co-teach with the ITF during classroom instruction. One of the administrators indicated knowledge of the Digital Learning Competencies helped to understand what is needed for effective technology integration and discussed providing personalized professional development for teachers based on the individual needs of the teacher as a way to model best practices.

Another administrator discussed the use of district provided technology professional development as a resource for modeling effective instruction. The strategies provided through the local professional development efforts have been taken back to schools where administrators work with the ITF to model the strategies during their faculty meetings, often using a hands-on approach that actively engages teachers. By modeling the strategies learned through professional development sessions, administrators are setting the expectation for technology integration in the classroom.

Focus group discussions also revealed how administrators model effective technology integration by capitalizing on the strengths of teacher leaders. Some of the administrators have teacher leaders model the effective use of technology at faculty meetings, while others have allowed time for educators to visit each other's classrooms and see the technology integration in action with students. Teachers are more likely to try new strategies with students or plan technology-related activities that have been modeled. In addition to modeling instructional practices, administrators discussed

modeling leadership through presenting at the district's annual Digital Teaching and Learning Conference.

Discussion around successful instances of effective modeling were followed with the discussion of modeling failure. Everyone agreed modeling how to work through technology difficulties and unexpected glitches impacted staff in a positive way and gave an attitude of "if they can do it, I can do it." The focus groups also discussed modeling how to be a continual learner through seeking out professional development opportunities for themselves.

Each of the administrators indicated providing feedback was important and discussed using a district provided walkthrough protocol, asking questions about lesson plans, and formal observations as methods to provide teachers with feedback. One common question the administrators use to provide feedback is, "have you ever thought about …?" The administrators also discussed working with the ITF or instructional coach to provide feedback and agreed that feedback from support personnel seemed less evaluative than it did when coming from an administrator. During the focus groups, there was discussion about tailoring feedback to be specific and unique to the needs of the individual teacher. One administrator discussed providing feedback in regard to technology aligned with the SAMR model. This feedback was designed to guide teachers past the substitution level of technology integration and into the modification and redefinition levels of technology integration.

Survey data from the assessment and evaluation construct of the PTLA are consistent with focus group data in which participating administrators indicated a preparedness to model effective use of technology and provide feedback to teachers

regarding best practices for teaching and learning in a device-rich environment.

When observing digitally rich classrooms, one common theme emerged among all of the participating administrators. Each of the administrators indicated they looked for student use of technology when observing. One administrator discussed how the Digital Learning Competencies provided insight for what to look for in digitally rich learning environments. "It's [Digital Learning Competencies] not just replacement but more infusion into the classroom. You are tying digital resources in with the curriculum." Another administrator stated, "I look for the students to be using it [technology] to showcase their learning and not simply just a worksheet as a PDF." Other observed practices administrators indicated they looked for are the level of student engagement, rich conversation and engagement between the teacher and the students, a higher level of learning, and technology enhancing the lesson. A participant summarized student use of technology with this simple statement, "It's not just if they are using it, but how they are using it." The level of student engagement is telling; but more importantly, has the technology provided a meaningful learning experience that actually addresses the curriculum in a way that could not have been completed without the use of a device?

Research Question 2 Summary

Based on the results of the PTLA survey, administrators indicated a lack of preparedness in the learning and teaching construct and preparedness in the assessment and evaluation construct. The gaps indicated in the learning and teaching portion of the PTLA present an overall lack of preparedness to lead digital learning initiatives with a solid technology-pedagogical knowledge. Focus group discussions support these findings. Learning and teaching directly relates to pedagogical practices, an area where

administrators discussed a weakness; and assessment and evaluation directly relates to observing and providing feedback, an area where administrators discussed with confidence their approach using the walkthrough instrument. The administrators indicated preparedness for modeling effective instructional practices often with the support of their ITF.

Research Question 3

What relationship exists between an administrator's ability to provide feedback to teachers regarding digital learning integration and the administrator's participation in professional development on technology integration?

Survey Data Summary

Research Question 3 was designed to determine the relationship between an administrator's ability to provide feedback to teachers regarding digital learning integration and participation in professional development related to this area. The two PTLA survey questions aligning with Research Question 3 are productivity and professional practice and social, legal, and ethical.

Productivity and professional practice. The productivity and professional practice construct of the PTLA survey addresses the administrator's use of technology resources and the administrator's participation in professional development pertaining to leading digital learning initiatives. There were no notable differences in the gathered data and the data from the original distribution for Survey Question 3, productivity and professional practice (see Table 8). Full chi-square results for productivity and professional practice can be found in Appendix L.

The majority of the surveyed administrators indicated they had participated in

professional development meant to improve or expand their use of technology. Participating administrators also indicated proficiency in the use of digital tools in their professional practice. The results of the productivity and professional practice survey items indicate a positive relationship in participating in professional development activities focused on the use of digital resources within the classroom. Additionally, there were positive relationships between participating administrators' use of digital tools for themselves and encouraging teachers to utilize the tools in their teaching practices.

Social, legal, and ethical issues. The final construct of the PTLA survey addresses technology leadership through the lens of social, legal, and ethical issues. Two of the seven survey items have distributions which differ from the original distribution at the 0.05 level of significance. Participating administrators indicated a lack of preparedness to (a) ensure equity of technology access and (b) support the use of technology to help meet the needs of special education students. For both, the number of principals indicating a lack of preparation was higher than expected.

It is noted in four of the seven remaining constructs of the social, legal, and ethical portion of the PTLA that the results are not considerably different from the original survey data; however, within these constructs, the majority, more than half, of the surveyed administrators indicated they were not prepared (see Table 7). Overall, the results indicated a lack of preparedness to deliver feedback or hold discussions concerning the specific topics related to social, legal, and ethical concerns. The full results for each of the chi-square analyses are provided in Appendix K. The lack of preparedness in the social, legal, and ethical construct of the PTLA necessitates professional development for the participating administrators in order to lead successful

digital teaching and learning initiatives in this area.

Focus Group Summary

Focus group discussions indicted participating principals had attended professional development at both the local and state levels; however, the local efforts are what drive the administrators' ability to provide feedback to teachers regarding digital teaching and learning integration. State provided professional development conferences such as the North Carolina Technology in Education Conference (NCTiES), online professional development provided by the Friday Institute, and the state-initiated IMPACT 5 grant were specifically mentioned as professional development programs in which the administrators in the focus groups had participated. Local efforts discussed by focus group participants include an annual Digital Teaching and Learning Conference (DTLC), beginning principal support PLCs, and the local initiatives provided through the technology department and district strategic plan. The amount of time that had passed since being a classroom teacher and the lack of preparation for leading digital learning initiatives from principal preparation programs were discussed among the administrators.

Each of the participating administrators discussed using the district walkthrough instrument as a form of feedback. One administrator discussed the area of the walkthrough form that specifically provides information about technology use in the classroom. The form provides details about the type of technology being used and includes a short answer portion where the person completing the walkthrough can give specific details about how students are using the technology. This administrator then discussed how the short walkthrough is "layered" with other types of feedback such as face-to-face conversations and formal evaluations. Emphasis was placed on the

importance of helping teachers to be reflective in their practice when it comes to technology integration.

Another member also discussed using the district walkthrough form to provide informal feedback to teachers about specific technology integration in classrooms. The administrator has adapted the walkthrough instrument to include the SAMR model for technology integration. The SAMR model discusses integration at four different levels with level one being substitution, the most basic use of technology, and level four being redefinition, the most complex use of the digital resources. The redefinition level of technology integration provides educational opportunity that could not be completed without the use of the digital resource. The second and third levels of integration are augmentation and modification. As a teacher designs instruction and student tasks moving through the levels of the SAMR model, the student task becomes more of a creative, critical thinking process.

The district walkthrough protocol has been used by administrators to graph the use of technology throughout the building. The data drive feedback conversations with individuals or groups of teachers.

During the focus groups, the administrators discussed providing feedback during grade-level meetings and through the planning process. When looking at lesson plans, they pose questions such as, “have you ever thought about or considered . . . ?” Each of the administrators also discussed the use of the ITFs and instructional coaches to deliver feedback. Feedback delivered from the coaches is perceived by teachers to be more supportive and less evaluative than when coming from an administrator.

Research Question 3 Summary

Based on the results of the PTLA and focus group discussions, participation in technology related professional development at both the state and district level have impacted the participating administrators positively in leading digital learning initiatives at the school level in the area of providing feedback to teachers. Participating administrators indicated partnering with support personnel such as the ITF or instructional coach to assist in delivering feedback to teachers. According to the PTLA results, further professional development is needed in order to provide feedback in the area of social, legal, and ethical practices.

Chapter 5: Discussion

Discussion

Administrators are the instructional leaders of their schools, and their vision and leadership is essential to successfully implementing and sustaining digital learning initiatives. The purpose of this study was to identify gaps in administrator preparedness for evaluating the use of digital resources in the classroom, specifically in the areas of offering constructive feedback, modeling instruction in a digitally rich environment, and building the administrator's capacity to lead digital learning initiatives at the school level.

The research questions to be answered through this study were

1. What gaps exist in an administrator's preparedness for leading digital learning initiatives, in each of the five strands of the ISTE-A standards, at the school level as indicated by the PTLA?
2. What are principal perceptions of their preparedness to evaluate teachers, provide constructive feedback, and model effective instruction in a digitally rich environment?
3. What relationship exists between an administrator's ability to provide feedback to teachers regarding digital learning integration and the administrator's participation in professional development on technology integration?

The study queried principals and assistant principals who were serving as administrators in device-rich schools during the 2017-2018 school year. For the purpose of this investigation, device-rich schools are schools with a one to one device to student ratio; however, the devices do not travel between the school and home and do not loop

with the student from one grade level to the next as they do in a true one to one environment. The research was conducted in two parts, a survey and focus groups. Both portions were used to identify existing gaps in administrator preparedness for leading digital learning initiatives within their schools as aligned to the ISTE-A standards; to identify administrator perceptions of preparedness for observing, modeling, and providing feedback to teachers in a device-rich setting; and to identify any potential relationships between the administrator's ability to provide quality feedback and their participation in technology related professional development.

The findings from this research could be used to inform the participating district's professional development initiatives for administrators and planning future technology initiatives. The results of the study will be added to the body of research surrounding administrator readiness to lead digital learning initiatives and will inform of the professional development needs as related to the ISTE-A standards and Digital Learning Competencies.

Summary of Research Question 1 Findings

The first research question sought to identify gaps in administrator preparedness for leading digital learning initiatives in each of the five strands of the ISTE-A standards at the school level as indicated by the PTLA survey. Combined results from the PTLA and focus group data revealed a lack of preparation in four areas of the ISTE-A standards: visionary leadership, digital-age learning culture, systemic improvement, and digital citizenship.

Visionary leadership. Sustaining digital teaching and learning initiatives within a school rests in the hands of an effective visionary leader who has the capacity to inspire

change in systems, processes, and pedagogical practices. Data from the PTLA survey coupled with focus group findings revealed a gap in administrator preparedness in the ISTE-A standard of visionary leadership. The investigation revealed that participating administrators were not prepared to participate in the "technology planning process, communicate district or school technology related initiatives to all stakeholders, or advocate for the inclusion of research based best practices in the school improvement planning process" (Castle, 2009, p. 3). Grady (2011) discussed shaping a vision for technology integration in a device-rich environment that involves all stakeholders at both the school and district levels is a critical piece in sustaining effective practices for digital teaching and learning.

Research has shown that visionary leaders have a strong knowledge of best pedagogical practices for teaching and learning, and they are proficient in communicating this vision to their teachers (Curcio, 2016). Fisher (2013) noted a strong visionary leader positively impacts teacher abilities to integrate technology into instructional practices. Administrators who demonstrate solid leadership and vision for technology integration are more effective in ensuring technology integration among teachers (Cummings, 2012; Curcio, 2016; Depew, 2015; Fisher, 2013).

Digital age learning culture. Administrators must have an understanding of best practices for teaching and learning when integrating technology (Shirley & Lenk, 2015). The PTLA and focus group data from surveyed administrators showed limited preparedness for leading best practices in the ISTE-A area of digital age learning culture. Survey results revealed deficits in administrator participation in best practices for the use of technology and advocating for the inclusion of research based instructional practices.

Results from this research are similar to previous research findings which have shown that administrators are not fully prepared to lead teachers in their technology-pedagogical knowledge (Depew, 2015; Rivard, 2010).

This research revealed that surveyed administrators relied on the knowledge of their ITFs to help fill the gap in their limited knowledge of technology integration; however, this support is only available for a limited amount of time at each school. The results align with previous research and support the need for additional support personnel such as the ITF to effectively lead and sustain digital teaching and learning initiatives (Rivard, 2010). Administrators with the capacity to promote best practices in a digital age learning environment are equipped with an understanding of technology-pedagogical practices and can create a culture that sustains change in teaching practices (Depew, 2015).

Survey results indicated a sense of preparedness from administrators in the daily use of technology for productivity and professional practice such as using technology as a means of communication or using "technology based management systems to access staff and student records." In previous studies, this has emerged as a strength for many principals (Grey-Bowen, 2010; Rivard, 2010)

Systemic improvement. Systemic improvement relates to the district- and building-level management systems, allocation of funds for meeting technology initiatives, and understanding of hardware and software systems. Typically, districts employ workers specialized in this trade to offer technology support in the hardware and software areas (Curcio, 2016); however, an administrator who is knowledgeable of the resources needed to manage and operate technology infrastructure and devices can

advocate for the specific needs within their building and assist teachers with troubleshooting technical difficulties. Administrators in the study showed limited preparation in areas related to systemic improvement. Survey results revealed participating administrators were not prepared to ensure "hardware and software replacement and upgrades were included in the school improvement plan," and they were not prepared to advocate at the district level for adequate, timely, and high-quality technology support services. The results are similar to previous research findings in the area of district- and building-level technology integration. In order to lead digital teaching and learning initiatives, building-level administrators should have a working knowledge and understanding for aligning district and school related technology plans to instructional practices (Klimczak, 2015; Rivard, 2010) and establish clear goals for the use of technology within their building (Grady, 2011).

This information coupled with the absence of preparedness from administrators in areas related to leadership and vision indicates an overall deficit in the area of systemic improvement for leading digital learning initiatives at the school level. Similar studies revealed administrators perceived themselves to have limited capabilities to lead sustained changes in digital teaching and learning practices (Klimczak, 2015; Yu & Prince, 2016).

Digital citizenship. Digital citizenship involves the appropriate use of social media, understanding policies, and promoting the "safe, legal, and ethical use of digital resources" (Castle, 2009, p. 8). Survey and focus group data revealed the administrators lack confidence in their ability oversee digital citizenship in their schools. Participating administrators indicated they were unprepared in many of the survey items within this

construct; however, the results were similar to the original distribution, indicating both the current and originally surveyed administrators perceive a weakness in the area of social, legal and ethical issues related to technology.

Findings from survey results and focus group data indicated that participating administrators were not prepared to implement policies and practices that raise awareness of social, legal, and ethical issues. Surveyed administrators were not prepared to enforce policies related to copyright and intellectual property, address issues related to privacy and online safety, or disseminate information about health concerns related to technology usage. Research from Fisher (2013) revealed a different perception from surveyed administrators. Participants in Fisher's study perceived themselves to be proficient in the area of digital citizenship when considering leading digital teaching and learning initiatives.

Earlier studies revealed the need for professional development for administrators in the area of digital citizenship (Grey-Bowen, 2010; Rivard, 2010), while a study conducted by Cummings (2012) placed the least amount of importance in this area when it came to leading digital teaching and learning initiatives.

Summary of Research Question 2 Findings

Research Question 2 investigated administrator perceptions of their preparedness to evaluate teachers, provide constructive feedback for improved classroom practices, and model effective instruction in a digitally rich classroom environment. Combined PTLA and focus group results revealed participating administrators consider themselves not prepared in the area of teaching and learning but prepared in the area of assessment and evaluation.

Teaching and learning directly relates to instructional leadership and understanding pedagogical practices with technology integration in mind. A strong instructional leader is required to lead digital learning initiatives (Gibson, 2015). An instructional leader is one who sets clear goals, has the capacity to model effective pedagogical practices, and provides feedback for improvement (Gibson, 2015; Jenkins, 2009; Spiro, 2013). When leading digital learning initiatives, an instructional leader must possess the same qualities; however, they must be equipped to implement technology related pedagogical practices, model technology integration, and provide professional development opportunities for teachers relating to the implementation of digital resources in the classroom (Curcio, 2016; Fisher, 2013). PTLA survey data revealed that participating administrators were not confident in their technology-pedagogy best practices for learning in teaching; therefore, during focus group sessions, the administrators discussed partnering with their ITFs to provide teachers with examples of technology integration. These findings are consistent with previous research revealing the same level of unpreparedness (Depew, 2015; Rivard, 2010).

The results of the study revealed administrators perceived a level of preparedness to model and provide feedback to teachers regarding technology integration, often utilizing their ITF and teacher leaders to model best practices for technology integration. A study conducted by Curcio (2016) discussed the use of teacher leaders as an effective way to model technology integration. Additionally, research from Spiro (2013) discussed that effective administrative practices include capitalizing on teacher leaders to model effective instructional practices. During focus groups, administrators discussed, at length, having the capability to provide feedback through the use of a district provided

walkthrough instrument. Participating administrators discussed tailoring the walkthrough instrument to meet the needs of the teachers in their building.

When conducting walkthroughs or evaluating teachers on the effective use of technology in the classroom, administrators in the study indicated looking for student engagement as a key indicator. Similarly, in an earlier study conducted by Rivard (2010), student engagement emerged as an indicator of successful technology integration.

Summary of Research Question 3 Findings

Research Question 3 explored the relationship between an administrator's perceived ability to provide feedback to teachers regarding digital learning integration and the administrator's participation in professional development related to these areas. Administrator preparation programs often lack a digital teaching and learning component focusing on leading digital learning initiatives (Esplin, 2017; Lewis, 2010; Metcalf & LaFrance, 2013; Miller, 2007). Due to this lack of preparation, professional development for administrators in the area of leading digital learning initiatives is needed (Grady, 2011; Grey-Bowen, 2010; Shirley & Lenk, 2015).

The study revealed participation in local and state level professional development had positively impacted the administrators in regard to leading digital teaching and learning initiatives. Considering their perceived ability to provide feedback, administrators in the study revealed the greatest professional development impact at the local level through the district provided walkthrough protocol. Participating administrators discussed personalizing the walkthrough instrument to meet the needs of their teachers. The walkthrough instrument has an area specifically designed to review technology integration in the classroom. Further research into using a walkthrough

instrument to provide feedback for technology integration is needed.

Findings from this study are consistent with previous research in support of professional development for administrators in leading digital learning initiatives. As principals are provided with specific professional development based on their personal deficits in technology integration within the classroom, their capabilities for leading digital learning initiatives are positively impacted (Carey, 2010; Rivard, 2010).

Limitations and Delimitations

Limitations in this study were those restricted by the design of the research. The researcher limited the participation of the current study to elementary and middle school principals and assistant principals within the researched district. The research in this study was limited to 24 elementary and middle school principals and assistant principals in a rural school district located in the western foothills of North Carolina during the 2017-1018 school year. A portion of the participating administrators had been moved to different schools prior to the 2018-2019 school year when the study was conducted. This change in placement could have influenced administrator participation.

The coursework provided to administrators during their administrative preparation program and the amount of previous preparation or training in regard to leading digital learning initiatives at the school level is another perceived limitation to this study. Furthermore, the years of experience participating administrators had been in the field was not taken into consideration.

The researcher, who did not participate in this study, is a principal in the district; therefore, a peer of the participants in the survey and focus groups. Due to this relationship, the researcher sought out the assistance of the chief information officer to

conduct the focus group sessions. Although participation was optional and the individual survey results remained anonymous, it is possible that the researcher's association with the researched district may have been a limiting influence on the study.

Recommendations

The role of building-level administrators in leading digital learning initiatives is paramount. They lead the charge in shaping a vision for sustained integration of technology into pedagogical practices and ensure teachers have the needed resources for classroom implementation. Based on the findings of the survey and focus group data, it can be recommended that administrators in charge of leading digital learning initiatives be provided with explicit professional development in the five areas of the ISTE-A standards. The research revealed local professional development initiatives to be most impactful. Districts should align local professional development efforts with their strategic plans for technology integration and offer personalized professional development to support growth in administrator deficits.

The current research revealed gaps in four of the five areas of the ISTE-A standards for administrators. It is recommended that specific and specialized professional development be provided for participating administrators in the areas of visionary leadership, digital age learning culture, systemic improvement, and digital citizenship, not only in the researched district but also in other districts seeking to improve the quality of instruction with technology integration into instructional practices. The professional development should include best pedagogical practices in digitally rich environments and offer explicit details for providing feedback to teachers to improve their classroom practices.

Each of the participating administrators mentioned the use of a district walkthrough protocol as a means for providing feedback to teachers. Some of the administrators had adapted the walkthrough instrument to specifically identify best practices for technology integration according to the SAMR model. The data from the adapted walkthrough form should be analyzed to determine if devices are being used at higher levels over a period of time. Additional discussions with classroom teachers who are receiving feedback from the walkthrough form would be beneficial in guiding the professional development opportunities for administrators.

While professional development specific to leading digital learning initiatives provides administrators with a skillset for understanding and promoting technology integration, technology advances so rapidly that they continue to have a limited knowledge in this area. For this reason, administrators rely on the content and pedagogical knowledge of their ITF to help support digital learning initiatives. Therefore, a second recommendation specific to the researched district is restructuring the current ITFs in a way that allows each to spend more quality time in their assigned school or hire additional ITFs to serve in this capacity. Each of the administrators participating in the focus groups discussed relying heavily on their ITF to assist with modeling best practices and providing feedback to teachers for technology integration. Providing more building-level support would ensure that any vision set forth for digital learning initiatives is achieved in a timely manner.

Further Research

Additional research to identify administrator gaps in preparedness to lead digital learning initiatives should be conducted with a larger body of participants. Due to the

dated PTLA which was created in 2009, it is recommended that an updated survey be created and aligned with the updated ISTE-A standards. In North Carolina, a more detailed survey could be created to include the North Carolina Digital Learning Competencies. Updated surveys would provide more specific information into the needs of building-level administrators leading digital learning initiatives. An administrator's years of experience should also be taken into consideration when conducting further research.

Research participants discussed the use of a walkthrough protocol as a means for delivering feedback during their focus group sessions. Additional research on the use of such instruments should be conducted to determine the effectiveness of their use, as there is limited research in this area.

Participating administrators discussed a partnership with their ITF in leading digital learning initiatives at the school level; however, the amount of time the ITF spends at each school is limited. Additional research should be conducted to determine the appropriate amount of time support personnel, such as the ITF, spend at each school in relation to implementing sustained changes in teaching practices.

Summary

The role of the building-level administrator has shifted from a managerial leader to an instructional leader. With the increasing amount of technology in classrooms, the instructional leader must be proficient in their personal use of digital resources and have the capacity to lead digital learning initiatives with the effective pedagogical practices. The results of the study indicated gaps in building-level administrator preparedness for leading such initiatives. In an effort to fill the gaps, administrators rely on the knowledge

and expertise of their support personnel to assist in modeling instruction and providing feedback to teachers and encouraging the effective use of technology in a digitally rich classroom environment. Professional development for administrators is an important piece to increasing administrator proficiency in technology integration. Unique opportunities that are specific to the professional development needs of the administrator should be offered.

In conclusion, building-level administrators with a strong vision for digital teaching and learning and the capacity to model effective instructional practices with technology in mind have the greatest potential for leading and sustaining successful digital learning initiatives at the school level. Administrators who have a strong partnership with their support personnel, such as the ITF, work together to fill their gaps in preparedness for leading best practices in teaching and learning while integrating technology into digitally rich classroom environments. Technology alone does not shift teaching practices and learning outcomes. The shift in these practices begins with visionary leadership from the building-level administrator who understands and models best pedagogical practices in a digitally rich environment.

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Appendix A

Principals Technology Leadership Assessment

Principal's Technology Leadership Survey - CONSENT

Informed Consent
Project Title: Administrator's Perception of Their Preparedness to Lead Digital Learning Initiatives Through Observing, Modeling and Providing feedback for the Effective Utilization of Technology in a Digitally Rich Environment

Researcher: Kristin Edwards
Department Title: Educational Leadership
Contact Information: Dr. Laura Boyles

Purpose of Research:
The purpose of this study is to identify gaps in administrative preparedness for evaluating the use of digital resources in the classroom, specifically in the areas of offering constructive feedback, modeling instruction in a digitally rich environment, and building the administrator's capacity to lead digital learning initiatives at the school level.

Procedure:
Should you agree to participate in the anonymous survey with the above mentioned purpose, you will be asked complete a Google Form survey requiring approximately 15 minutes to complete. The survey data will be used to inform and answer the following research questions.

RQ1 What gaps exist in an administrator's preparedness for leading digital learning initiatives, in each of the five strands of the ISTE-A standards, at the school level as indicated by the Principals Technology Leadership Assessment (PTLA)?

RQ2 What are the principal's perceptions of their preparedness to evaluate teachers, provide constructive feedback, and model effective instruction in a digitally rich environment?

RQ3 What relationship exists between an administrator's ability to provide feedback to teachers regarding digital learning integration and the administrator's participation in professional development on technology integration?

Time Required:
It is anticipated that the anonymous online survey will require about 15 minutes of your time.

Voluntary Participation
Participation in this study is voluntary. You have the right to withdraw from the research study at any time without penalty. You also have the right to refuse to answer any question(s) for any reason without penalty. If you choose to withdraw, you may request that any of your data which has been collected be destroyed unless it is in a de-identified state.

Confidentiality:
Data collected from the initial survey will be collected via an anonymous Google Form. The information that you give in the study will be handled confidentially. Your data will be anonymous which means that your name will not be collected or linked to the data. The anonymous raw survey data will be viewed by the researcher only, will be stored electronically on the researcher's Google Drive, and will be destroyed (permanently deleted) within six months completion of the dissertation and approval of final defense.

Risks:
There are no known risks to the individuals participating in this in-depth research study.

Benefits:
There are no direct benefits to you for your participation in this study. Your participation will provide to the body of research surrounding the preparedness of administrators to lead digital learning initiatives within their schools as aligned to the NETS-A standards. The Institutional Review Board at Gardner-Webb University has determined that participation in this study poses minimal risk to participants.

Payment:
You will receive no payment for participating in the stud

Right to Withdraw From the Study:
You have the right to withdraw from the study at any time without penalty. However, once you submit the

anonymous survey data it will not be able to be retrieved and will remain a part of the data collection.

If you have questions about the study, contact the following individuals:
Kristin Edwards
Educational Leadership
Gardner-Webb University
Boiling Springs, NC 28017

Dr. Laura Boyles
Educational Leadership
Gardner-Webb University
Boiling Springs, NC 28017

Voluntary Consent by Participant
I have read the information in this consent form and fully understand the contents of this document. I have had a chance to ask any questions concerning this study and they have been answered for me.

* Required

1. **Voluntary Consent** *
   Mark only one oval.

   ◯ I agree to participate in the confidential survey. (By choosing agree you will be taken to the survey) *Skip to "Principal's Technology Leadership Survey."*

   ◯ I do not agree to participate in the confidential survey. (This option will exit the survey) *Skip to "You have chosen not to participate in the survey.."*

Principal's Technology Leadership Survey

PURPOSE
You are being given this technology leadership assessment at the request of Kristin Edwards, a Gardner-Webb University Doctoral Candidate, researching administrator's preparedness to lead digital learning initiatives in a device-rich environment. The results of this survey will be combined with the results from focus group interviews to inform the candidate's research.

As you answer the questions, think of your actual behavior over the course of the last school year, 2017-2018. 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.

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 this survey is approximately 15 minutes.

I. Leadership and Vison

2. **Answer the following statements in regard to Leadership and Vision** *

Mark only one oval per row.

	1. Not at all	2. Minimally	3. Somewhat	4. Significantly	5. Fully
1. To what extent did you participate in your district's or school's most recent technology planning process?					
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?					
3. To what extent did you promote participation of your school's stakeholders in the technology planning process of your school or district?					
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?					
5. To what extent did you advocate for inclusion of research-based technology practices in your school improvement plan?					
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)?					

II. Learning and Teaching

3. **Answer the following in regard to Learning and Teaching** *

Mark only one oval per row.

	1. Not at all	2. Minimally	3. Somewhat	4. Significantly	5. Fully
1. To what extent did you provide or make available assistance to teachers to use technology for interpreting and analyzing student assessment data?					
2. To what extent did you provide or make available assistance to teachers for using student assessment data to modify instruction?					
3. To what extent did you disseminate or model best practices in learning and teaching with technology to faculty and staff?					
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?					
5. To what extent did you organize or conduct assessments of staff needs related to professional development on the use of technology?					
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 and Professional Practice

4. **Answer the following in regard to Productivity & Professional Practice** *

Mark only one oval per row.

	1. Not at all	2. Minimally	3. Somewhat	4. Significantly	5. Fully
1. To what extent did you participate in professional development activities meant to improve or expand your use of technology?					
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)?					
3. To what extent did you use technology-based management systems to access staff/faculty personnel records?					
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, videoconferences) as a means of communicating with education stakeholders, including peers, experts, students, parents/guardians, and the community?					

IV. Support, Management, and Operations

5. **Answer the following in regard to Support, Management, & Operations** *

Mark only one oval per row.

	1. Not at all	2. Minimally	3. Somewhat	4. Significantly	5. Fully
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)?					
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?					
4. To what extent did you ensure that hardware and software replacement/upgrades were incorporated into school technology plans?					
5. To what extent did you advocate at the district level for adequate, timely, and high-quality technology support services?					
6. To what extent did you investigate how satisfied faculty and staff were with the technology support services provided by your district/school?					

V. Assessment and Evaluation

6. **Answer the following in regard to Assessment & Evaluation** *

Mark only one oval per row.

	1. Not at all	2. Minimally	3. Somewhat	4. Significantly	5. Fully
1. To what extent did you promote or model technology-based systems to collect student assessment data?					
2. To what extent did you promote the evaluation of instructional practices, including technology-based practices, to assess their effectiveness?					
3. To what extent did you assess and evaluate existing technology-based administrative and operations systems for modification or upgrade?					
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?					

VI. Social, Legal, and Ethical Issues

7. **Answer the following in regard to Social, Legal, & Ethical Issues** *

Mark only one oval per row.

	1. Not at all	2. Minimally	3. Somewhat	4. Significantly	5. Fully
1. To what extent did you work to ensure equity of technology access and use in your school?					
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?					
3. To what extent were you in involved in enforcing policies related to copyright and intellectual property?					
4. To what extent were you involved in addressing issues related to privacy and online safety?					
5. To what extent did you support the use of technology to help meet the needs of special education students?					
6. To what extent did you support the use of technology to assist in the delivery of individualized education programs for all students?					
7. To what extent did you disseminate information about health concerns related to technology and computer usage in classrooms and offices?					

Skip to "Thank you for your participation in this anonymous survey.."

You have chosen not to participate in the survey.

Thank you for your participation in this anonymous survey.

Appendix B

Email for Participation in PTLA Survey

Dear Principal or Assistant Principal,

As a doctoral candidate at Gardner-Webb University, I am conducting a study in regard to administrators leading digital learning initiatives through observing, modeling and providing feedback for the effective utilization of technology in a digitally rich environment.

You are being asked to participate in an anonymous digital survey because you were serving as a Principal or Assistant Principal in an elementary or middle school during the 2017-2018 school year.

The study has been approved by the school district and the Institutional Review Board of Gardner-Webb University. Your insight and feedback to leading digital learning initiatives will be valuable to the study.

Participation in the anonymous survey is optional. Should you choose to participate, you can access the survey from the link below where you will be prompted to consent to or decline participation. The survey takes approximately 15 minutes to complete and will remain open through Friday, September 28, 2018.

Thank you in advance for your consideration.

Link to survey: https://goo.gl/forms/iJOm6ViVxxoaYbY22

Sincerely,

Kristin Edwards
Doctoral Candidate
Gardner-Webb University

Appendix C

Email for Participation in Focus Groups

Dear Principal or Assistant Principal,

As a doctoral candidate at Gardner-Webb University, I am conducting a study in regard to administrators leading digital learning initiatives through observing, modeling and providing feedback for the effective utilization of technology in a digitally rich environment.

You are being asked to participate in one of three focus groups because you were serving as a Principal or Assistant Principal in an elementary or middle school during the 2017-2018 school year. The focus groups will convene on Tuesday, October 2nd and Tuesday, October 9th at 3:15 pm at the Olive Hill Resource Center.

The Chief Information Officer will be organizing and conducting the focus groups. Groups will be limited to eight participants. If you are interested in participating in the focus groups, please provide your contact information using this form <INSERT LINK TO FORM>.

The study has been approved by the school district and the Institutional Review Board of Gardner-Webb University. Your insight and feedback to leading digital learning initiatives will be valuable to the study. Participation in the focus group is optional.

Thank you in advance for your consideration.

Sincerely,

Kristin Edwards
Doctoral Candidate
Gardner-Webb University

Appendix D

Follow-Up Email for Participation in Survey

This email serves as a reminder for any principal who served in an elementary or middle school setting during the 2017 - 2018 school year and wishes to participate in this anonymous survey.

Thank you to any administrator who has completed the survey.

Dear Principal or Assistant Principal,

As a doctoral candidate at Gardner-Webb University, I am conducting a study in regard to administrators leading digital learning initiatives through observing, modeling and providing feedback for the effective utilization of technology in a digitally rich environment.

You are being asked to participate in an anonymous digital survey because you were serving as a Principal or Assistant Principal in an elementary or middle school during the 2017-2018 school year.

The study has been approved by the school district and the Institutional Review Board of Gardner-Webb University. Your insight and feedback to leading digital learning initiatives will be valuable to the study.

Participation in the anonymous survey is optional. Should you choose to participate, you can access the survey from the link below where you will be prompted to consent to or decline participation. The survey takes approximately 15 minutes to complete and will remain open through Friday, September 28, 2018.

Thank you in advance for your consideration.

Link to survey: https://goo.gl/forms/iJOm6ViVxxoaYbY22

Sincerely,

Kristin Edwards
Doctoral Candidate
Gardner-Webb University

Appendix E

Follow-Up Email for Participation in Focus Group

This email serves as a reminder for any principal who served in an elementary or middle school setting during the 2017 - 2018 school year and wishes to participate in a focus group in regard to leading digital learning initiatives through observing, modeling and providing feedback for the effective utilization of technology in a digitally rich environment.

Thank you to any administrator who has already agreed to participate in the focus group.

Dear Principal or Assistant Principal,

As a doctoral candidate at Gardner-Webb University, I am conducting a study in regard to administrators leading digital learning initiatives through observing, modeling and providing feedback for the effective utilization of technology in a digitally rich environment.

You are being asked to participate in one of three focus groups because you were serving as a Principal or Assistant Principal in an elementary or middle school during the 2017-2018 school year. The focus groups will convene on Tuesday, October 2nd and Tuesday, October 9th at 3:15 pm at the Olive Hill Resource Center.

The Chief Information Officer will be organizing and conducting the focus groups. Groups will be limited to eight participants. If you are interested in participating in the focus groups, please provide your contact information using this form <INSERT LINK TO FORM>.

The study has been approved by the school district and the Institutional Review Board of Gardner-Webb University. Your insight and feedback to leading digital learning initiatives will be valuable to the study. Participation in the focus group is optional.

Thank you in advance for your consideration.

Sincerely,

Kristin Edwards
Doctoral Candidate
Gardner-Webb University

Appendix F

Focus Group Informed Consent

Project Title:
Administrator's Perception of Their Preparedness to Lead Digital Learning Initiatives Through Observing, Modeling and Providing feedback for the Effective Utilization of Technology in a Digitally Rich Environment

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Researcher: Kristin Edwards
Department Title: Educational Leadership
Contact Information: Dr. Laura Boyles

Purpose of Research:
The purpose of this study is to identify gaps in administrative preparedness for evaluating the use of digital resources in the classroom, specifically in the areas of offering constructive feedback, modeling instruction in a digitally rich environment, and building the administrator's capacity to lead digital learning initiatives at the school level.

Procedure:
Should you agree to participate in the focus group with the above-mentioned purpose, you will be asked to participate in a one-hour long focus group facilitated by The Chief Information Officer. Focus group questions have been developed in an effort to examine the following research questions:

> **RQ1** What gaps exist in an administrator's preparedness for leading digital learning initiatives, in each of the five strands of the ISTE-A standards, at the school level as indicated by the Principals Technology Leadership Assessment (PTLA)?
>
> **RQ2** What are principal perceptions of their preparedness to evaluate teachers, provide constructive feedback, and model effective instruction in a digitally rich environment?
>
> **RQ3** What relationship exists between an administrator's ability to provide feedback to teachers regarding digital learning integration and the administrator's participation in professional development on technology integration?

Time Required:
It is anticipated that the anonymous online survey will require about 1 hour of your time.

Voluntary Participation
Participation in this study is voluntary. You have the right to withdraw from the research study at any time without penalty. You also have the right to refuse to answer any question(s) for any reason without penalty. If you choose to withdraw, you may request that any of your data which has been collected be destroyed unless it is in a de-identified state.

Confidentiality:
Participants in the focus group will be recorded using quicktime voice record on the hard drive of the researcher's MacBook. The audio files will be backed up to an external drive to prevent data from being deleted. Upon completion of the audio recording only the researcher will have access to the files. At no time will the audio recording be shared with or heard by anyone other than the researcher. Both the MacBook and external drive will be password protected. Both sets of audio recorded data will be destroyed (permanently deleted) within six months of completion of the dissertation and approval of final defense.

Risks:
There are no known risks to the individuals participating in this in-depth research study.

Benefits:
There are no direct benefits to you for your participation in this study. Your participation will provide to the body of research surrounding the preparedness of administrators to lead digital learning initiatives within their schools as aligned to the NETS-A standards. The Institutional Review Board at Gardner-Webb University has determined that participation in this study poses minimal risk to participants.

Payment:
You will receive no payment for participating in the study.

Right to Withdraw from the Study:
You have the right to withdraw from the study at any time without penalty. If you wish to withdraw prior to participating in the focus group, please notify The Chief Information Officer. If you wish to withdraw during the focus group interview, please notify The Chief Information Officer and leave the room. However, because this is an anonymous focus group your individual responses previously recorded will remain a part of the study.

If you have questions about the study, contact the following individuals:
Kristin Edwards
Educational Leadership
Gardner-Webb University
Boiling Springs, NC 28017
XXXXXXXXX

Dr. Laura Boyles
Educational Leadership
Gardner-Webb University
Boiling Springs, NC 28017
XXXXXXXXX

If the research design of the study necessitates that its full scope is not explained prior to participation, it will be explained to you after completion of the study. If

you have concerns about your rights or how you are being treated, or if you have questions, want more information, or have suggestions, please contact the IRB Institutional Administrator listed below.

Dr. Sydney Brown, Dean
IRB Institutional Administrator
Gardner-Webb University
Boiling Springs, NC 28017
XXXXXXXX

Voluntary Consent by Participant

I have read the information in this consent form and fully understand the contents of this document. I have had a chance to ask any questions concerning this study and they have been answered for me.

_____ I agree to participate in the focus group.

_____ I do not agree to participate in the focus group. I understand that this focus group may be audio recorded for purposes of accuracy. The audio recording will be transcribed and destroyed.

_____ Date: _____

Participant Printed Name

_____ Date: _____

Participant Signature

You will receive a copy of this form for your records.

Appendix G

Focus Group Script

Good afternoon. On behalf of Mrs. Edwards, thank you for being here today. As you all know, I am XXXXXXXXXXXX, Chief Information Officer, and I will be serving as the moderator of today's focus group. The topic we will be discussing is administrator perceptions of preparedness for leading digital learning initiatives at the school level. The results of the study will be added to the body of research surrounding administrator preparedness for leading digital learning initiatives and will inform of the professional development needs as related to the ISTE-A and Digital Learning Competencies. You were selected to participate in this focus group because you were serving as a building level administrator in a device rich school during the 2017-2018 school year. Please take a moment to respond to the Poll Everywhere survey question that has been posted. (Question: Which of the following best describes you in regard to your ability to lead digital learning? A.) I am proficient and could teacher others, B.) I am proficient C.) I am somewhat proficient D.) I am not proficient)

Before we begin with our questions I want to discuss a few guiding principles of the group discussion. For the purpose of this study there are no correct or incorrect answers. You are simply providing your perspective of leading in a device rich environment. You may or may not agree with another person's point of view; however, I ask that you remain respectful throughout the duration of the focus group. Please turn your cell phones off or on silent. If for some reason you must step away due to an emergency, please quietly return to the conversation in the least disruptive manner.

Today's discussion is being recorded for research purposes. No one other than Mrs. Edwards will hear or have access to the recordings, and they will be permanently deleted within six months of Mrs. Edwards final defense and successful completion of her dissertation studies.

Let's begin with introductions. Please state your name and the number of years you have been in administration.

Key Question 1: How did you apply your understanding of the ISTE-A and NC Digital Learning Competencies for Administrators in leading digital learning initiatives during the 2017-2018 school year?

Follow up Question: (If needed) What action steps did you take for leading digital learning initiatives?

Probing Question: (If needed) Has anyone else had a similar experience with leading digital learning initiatives?

Key Question 2: In what ways do you feel least prepared for leading digital learning initiatives within your school during the 2017-2018 school year?

Follow up Question: (If needed) What was it that prepared you to lead digital learning initiatives?

Probing Question: (If needed) Does anyone feel unprepared for leading such initiatives?

Key Question 3: In what ways do you model effective instructional practices involving technology integration?

Follow up Question: Why did you choose that method for modeling?

Probing Question: (If needed) Does anyone model effective instructional practices involving technology integration differently?

Key Question 4: When observing a digitally rich classroom environment, what do you look for in instructional practices?

Follow up Question: (If needed) Why are those instructional practices important for teaching in a device rich environment?

Probing Question: Does anyone look for something different?

Key Question 5: How do you provide feedback for improved classroom practices to teachers in regards to instructional technology?

Follow up Question: (If needed) Why did you choose that method for delivering feedback?

Probing Question: Does anyone provide feedback in a similar or different way?

Closing Question: What other items do you feel are important in leading digital learning initiatives?

Thank you for your time and participation in this confidential focus group.

Appendix H

Original PTLA Distributions

Percentage Responses for Construct 1 Leadership & Vision

Survey Item	Not At All	Minimally	Somewhat	Significantly	Fully
4. To what extent did you participate in your district's or school's most recent technology planning process?	12	4	32	40	12
5. To what extent did you communicate information about your district's or school's technology planning and implementation efforts to your school's stakeholders?	0	4	28	60	8
6. To what extent did you promote participation of your school's stakeholders in the technology planning process of your school or district?	0	8	32	44	16
7. 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	4	32	32	28
8. To what extent did you advocate for inclusion of research-based technology practices in your school improvement plan?	4	8	24	52	12
9. 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)?	0	16	40	40	4

Note: All respondents completed each item N=25

Percentage Responses for Construct 2 Learning & Teaching

Survey Item	Not At All	Minimally	Somewhat	Significantly	Fully
10. To what extent did you provide or make available assistance to teachers to use technology for interpreting and analyzing student assessment data?	0	0	8	40	52
11. To what extent did you provide or make available assistance to teachers for using student assessment data to modify instruction?	0	4	8	48	40
12. To what extent did you disseminate or model best practices in learning and teaching with technology to faculty and staff? *(*N=24 on this item)*	0	0	28	56	12
13. 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?	0	0	8	68	24
14. To what extent did you organize or conduct assessments of staff needs related to professional development on the use of technology?	0	12	32	36	20
15. To what extent did you facilitate or ensure the delivery of professional development on the use of technology to faculty and staff?	0	0	28	44	28

Note: All respondents completed each item N=25 (*except question 12)

Percentage Responses for Construct 3 Productivity & Professional Practice

Survey Item	Not At All	Minimally	Somewhat	Significantly	Fully
16. To what extent did you participate in professional development activities meant to improve or expand your use of technology?	0	0	36	56	8
17. To what extent did you use technology to help complete your day-to-day tasks (e.g., developing budgets, communicating with others, gathering information)?	0	0	16	28	56
18. To what extent did you use technology-based management systems to access staff/faculty personnel records? *Note: N=24 on this item*	0	4	8	44	40
19. To what extent did you use technology-based management systems to access student records?	0	4	8	44	44
20. 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?	0	4	20	32	44

Note: All respondents completed each item N=25

Percentage Responses for Construct 4 Support, Management & Operations

Survey Item	Not At All	Minimally	Somewhat	Significantly	Fully
21. 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)?	0	0	0	60	40
22. To what extent did you allocate campus discretionary funds to help meet the school's technology needs?	0	8	40	52	0
23. To what extent did you pursue supplemental funding to help meet the technology needs of your school?	20	16	32	28	4
24. To what extent did you ensure that hardware and software replacement/upgrades were incorporated into school technology plans?	8	16	32	24	20
25. To what extent did you advocate at the district level for adequate, timely, and high-quality technology support services?	0	12	20	48	20
26. To what extent did you investigate how satisfied faculty and staff were with the technology support services provided by your district/school?	0	4	56	32	8

Note: All respondents completed each item N=25

Percentage Responses for Construct 5 Assessment & Evaluation

Survey Item	Not At All	Minimally	Somewhat	Significantly	Fully
27. To what extent did you promote or model technology-based systems to collect student assessment data?	0	0	20	56	24
28. To what extent did you promote the evaluation of instructional practices, including technology-based practices, to assess their effectiveness?	0	20	36	40	4
29. To what extent did you assess and evaluate existing technology-based administrative and operations systems for modification or upgrade? *Note. N=24 on this item*	12	24	32	20	8
30. 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?	0	8	32	40	20
31. To what extent did you include the effective use of technology as a criterion for assessing the performance of faculty?	0	12	32	40	16

Note: All respondents completed each item N=25 (*except question 29)

Percentage Responses for Construct 6 - Social, Legal, and Ethical Issues

Survey Item	Not At All	Minimally	Somewhat	Significantly	Fully
32. To what extent did you work to ensure equity of technology access and use in your school?	0	0	12	36	48
33. 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?	0	12	44	24	16
34. To what extent were you in involved in enforcing policies related to copyright and intellectual property?	0	20	40	16	20
35. To what extent were you involved in addressing issues related to privacy and online safety?	0	0	44	28	24
36. To what extent did you support the use of technology to help meet the needs of special education students?	0	0	12	44	40
37. To what extent did you support the use of technology to assist in the delivery of individualized education programs for all students?	0	4	24	36	32
38. To what extent did you disseminate information about health concerns related to technology and computer usage in classrooms and offices?	12	48	12	20	4

Note: N= 24 on all items in this construct

Means, Standard Deviations, and Ranges for each of the PTLA Scales

	No. of Items	Possible Range	Actual Range	Mean	Standard Deviation
Leadership & Vision	6	6-30	11-27	21.44	3.798
Learning & Teaching	6	6-30	16-30	24.16	3.375
Productivity & Professional Practice	5	5-25	15-25	20.64	2.660
Support, Management & Operations	6	6-30	15-26	21.16	3.132
Assessment & Evaluation	5	5-25	12-24	17.40	2.843
Social, Legal, & Ethical Issues	7	7-35	0-35	24.80	6.934

Appendix I

PTLA Leadership and Vision Chi-Square Data

Leadership and Vision [1. To what extent did you participate in your district's or school's most recent technology planning process?]

Categories	**Observed**	**Expected**	**(fo-fe)2/fe**
Not Prepared	11	14*.48=6.72	(11-6.72)2/6.72 = 2.726
Prepared	3	14*.52=7.28	(3-7.28)2/7.28 = 2.516
Sum =	14	14	5.242

(1) *Null and Alternative Hypotheses*

The following null and alternative hypotheses need to be tested:

H_0: p_1 = .48, p_2 = .52 $H0$: $p1 = .48$, $p2=.52$

H_aHa: Some of the population proportions differ from the values stated in the null hypothesis

This corresponds to a Chi-Square test for Goodness of Fit.

(2) *Rejection Region*

Based on the information provided, the significance level is $\alpha=.05$, the number of degrees of freedom is $df=2-1=1$, so then the rejection region for this test is $R = \{\chi2 : \chi2 > 3.841\}$.

(3) *Test Statistics*

The Chi-Squared statistic is computed as follows:

$X2 = i = 1 \sum n\ Ei\ (Oi-Ei)\ 2 = 2.726 + 2.516 = 5.242$

The Chi^2 value is 5.242. The p-value is .02205. The result is significant at p < .05.

(4) *Decision about the null hypothesis*

Since it is observed that $\chi2 = 5.242 > \chi c2 = 3.841$, it is then concluded that *the null hypothesis is rejected.*

(5) *Conclusion*

It is concluded that the null hypothesis Ho is *rejected.* Therefore, there is enough evidence to claim that some of the population proportions differ from those stated in the null hypothesis, at the $\alpha=.05$ significance level.

Leadership and Vision [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?]

Categories	Observed	Expected	(fo-fe)2/fe
Not Prepared	9	14*.32=4.48	(9-4.48)2/4.48 = 4.56
Prepared	5	14*.68=9.52	(5-9.52)2/9.52 = 2.146
Sum =	14	14	6.706

(1) *Null and Alternative Hypotheses*

The following null and alternative hypotheses need to be tested:

H_0: p_1 = .32, p_2 = .68*H*0: *p*1 = .32, *p*2 = .68

H_a*Ha*: Some of the population proportions differ from the values stated in the null hypothesis

This corresponds to a Chi-Square test for Goodness of Fit.

(2) *Rejection Region*

Based on the information provided, the significance level is α=.05, the number of degrees of freedom is*df*=2−1=1, so then the rejection region for this test is $R=\{\chi 2:\chi 2>3.841\}$.

(3) *Test Statistics*

The Chi-Squared statistic is computed as follows:

$X2 = i = 1 \sum n\ Ei(Oi-Ei)\ 2 = 4.56 + 2.146 = 6.706$

The Chi^2 value is 6.706. The p-value is .00961. The result is significant at p < .05.

(4) *Decision about the null hypothesis*

Since it is observed that $\chi 2 = 6.706 > \chi c2 = 3.841$, it is then concluded that *the null hypothesis is rejected.*

(5) *Conclusion*

It is concluded that the null hypothesis Ho is *rejected.* Therefore, there is enough evidence to claim that some of the population proportions differ from those stated in the null hypothesis, at the α = .05 significance level.

Leadership and Vision [3. To what extent did you promote participation of your school's stakeholders in the technology planning process of your school or district?]

Categories	Observed	Expected	(fo-fe)2/fe
Not Prepared	9	14*.4=5.6	(9-5.6)2/5.6 = 2.064
Prepared	5	14*.6=8.4	(5-8.4)2/8.4 = 1.376
Sum =	14	14	3.44

(1) *Null and Alternative Hypotheses*

The following null and alternative hypotheses need to be tested:

H_0: p_1 = .4, p_2 = .6 $H0 : p1 = .4, p2 = .6$

H_aHa: Some of the population proportions differ from the values stated in the null hypothesis

This corresponds to a Chi-Square test for Goodness of Fit.

(2) *Rejection Region*

Based on the information provided, the significance level is α=.05, the number of degrees of freedom is df=2−1=1, so then the rejection region for this test is $R=\{\chi 2:\chi 2>3.841\}$.

(3) *Test Statistics*

The Chi-Squared statistic is computed as follows:

$\chi 2= i = 1\sum n\ Ei\ (Oi−Ei)\ 2 = 2.064 + 1.376 = 3.44$

The Chi^2 value is 3.44. The p-value is .06362. The result is not significant at p < .05.

(4) *Decision about the null hypothesis*

Since it is observed that $\chi 2 = 3.44 \leq \chi c\ 2 = 3.841$, it is then concluded that *the null hypothesis is not rejected.*

(5) *Conclusion*

It is concluded that the null hypothesis Ho is *not rejected.* Therefore, there is NOT enough evidence to claim that some of the population proportions differ from those stated in the null hypothesis, at the α=.05 significance level.

Leadership and Vision [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?]

Categories	Observed	Expected	(fo-fe)2/fe
Not Prepared	5	14*.4=5.6	(5-5.6)2/5.6 = 0.064
Prepared	9	14*.6=8.4	(9-8.4)2/8.4 = 0.043
Sum =	14	14	0.107

(1) *Null and Alternative Hypotheses*

The following null and alternative hypotheses need to be tested:

H_0: p_1 = .4, p_2 = .6 $H0 : p1 = .4,\ p2 = .6$

H_a*Ha*: Some of the population proportions differ from the values stated in the null hypothesis

This corresponds to a Chi-Square test for Goodness of Fit.

(2) *Rejection Region*

Based on the information provided, the significance level is α=.05, the number of degrees of freedom is df=2−1=1, so then the rejection region for this test is R={χ2:χ2>3.841}.

(3) *Test Statistics*

The Chi-Squared statistic is computed as follows:

$\chi 2 = i = 1 \sum n\ Ei\ (Oi - Ei)\ 2 = 0.064 + 0.043 = 0.107$

The Chi^2 value is 0.107. The p-value is .74342. The result is not significant at p < .05.

(4) *Decision about the null hypothesis*

Since it is observed that $\chi 2 = 0.107 \leq \chi c2 = 3.841$, it is then concluded that *the null hypothesis is not rejected.*

(5) *Conclusion*

It is concluded that the null hypothesis Ho is *not rejected.* Therefore, there is NOT enough evidence to claim that some of the population proportions differ from those stated in the null hypothesis, at the =.05 significance level.

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

Categories	Observed	Expected	(fo-fe)2/fe
Not Prepared	9	14*.36=5.04	(9-5.04)2/5.04 = 3.111
Prepared	5	14*.64=8.96	(5-8.96)2/8.96 = 1.75
Sum =	14	14	4.862

(1) *Null and Alternative Hypotheses*

The following null and alternative hypotheses need to be tested:

H_0: p_1 = .36, p_2 = .64 $H0 : p1 = .36, p2 = .64$

H_aHa: Some of the population proportions differ from the values stated in the null hypothesis

This corresponds to a Chi-Square test for Goodness of Fit.

(2) *Rejection Region*

Based on the information provided, the significance level is α=.05, the number of degrees of freedom is df=2−1=1, so then the rejection region for this test is R={χ2:χ2>3.841}.

(3) *Test Statistics*

The Chi-Squared statistic is computed as follows:

$\chi 2= i = 1\sum n\ Ei\ (Oi−Ei)\ 2 = 3.111 + 1.75 = 4.862$

The Chi^2 value is 4.862. The p-value is .02746. The result is significant at p < .05.

(4) *Decision about the null hypothesis*

Since it is observed that $\chi 2 = 4.862 > \chi c\ 2 = 3.841$, it is then concluded that *the null hypothesis is rejected.*

(5) *Conclusion*

It is concluded that the null hypothesis Ho is *rejected.* Therefore, there is enough evidence to claim that some of the population proportions differ from those stated in the null hypothesis, at the α=.05 significance level.

Leadership and Vision [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)?]

Categories	Observed	Expected	(fo-fe)2/fe
Not Prepared	9	14*.56=7.84	(9-7.84)2/7.84 = 0.172
Prepared	5	14*.44=6.16	(5-6.16)2/6.16 = 0.218
Sum =	14	14	0.39

(1) *Null and Alternative Hypotheses*

The following null and alternative hypotheses need to be tested:

H_0: p_1 = .56, p_2 = .44 $H0 : p1 = .56, p2 = .44$

H_aHa: Some of the population proportions differ from the values stated in the null hypothesis

This corresponds to a Chi-Square test for Goodness of Fit.

(2) *Rejection Region*

Based on the information provided, the significance level is α=.05, the number of degrees of freedom is df=2−1=1, so then the rejection region for this test is R={χ2:χ2>3.841}.

(3) *Test Statistics*

The Chi-Squared statistic is computed as follows:

$\chi 2= i = 1\sum n\ Ei\ (Oi−Ei)\ 2 = 0.172 + 0.218 = 0.39$

The Chi^2 value is 0.39. The p-value is .53226. The result is not significant at p < .05.

(4) *Decision about the null hypothesis*

Since it is observed that $\chi 2 = 0.39 \leq \chi c2 = 3.841$, it is then concluded that *the null hypothesis is not rejected.*

(5) *Conclusion*

It is concluded that the null hypothesis Ho is *not rejected.* Therefore, there is NOT enough evidence to claim that some of the population proportions differ from those stated in the null hypothesis, at the α=.05 significance level.

Appendix J

PTLA Support, Management, and Operations Chi-Square Data

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)?]

Categories	Observed	Expected	(fo-fe)2/fe
Not Prepared	4	14*0=0	(4-0)2/0 = 0
Prepared	10	14*1=14	(10-14)2/14 = 1.143
Sum =	14	14	0

(1) *Null and Alternative Hypotheses*

The following null and alternative hypotheses need to be tested:

H_0: p_1 = 0, p_2 = 1 $H0 : p1 = 0, p2 =1$

H_aHa: Some of the population proportions differ from the values stated in the null hypothesis

This corresponds to a Chi-Square test for Goodness of Fit.

(2) *Rejection Region*

Based on the information provided, the significance level is α=.05, the number of degrees of freedom is df=2−1=1, so then the rejection region for this test is $R=\{\chi 2:\chi 2>3.841\}$.

(3) *Test Statistics*

The Chi-Squared statistic is computed as follows:

$\chi 2= i = 1\sum n\ Ei\ (Oi−Ei)\ 2 = 0 + 1.143 = 0$

The Chi^2 value is ∞. The p-value is < .00001. The result is significant at p < .05.

(4) *Decision about the null hypothesis*

Since it is observed that $\chi 2 = 0 \leq \chi c2 = 3.841$, it is then concluded that *the null hypothesis is not rejected.*

(5) *Conclusion*

It is concluded that the null hypothesis Ho is *not rejected.* Therefore, there is NOT enough evidence to claim that some of the population proportions differ from those stated in the null hypothesis, at the α=.05 significance level.

Support, Management, & Operations [2. To what extent did you allocate campus discretionary funds to help meet the school's technology needs?]

Categories	Observed	Expected	(fo-fe)2/fe
Not Prepared	7	14*.48=6.72	(7-6.72)2/6.72 = 0.012
Prepared	7	14*.52=7.28	(7-7.28)2/7.28 = 0.011
Sum =	14	14	0.022

(1) *Null and Alternative Hypotheses*

The following null and alternative hypotheses need to be tested:

H_0: p_1 = .48, p_2 = .52 $H0 : p1 = .48,\ p2 = .52$

H_a*Ha*: Some of the population proportions differ from the values stated in the null hypothesis

This corresponds to a Chi-Square test for Goodness of Fit.

(2) *Rejection Region*

Based on the information provided, the significance level is α=.05, the number of degrees of freedom is df=2−1=1, so then the rejection region for this test is $R=\{\chi 2:\chi 2>3.841\}$.

(3) *Test Statistics*

The Chi-Squared statistic is computed as follows:

$\chi 2= i = 1\sum n\ Ei\ (Oi−Ei)\ 2 = 0.012 + 0.011 = 0.022$

The Chi^2 value is 0.023. The p-value is .87859. The result is not significant at p < .05.

(4) *Decision about the null hypothesis*

Since it is observed that $\chi 2 = 0.022 \leq \chi c2 = 3.841$, it is then concluded that *the null hypothesis is not rejected.*

(5) *Conclusion*

It is concluded that the null hypothesis Ho is *not rejected.* Therefore, there is NOT enough evidence to claim that some of the population proportions differ from those stated in the null hypothesis, at the α=.05 significance level.

Support, Management, & Operations [3. To what extent did you pursue supplemental funding to help meet the technology needs of your school?]

Categories	Observed	Expected	(fo-fe)2/fe
Not Prepared	11	14*.68=9.52	(11-9.52)2/9.52 = 0.23
Prepared	3	14*.32=4.48	(3-4.48)2/4.48 = 0.489
Sum =	14	14	0.719

(1) *Null and Alternative Hypotheses*

The following null and alternative hypotheses need to be tested:

H_0: p_1 = .68, p_2 = .32 $H0 : p1 = .68, p2 = .32$

H_a*Ha*: Some of the population proportions differ from the values stated in the null hypothesis

This corresponds to a Chi-Square test for Goodness of Fit.

(2) *Rejection Region*

Based on the information provided, the significance level is α=.05, the number of degrees of freedom is df=2−1=1, so then the rejection region for this test is $R=\{\chi 2:\chi 2>3.841\}$.

(3) *Test Statistics*

The Chi-Squared statistic is computed as follows:

$\chi 2= i = 1\sum n\ Ei\ (Oi−Ei)\ 2 = 0.23 + 0.489 = 0.719$

The Chi^2 value is 0.719. The p-value is .39647. The result is not significant at p < .05.

(4) *Decision about the null hypothesis*

Since it is observed that $\chi 2 = 0.719 \leq \chi c2 = 3.841$, it is then concluded that *the null hypothesis is not rejected.*

(5) *Conclusion*

It is concluded that the null hypothesis Ho is *not rejected.* Therefore, there is NOT enough evidence to claim that some of the population proportions differ from those stated in the null hypothesis, at the α=.05 significance level.

Support, Management, & Operations [4. To what extent did you ensure that hardware and software replacement/upgrades were incorporated into school technology plans?]

Categories	Observed	Expected	(fo-fe)2/fe
Not Prepared	10	14*.56=7.84	(10-7.84)2/7.84 = 0.595
Prepared	4	14*.44=6.16	(4-6.16)2/6.16 = 0.757
Sum =	14	14	1.353

(1) *Null and Alternative Hypotheses*

The following null and alternative hypotheses need to be tested:

H_0: p_1 = .56, p_2 = .44 $H0 : p1=.56, \quad p2 = .44$

H_a*Ha*: Some of the population proportions differ from the values stated in the null hypothesis

This corresponds to a Chi-Square test for Goodness of Fit.

(2) *Rejection Region*

Based on the information provided, the significance level is α=.05, the number of degrees of freedom is df=2−1=1, so then the rejection region for this test is $R=\{\chi 2:\chi 2>3.841\}$.

(3) *Test Statistics*

The Chi-Squared statistic is computed as follows:

$\chi 2= i = 1\sum n\ Ei\ (Oi−Ei)\ 2 = 0.595 + 0.757 = 1.353$

The Chi^2 value is 1.353. The p-value is .24484. The result is not significant at p < .05.

(4) *Decision about the null hypothesis*

Since it is observed that $\chi 2 = 1.353 \leq \chi c2 = 3.841$, it is then concluded that *the null hypothesis is not rejected.*

(5) *Conclusion*

It is concluded that the null hypothesis Ho is *not rejected.* Therefore, there is NOT enough evidence to claim that some of the population proportions differ from those stated in the null hypothesis, at the α=.05 significance level.

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

Categories	Observed	Expected	(fo-fe)2/fe
Not Prepared	11	14*.32=4.48	(11-4.48)2/4.48 = 9.489
Prepared	3	14*.68=9.52	(3-9.52)2/9.52 = 4.465
Sum =	14	14	13.954

(1) *Null and Alternative Hypotheses*

The following null and alternative hypotheses need to be tested:

H_0: p_1 = .32, p_2 = .68 $H0 : p1 = .32, \quad p2 = .68$

H_a*Ha*: Some of the population proportions differ from the values stated in the null hypothesis

This corresponds to a Chi-Square test for Goodness of Fit.

(2) *Rejection Region*

Based on the information provided, the significance level is α=.05, the number of degrees of freedom is df=2−1=1, so then the rejection region for this test is $R=\{\chi 2:\chi 2>3.841\}$.

(3) *Test Statistics*

The Chi-Squared statistic is computed as follows:

$\chi 2= i = 1\sum n \ \ Ei \ (Oi−Ei) \ \ 2 = 9.489 + 4.465 = 13.954$

The Chi^2 value is 13.954. The p-value is .00019. The result is significant at p < .05.

(4) *Decision about the null hypothesis*

Since it is observed that $\chi 2= 13.954 > \chi c2 = 3.841$, it is then concluded that *the null hypothesis is rejected.*

(5) *Conclusion*

It is concluded that the null hypothesis Ho is *rejected.* Therefore, there is enough evidence to claim that some of the population proportions differ from those stated in the null hypothesis, at the α=.05 significance level.

Support, Management, & Operations [6. To what extent did you investigate how satisfied faculty and staff were with the technology support services provided by your district/school?]

Categories	Observed	Expected	(fo-fe)2/fe
Not Prepared	10	14*.6=8.4	(10-8.4)2/8.4 = 0.305
Prepared	4	14*.4=5.6	(4-5.6)2/5.6 = 0.457
Sum =	14	14	0.762

(1) *Null and Alternative Hypotheses*

The following null and alternative hypotheses need to be tested:

H_0: p_1 = .6, p_2 = .4 $H0 : p1 = .6, p2 = .4$

H_a*Ha*: Some of the population proportions differ from the values stated in the null hypothesis

This corresponds to a Chi-Square test for Goodness of Fit.

(2) *Rejection Region*

Based on the information provided, the significance level is α=.05, the number of degrees of freedom is df=2−1=1, so then the rejection region for this test is $R=\{\chi2:\chi2>3.841\}$.

(3) *Test Statistics*

The Chi-Squared statistic is computed as follows:

$\chi2= i = 1\sum n\ Ei\ (Oi−Ei)\ 2 = 0.305 + 0.457 = 0.762$

The Chi^2 value is 0.762. The p-value is .38273. The result is not significant at p < .05.

(4) *Decision about the null hypothesis*

Since it is observed that $\chi2 = 0.762 \leq \chi c2 = 3.841$, it is then concluded that *the null hypothesis is not rejected.*

(5) *Conclusion*

It is concluded that the null hypothesis Ho is *not rejected.* Therefore, there is NOT enough evidence to claim that some of the population proportions differ from those stated in the null hypothesis, at the α=.05 significance level.

Appendix K

PTLA Social, Legal, and Ethical Chi-Square Data

Social, Legal, & Ethical Issues [1. To what extent did you work to ensure equity of technology access and use in your school?]

Categories	Observed	Expected	(fo-fe)2/fe
Not Prepared	5	14*.13=1.82	(5-1.82)2/1.82 = 5.556
Prepared	9	14*.87=12.18	(9-12.18)2/12.18 = 0.83
Sum =	14	14	6.387

(1) *Null and Alternative Hypotheses*

The following null and alternative hypotheses need to be tested:

H_0: p_1 = .13, p_2 = .87 $H0 : p1 = .13, p2 = .87$

H_a*Ha*: Some of the population proportions differ from the values stated in the null hypothesis

This corresponds to a Chi-Square test for Goodness of Fit.

(2) *Rejection Region*

Based on the information provided, the significance level is=.05, the number of degrees of freedom is $df=2-1=1$, so then the rejection region for this test is $R=\{\chi 2:\chi 2>3.841\}$.

(3) *Test Statistics*

The Chi-Squared statistic is computed as follows:

$\chi 2= i = 1\sum n\ Ei\ (Oi-Ei)\ 2 = 5.556 + 0.83 = 6.387$

The Chi^2 value is 6.387. The p-value is .0115. The result is significant at p < .05.

(4) *Decision about the null hypothesis*

Since it is observed that $\chi 2=6.387>\chi c2=3.841$, it is then concluded that *the null hypothesis is rejected.*

(5) *Conclusion*

It is concluded that the null hypothesis Ho is *rejected.* Therefore, there is enough evidence to claim that some of the population proportions differ from those stated in the null hypothesis, at the $\alpha=.05$ significance level.

Social, Legal, & Ethical Issues [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?]

Categories	Observed	Expected	(fo-fe)2/fe
Not Prepared	8	14*.58=8.12	(8-8.12)2/8.12 = 0.002
Prepared	6	14*.42=5.88	(6-5.88)2/5.88 = 0.002
Sum =	14	14	0.004

(1) *Null and Alternative Hypotheses*

The following null and alternative hypotheses need to be tested:

H_0: p_1 = .58, p_2 = .42 $H0$: $p1 = .58$, $p2 = .42$

H_a*Ha*: Some of the population proportions differ from the values stated in the null hypothesis.

This corresponds to a Chi-Square test for Goodness of Fit.

(2) *Rejection Region*

Based on the information provided, the significance level is α=.05, the number of degrees of freedom is df=2−1=1, so then the rejection region for this test is R={χ2:χ2>3.841}.

(3) *Test Statistics*

The Chi-Squared statistic is computed as follows:

$\chi 2 = i = 1 \sum n\ Ei(Oi-Ei)2 = 0.002 + 0.002 = 0.004$

The Chi^2 value is 0.004. The p-value is .94819. The result is not significant at p < .05.

(4) *Decision about the null hypothesis*

Since it is observed that $\chi 2 = 0.004 \leq \chi c2 = 3.841$, it is then concluded that *the null hypothesis is not rejected.*

(5) *Conclusion*

It is concluded that the null hypothesis Ho is *not rejected.* Therefore, there is NOT enough evidence to claim that some of the population proportions differ from those stated in the null hypothesis, at the α=.05 significance level.

Social, Legal, & Ethical Issues [3. To what extent were you in involved in enforcing policies related to copyright and intellectual property?]

Categories	Observed	Expected	(fo-fe)2/fe
Not Prepared	11	14*.63=8.82	(11-8.82)2/8.82 = 0.539
Prepared	3	14*.37=5.18	(3-5.18)2/5.18 = 0.917
Sum =	14	14	1.456

(1) *Null and Alternative Hypotheses*

The following null and alternative hypotheses need to be tested:

H_0: p_1 = .63, p_2 = .37 $H0 : p1 = .63,\ p2 = .37$

H_a*Ha*: Some of the population proportions differ from the values stated in the null hypothesis

This corresponds to a Chi-Square test for Goodness of Fit.

(2) *Rejection Region*

Based on the information provided, the significance level is α=.05, the number of degrees of freedom is df=2−1=1, so then the rejection region for this test is $R=\{\chi 2:\chi 2>3.841\}$.

(3) *Test Statistics*

The Chi-Squared statistic is computed as follows:

$\chi 2= i = 1\sum n\ Ei\ (Oi−Ei)\ 2\ =\ 0.539 + 0.917 = 1.456$

The Chi^2 value is 1.456. The p-value is .22752. The result is not significant at p < .05.

(4) *Decision about the null hypothesis*

Since it is observed that $\chi 2= 1.456 \leq \chi c2 = 3.841$, it is then concluded that *the null hypothesis is not rejected.*

(5) *Conclusion*

It is concluded that the null hypothesis Ho is *not rejected.* Therefore, there is NOT enough evidence to claim that some of the population proportions differ from those stated in the null hypothesis, at the α=.05 significance level.

Social, Legal, & Ethical Issues [4. To what extent were you involved in addressing issues related to privacy and online safety?]

Categories	Observed	Expected	(fo-fe)2/fe
Not Prepared	10	14*.46=6.44	(10-6.44)2/6.44 = 1.968
Prepared	4	14*.54=7.56	(4-7.56)2/7.56 = 1.676
Sum =	14	14	3.644

(1) *Null and Alternative Hypotheses*

The following null and alternative hypotheses need to be tested:

H_0: p_1 = .46, p_2 = .54 *H*0: *p*1 = .46, *p*2 = .54

H_a*Ha*: Some of the population proportions differ from the values stated in the null hypothesis

This corresponds to a Chi-Square test for Goodness of Fit.

(2) *Rejection Region*

Based on the information provided, the significance level is α=.05, the number of degrees of freedom is *df*=2−1=1, so then the rejection region for this test is $R=\{\chi 2:\chi 2>3.841\}$.

(3) *Test Statistics*

The Chi-Squared statistic is computed as follows:

$\chi 2= i = 1\sum n\ Ei\ (Oi-Ei)2 = 1.968 + 1.676 = 3.644$

The Chi^2 value is 3.644. The p-value is .05626. The result is not significant at p < .05.

(4) *Decision about the null hypothesis*

Since it is observed that $\chi 2=3.644 \leq \chi c2 = 3.841$, it is then concluded that *the null hypothesis is not rejected.*

(5) *Conclusion*

It is concluded that the null hypothesis Ho is *not rejected.* Therefore, there is NOT enough evidence to claim that some of the population proportions differ from those stated in the null hypothesis, at the α=.05 significance level.

Social, Legal, & Ethical Issues [5. To what extent did you support the use of technology to help meet the needs of special education students?]

Categories	Observed	Expected	(fo-fe)2/fe
Not Prepared	6	14*.13=1.82	(6-1.82)2/1.82 = 9.6
Prepared	8	14*.87=12.18	(8-12.18)2/12.18 = 1.435
Sum =	14	14	11.035

(1) *Null and Alternative Hypotheses*

The following null and alternative hypotheses need to be tested:

H_0: p_1 = .13, p_2 = .87 $H0 : p1 = .13,\ p2 = .87$

H_a*Ha*: Some of the population proportions differ from the values stated in the null hypothesis

This corresponds to a Chi-Square test for Goodness of Fit.

(2) *Rejection Region*

Based on the information provided, the significance level is α=.05, the number of degrees of freedom is df=2−1=1, so then the rejection region for this test is R={$\chi 2$:$\chi 2$>3.841}.

(3) *Test Statistics*

The Chi-Squared statistic is computed as follows:

$\chi 2= i = 1\sum n\ Ei\ (Oi−Ei)\ 2 = 9.6 + 1.435 = 11.035$

The Chi^2 value is 11.035. The p-value is .00089. The result is significant at p < .05.

(4) *Decision about the null hypothesis*

Since it is observed that $\chi 2= 11.035 > \chi c2 = 3.841$, it is then concluded that *the null hypothesis is rejected.*

(5) *Conclusion*

It is concluded that the null hypothesis Ho is *rejected.* Therefore, there is enough evidence to claim that some of the population proportions differ from those stated in the null hypothesis, at the α=.05 significance level.

Social, Legal, & Ethical Issues [6. To what extent did you support the use of technology to assist in the delivery of individualized education programs for all students?]

Categories	Observed	Expected	(fo-fe)2/fe
Not Prepared	6	14*.29=4.06	(6-4.06)2/4.06 = 0.927
Prepared	8	14*.71=9.94	(8-9.94)2/9.94 = 0.379
Sum =	14	14	1.306

(1) *Null and Alternative Hypotheses*

The following null and alternative hypotheses need to be tested:

H_0: p_1 = .29, p_2 = .71 $H0 : p1 = .29, p2 = .71$

H_a*Ha*: Some of the population proportions differ from the values stated in the null hypothesis

This corresponds to a Chi-Square test for Goodness of Fit.

(2) *Rejection Region*

Based on the information provided, the significance level is α=.05, the number of degrees of freedom is df=2−1=1, so then the rejection region for this test is $R=\{\chi2:\chi2>3.841\}$.

(3) *Test Statistics*

The Chi-Squared statistic is computed as follows:

$\chi2= i = 1\sum n\ Ei\ (Oi−Ei)2 = 0.927 + 0.379 = 1.306$

The Chi^2 value is 1.306. The p-value is .25319. The result is not significant at p < .05.

(4) *Decision about the null hypothesis*

Since it is observed that $\chi2= 1.306 \leq \chi c2 = 3.841$, it is then concluded that *the null hypothesis is not rejected.*

(5) *Conclusion*

It is concluded that the null hypothesis Ho is *not rejected.* Therefore, there is NOT enough evidence to claim that some of the population proportions differ from those stated in the null hypothesis, at the α=.05 significance level.

Social, Legal, & Ethical Issues [7. To what extent did you disseminate information about health concerns related to technology and computer usage in classrooms and offices?]

Categories	Observed	Expected	(fo-fe)2/fe
Not Prepared	11	14*.75=10.5	(11-10.5)2/10.5 = 0.024
Prepared	3	14*.25=3.5	(3-3.5)2/3.5 = 0.071
Sum =	14	14	0.095

(1) *Null and Alternative Hypotheses*

The following null and alternative hypotheses need to be tested:

H_0: p_1 = .75, p_2 = .25 $H0 : p1 = .75, p2 = .25$

H_a*Ha*: Some of the population proportions differ from the values stated in the null hypothesis

This corresponds to a Chi-Square test for Goodness of Fit.

(2) *Rejection Region*

Based on the information provided, the significance level is α=.05, the number of degrees of freedom is df=2−1=1, so then the rejection region for this test is R={χ2:χ2>3.841}.

(3) *Test Statistics*

The Chi-Squared statistic is computed as follows:

$\chi 2= i = 1\sum n\ Ei\ (Oi−Ei)2 = 0.024 + 0.071 = 0.095$

The Chi^2 value is 0.095. The p-value is .75762. The result is not significant at p < .05.

(4) *Decision about the null hypothesis*

Since it is observed that $\chi 2 = 0.095 \leq \chi c2 = 3.841$, it is then concluded that *the null hypothesis is not rejected.*

(5) *Conclusion*

It is concluded that the null hypothesis Ho is *not rejected.* Therefore, there is NOT enough evidence to claim that some of the population proportions differ from those stated in the null hypothesis, at the α=.05 significance level.

Appendix L

PTLA Productivity and Professional Practice Chi-Square Data

Productivity & Professional Practice [1. To what extent did you participate in professional development activities meant to improve or expand your use of technology?]

Categories	Observed	Expected	(fo-fe)2/fe
Not Prepared	6	14*.36=5.04	(6-5.04)2/5.04 = 0.183
Prepared	8	14*.64=8.96	(8-8.96)2/8.96 = 0.103
Sum =	14	14	0.286

(1) *Null and Alternative Hypotheses*

The following null and alternative hypotheses need to be tested:

H_0: p_1 = .36, p_2 = .64 $H0 : p1 = .36, p2 = .64$

H_a*Ha*: Some of the population proportions differ from the values stated in the null hypothesis

This corresponds to a Chi-Square test for Goodness of Fit.

(2) *Rejection Region*

Based on the information provided, the significance level is α=.05, the number of degrees of freedom is df=2−1=1, so then the rejection region for this test is $R=\{\chi 2:\chi 2>3.841\}$.

(3) *Test Statistics*

The Chi-Squared statistic is computed as follows:

$\chi 2 = i = 1\sum n\ Ei\ (Oi−Ei)\ 2 = 0.183 + 0.103 = 0.286$

The Chi^2 value is 0.286. The p-value is .59298. The result is not significant at p < .05.

(4) *Decision about the null hypothesis*

Since it is observed that $\chi 2 = 0.286 \leq \chi c\ 2 = 3.841$, it is then concluded that *the null hypothesis is not rejected.*

(5) *Conclusion*

It is concluded that the null hypothesis Ho is *not rejected.* Therefore, there is NOT enough evidence to claim that some of the population proportions differ from those stated in the null hypothesis, at the α=.05 significance level.

Productivity & Professional Practice [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)?]

Categories	Observed	Expected	(fo-fe)2/fe
Not Prepared	0	14*.16=2.24	(0-2.24)2/2.24 = 2.24
Prepared	14	14*.84=11.76	(14-11.76)2/11.76 = 0.427
Sum =	14	14	2.667

(1) *Null and Alternative Hypotheses*

The following null and alternative hypotheses need to be tested:

H_0: p_1 = .16, p_2 = .84 $H0$: $p1 = .16$, $p2 = .84$

H_a*Ha*: Some of the population proportions differ from the values stated in the null hypothesis

This corresponds to a Chi-Square test for Goodness of Fit.

(2) *Rejection Region*

Based on the information provided, the significance level is α=.05, the number of degrees of freedom is df = 2 - 1 = 1df=2−1=1, so then the rejection region for this test is R={χ2:χ2>3.841}.

(3) *Test Statistics*

The Chi-Squared statistic is computed as follows:

$X2 = i = 1\sum n\ Ei\ (Oi−Ei)\ 2 = 2.24 + 0.427 = 2.667$

The Chi^2 value is 2.667. The p-value is .10247. The result is not significant at p < .05.

(4) *Decision about the null hypothesis*

Since it is observed that $\chi2 = 2.667 \leq \chi c2 = 3.841$, it is then concluded that *the null hypothesis is not rejected.*

(5) *Conclusion*

It is concluded that the null hypothesis Ho is *not rejected.* Therefore, there is NOT enough evidence to claim that some of the population proportions differ from those stated in the null hypothesis, at the α=.05 significance level.

Productivity & Professional Practice [3. To what extent did you use technology-based management systems to access staff/faculty personnel records?]

Categories	Observed	Expected	(fo-fe)2/fe
Not Prepared	3	14*.12=1.68	(3-1.68)2/1.68 = 1.037
Prepared	11	14*.88=12.32	(11-12.32)2/12.32 = 0.141
Sum =	14	14	1.179

(1) *Null and Alternative Hypotheses*

The following null and alternative hypotheses need to be tested:

H_0: p_1 = .12, p_2 = .88 $H0 : p1 = .12, p2 = .88$

H_a*Ha*: Some of the population proportions differ from the values stated in the null hypothesis

This corresponds to a Chi-Square test for Goodness of Fit.

(2) *Rejection Region*

Based on the information provided, the significance level is α=.05, the number of degrees of freedom is df=2−1=1, so then the rejection region for this test is $R=\{\chi 2:\chi 2>3.841\}$.

(3) *Test Statistics*

The Chi-Squared statistic is computed as follows:

$\chi 2 = i = 1\sum n\ Ei\ (Oi−Ei)\ 2 = 1.037 + 0.141 = 1.179$

The Chi^2 value is 1.179. The p-value is .27765. The result is not significant at p < .05.

(4) *Decision about the null hypothesis*

Since it is observed that $\chi 2= 1.179 \leq \chi c\ 2 =3.841$, it is then concluded that *the null hypothesis is not rejected.*

(5) *Conclusion*

It is concluded that the null hypothesis Ho is *not rejected.* Therefore, there is NOT enough evidence to claim that some of the population proportions differ from those stated in the null hypothesis, at the α=.05 significance level.

Productivity & Professional Practice [4. To what extent did you use technology-based management systems to access student records?]

Categories	Observed	Expected	(fo-fe)2/fe
Not Prepared	1	14*.12=1.68	(1-1.68)2/1.68 = 0.275
Prepared	13	14*.88=12.32	(13-12.32)2/12.32 = 0.038
Sum =	14	14	0.313

(1) *Null and Alternative Hypotheses*

The following null and alternative hypotheses need to be tested:

H_0: p_1 = .12, p_2 = .88 $H0 : p1 = .12,\ p2 = .88$

H_a*Ha*: Some of the population proportions differ from the values stated in the null hypothesis

This corresponds to a Chi-Square test for Goodness of Fit.

(2) *Rejection Region*

Based on the information provided, the significance level is α=.05, the number of degrees of freedom is df=2−1=1, so then the rejection region for this test is R={$\chi 2$:$\chi 2$>3.841}.

(3) *Test Statistics*

The Chi-Squared statistic is computed as follows:

$\chi 2 = i = 1 \sum n\ Ei\ (Oi−Ei)\ 2 = 0.275 + 0.038 = 0.313$

The Chi^2 value is 0.313. The p-value is .57599. The result is not significant at p < .05.

(4) *Decision about the null hypothesis*

Since it is observed that $\chi 2 = 0.313 \leq \chi c2 = 3.841$, it is then concluded that *the null hypothesis is not rejected.*

(5) *Conclusion*

It is concluded that the null hypothesis Ho is *not rejected.* Therefore, there is NOT enough evidence to claim that some of the population proportions differ from those stated in the null hypothesis, at the α=.05 significance level.

Productivity & Professional Practice [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?]

Categories	Observed	Expected	(fo-fe)2/fe
Not Prepared	3	14*.24=3.36	(3-3.36)2/3.36 = 0.039
Prepared	11	14*.76=10.64	(11-10.64)2/10.64 = 0.012
Sum =	14	14	0.051

(1) *Null and Alternative Hypotheses*

The following null and alternative hypotheses need to be tested:

H_0: p_1 = .24, p_2 = .76 $H0 : p1 = .24, p2 = .76$

H_a*Ha*: Some of the population proportions differ from the values stated in the null hypothesis

This corresponds to a Chi-Square test for Goodness of Fit.

(2) *Rejection Region*

Based on the information provided, the significance level is α=.05, the number of degrees of freedom is df=2−1=1, so then the rejection region for this test is $R=\{\chi 2:\chi 2>3.841\}$.

(3) *Test Statistics*

The Chi-Squared statistic is computed as follows:

$\chi 2= i = 1\sum n\ Ei\ (Oi−Ei)\ 2 = 0.039 + 0.012 = 0.051$

The Chi^2 value is 0.051. The p-value is .82176. The result is not significant at p < .05.

(4) *Decision about the null hypothesis*

Since it is observed that $\chi 2= 0.051 \leq \chi c2 = 3.841$, it is then concluded that *the null hypothesis is not rejected.*

(5) *Conclusion*

It is concluded that the null hypothesis Ho is *not rejected.* Therefore, there is NOT enough evidence to claim that some of the population proportions differ from those stated in the null hypothesis, at the α=.05 significance level.

Appendix M

PTLA Learning and Teaching Chi-Square Data

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?]

Categories	Observed	Expected	(fo-fe)2/fe
Not Prepared	5	14*.08=1.12	(5-1.12)2/1.12 = 13.441
Prepared	9	14*.92=12.88	(9-12.88)2/12.88 = 1.169
Sum =	14	14	14.61

(1) *Null and Alternative Hypotheses*

The following null and alternative hypotheses need to be tested:

H_0: p_1 = .08, p_2 = .92 $H0 : p1 = .08, p2 = .92$

H_a*Ha*: Some of the population proportions differ from the values stated in the null hypothesis

This corresponds to a Chi-Square test for Goodness of Fit.

(2) *Rejection Region*

Based on the information provided, the significance level is α=.05, the number of degrees of freedom is df=2−1=1, so then the rejection region for this test is $R=\{\chi2:\chi2>3.841\}$.

(3) *Test Statistics*

The Chi-Squared statistic is computed as follows:

$\chi2= i = 1\sum n\ Ei\ (Oi−Ei)\ 2 = 13.441 + 1.169 = 14.61$

The Chi^2 value is 14.61. The p-value is .00013. The result is significant at p < .05.

(4) *Decision about the null hypothesis*

Since it is observed that $\chi2=14.61>\chi c2=3.841$, it is then concluded that *the null hypothesis is rejected.*

(5) *Conclusion*

It is concluded that the null hypothesis Ho is *rejected.* Therefore, there is enough evidence to claim that some of the population proportions differ from those stated in the null hypothesis, α=.05 significance level.

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

Categories	Observed	Expected	(fo-fe)2/fe
Not Prepared	7	14*.12=1.68	(7-1.68)2/1.68 = 16.847
Prepared	7	14*.88=12.32	(7-12.32)2/12.32 = 2.297
Sum =	14	14	19.144

(1) *Null and Alternative Hypotheses*

The following null and alternative hypotheses need to be tested:

H_0: p_1 = .12, p_2 = .88 $H0 : p1 = .12,\ p2 = .88$

H_a*Ha*: Some of the population proportions differ from the values stated in the null hypothesis

This corresponds to a Chi-Square test for Goodness of Fit.

(2) *Rejection Region*

Based on the information provided, the significance level is α=.05, the number of degrees of freedom is df=2−1=1, so then the rejection region for this test is $R = \{\chi 2 : \chi 2 > 3.841\}$.

(3) *Test Statistics*

The Chi-Squared statistic is computed as follows:

$\chi 2= i = 1\sum n\ Ei\ (Oi−Ei)\ 2 = 16.847 + 2.297 = 19.144$

The Chi^2 value is 19.144. The p-value is .00001. The result is significant at p < .05.

(4) *Decision about the null hypothesis*

Since it is observed that $\chi 2= 19.144 > \chi c\ 2 = 3.841$, it is then concluded that *the null hypothesis is rejected.*

(5) *Conclusion*

It is concluded that the null hypothesis Ho is *rejected.* Therefore, there is enough evidence to claim that some of the population proportions differ from those stated in the null hypothesis, at the α=.05 significance level.

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

Categories	Observed	Expected	(fo-fe)2/fe
Not Prepared	9	14*.29=4.06	(9-4.06)2/4.06 = 6.011
Prepared	5	14*.71=9.94	(5-9.94)2/9.94 = 2.455
Sum =	14	14	8.466

(1) *Null and Alternative Hypotheses*

The following null and alternative hypotheses need to be tested:

H_0: p_1 = .29, p_2 = .71 $H0 : p1 = .29, p2 = .71$

H_a *Ha*: Some of the population proportions differ from the values stated in the null hypothesis

This corresponds to a Chi-Square test for Goodness of Fit.

(2) *Rejection Region*

Based on the information provided, the significance level is α=.05, the number of degrees of freedom is df=2−1=1, so then the rejection region for this test is $R = \{\chi2:\chi2>3.841\}$.

(3) *Test Statistics*

The Chi-Squared statistic is computed as follows:

$\chi2= i = 1\sum n\ Ei\ (Oi−Ei)\ 2 = 6.011 + 2.455 = 8.466$

The Chi^2 value is 8.466. The p-value is .00362. The result is significant at p < .05.

(4) *Decision about the null hypothesis*

Since it is observed that $\chi2=8.466>\chi c2=3.841$, it is then concluded that *the null hypothesis is rejected.*

(5) *Conclusion*

It is concluded that the null hypothesis Ho is *rejected.* Therefore, there is enough evidence to claim that some of the population proportions differ from those stated in the null hypothesis, at the α=.05 significance level.

Learning and Teaching [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?]

Categories	Observed	Expected	(fo-fe)2/fe
Not Prepared	5	14*.08=1.12	(5-1.12)2/1.12 = 13.441
Prepared	9	14*.92=12.88	(9-12.88)2/12.88 = 1.169
Sum =	14	14	14.61

(1) *Null and Alternative Hypotheses*

The following null and alternative hypotheses need to be tested:

H_0: p_1 = .08, p_2 = .92 $H0 : p1 = .08, p2 = .92$

H_a*Ha*: Some of the population proportions differ from the values stated in the null hypothesis

This corresponds to a Chi-Square test for Goodness of Fit.

(2) *Rejection Region*

Based on the information provided, the significance level is α=.05, the number of degrees of freedom is df=2−1=1, so then the rejection region for this test is $R=\{\chi 2:\chi 2>3.841\}$.

(3) *Test Statistics*

The Chi-Squared statistic is computed as follows:

$\chi 2= i = 1\sum n\ Ei\ (Oi−Ei)\ 2 = 13.441 + 1.169 = 14.61$

The Chi^2 value is 14.61. The p-value is .00013. The result is significant at p < .05.

(4) *Decision about the null hypothesis*

Since it is observed that $\chi 2=14.61>\chi c2=3.841$, it is then concluded that *the null hypothesis is rejected.*

(5) *Conclusion*

It is concluded that the null hypothesis Ho is *rejected.* Therefore, there is enough evidence to claim that some of the population proportions differ from those stated in the null hypothesis, α=.05 significance level.

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

Categories	Observed	Expected	(fo-fe)2/fe
Not Prepared	8	14*.44=6.16	(8-6.16)2/6.16 = 0.55
Prepared	6	14*.56=7.84	(6-7.84)2/7.84 = 0.432
Sum =	14	14	0.981

(1) *Null and Alternative Hypotheses*

The following null and alternative hypotheses need to be tested:

H_0: p_1 = .44, p_2 = .56 $H0 : p1 = .44, p2 = .56$

H_a*Ha*: Some of the population proportions differ from the values stated in the null hypothesis

This corresponds to a Chi-Square test for Goodness of Fit.

(2) *Rejection Region*

Based on the information provided, the significance level is α=.05, the number of degrees of freedom is df=2−1=1, so then the rejection region for this test is $R=\{\chi 2:\chi 2>3.841\}$.

(3) *Test Statistics*

The Chi-Squared statistic is computed as follows:

$\chi 2 = i = 1\sum n\ Ei\ (Oi−Ei)\ 2 = 0.55 + 0.432 = 0.981$

The Chi^2 value is 0.981. The p-value is .32184. The result is not significant at p < .05.

(4) *Decision about the null hypothesis*

Since it is observed that $\chi 2=0.981\leq \chi c2=3.841$, it is then concluded that *the null hypothesis is not rejected.*

(5) *Conclusion*

It is concluded that the null hypothesis Ho is *not rejected.* Therefore, there is NOT enough evidence to claim that some of the population proportions differ from those stated in the null hypothesis, at the α=.05 significance level.

Learning and Teaching [6. To what extent did you facilitate or ensure the delivery of professional development on the use of technology to faculty and staff?]

Categories	Observed	Expected	(fo-fe)2/fe
Not Prepared	7	14*.28=3.92	(7-3.92)2/3.92 = 2.42
Prepared	7	14*.72=10.08	(7-10.08)2/10.08 = 0.941
Sum =	14	14	3.361

(1) *Null and Alternative Hypotheses*

The following null and alternative hypotheses need to be tested:

H_0: p_1 = .28, p_2 = .72 $H0 : p1 =.28, p2 = .72$

H_a*Ha*: Some of the population proportions differ from the values stated in the null hypothesis

This corresponds to a Chi-Square test for Goodness of Fit.

(2) *Rejection Region*

Based on the information provided, the significance level is α=.05, the number of degrees of freedom is df=2−1=1, so then the rejection region for this test is $R=\{\chi 2:\chi 2>3.841\}$.

(3) *Test Statistics*

The Chi-Squared statistic is computed as follows:

$\chi 2= i = 1\sum n\ Ei\ (Oi−Ei)\ 2 = 2.42 + 0.941 = 3.361$

The Chi^2 value is 3.361. The p-value is .06675. The result is not significant at p < .05.

(4) *Decision about the null hypothesis*

Since it is observed that $\chi 2=3.361\leq \chi c2=3.841$, it is then concluded that *the null hypothesis is not rejected.*

(5) *Conclusion*

It is concluded that the null hypothesis Ho is *not rejected.* Therefore, there is NOT enough evidence to claim that some of the population proportions differ from those stated in the null hypothesis, at the α=.05 significance level.

Appendix N

PTLA Assessment and Evaluation Chi-Square Data

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

Categories	Observed	Expected	(fo-fe)2/fe
Not Prepared	4	14*.2=2.8	(4-2.8)2/2.8 = 0.514
Prepared	10	14*.8=11.2	(10-11.2)2/11.2 = 0.129
Sum =	14	14	0.643

(1) *Null and Alternative Hypotheses*

The following null and alternative hypotheses need to be tested:

H_0: p_1 = .2, p_2 = .8 $H0 : p1 = .2, p2 = .8$

H_a*Ha*: Some of the population proportions differ from the values stated in the null hypothesis

This corresponds to a Chi-Square test for Goodness of Fit.

(2) *Rejection Region*

Based on the information provided, the significance level is α=.05, the number of degrees of freedom is df=2−1=1, so then the rejection region for this test is $R = \{\chi 2 : \chi 2 > 3.841\}$.

(3) *Test Statistics*

The Chi-Squared statistic is computed as follows:

$\chi 2 = i = 1 \sum n \; Ei \; (Oi - Ei) \; 2 = 0.514 + 0.129 = 0.643$

The Chi^2 value is 0.643. The p-value is .42268. The result is not significant at p < .05.

(4) *Decision about the null hypothesis*

Since it is observed that $\chi 2 = 0.643 \leq \chi c2 = 3.841$, it is then concluded that *the null hypothesis is not rejected.*

(5) *Conclusion*

It is concluded that the null hypothesis Ho is *not rejected.* Therefore, there is NOT enough evidence to claim that some of the population proportions differ from those stated in the null hypothesis, at the α=.05 significance level.

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

Categories	Observed	Expected	(fo-fe)2/fe
Not Prepared	6	14*.56=7.84	(6-7.84)2/7.84 = 0.432
Prepared	8	14*.44=6.16	(8-6.16)2/6.16 = 0.55
Sum =	14	14	0.981

(1) *Null and Alternative Hypotheses*

The following null and alternative hypotheses need to be tested:

H_0: p_1 = .56, p_2 = .44 $H0 : p1 = .56, p2 = .44$

H_aHa: Some of the population proportions differ from the values stated in the null hypothesis

This corresponds to a Chi-Square test for Goodness of Fit.

(2) *Rejection Region*

Based on the information provided, the significance level is α=.05, the number of degrees of freedom is df=2−1=1, so then the rejection region for this test is R={χ2:χ2>3.841}.

(3) *Test Statistics*

The Chi-Squared statistic is computed as follows:

$\chi 2=i=1\sum nEi(Oi-Ei)2=0.432+0.55=0.981$

The Chi^2 value is 0.981. The p-value is .32184. The result is not significant at p < .05.

(4) *Decision about the null hypothesis*

Since it is observed that χ2= 0.981 ≤ $\chi c2$ = 3.841, it is then concluded that *the null hypothesis is not rejected.*

(5) *Conclusion*

It is concluded that the null hypothesis Ho is *not rejected.* Therefore, there is NOT enough evidence to claim that some of the population proportions differ from those stated in the null hypothesis, at the α=.05 significance level.

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

Categories	Observed	Expected	(fo-fe)2/fe
Not Prepared	10	14*.71=9.94	(10-9.94)2/9.94 = 0
Prepared	4	14*.29=4.06	(4-4.06)2/4.06 = 0.001
Sum =	14	14	0.001

(1) *Null and Alternative Hypotheses*

The following null and alternative hypotheses need to be tested:

H_0: p_1 = .71, p_2 = .29 $H0 : p1 = .71,\ p2 = .29$

H_a*Ha*: Some of the population proportions differ from the values stated in the null hypothesis

This corresponds to a Chi-Square test for Goodness of Fit.

(2) *Rejection Region*

Based on the information provided, the significance level is α=.05, the number of degrees of freedom is df=2−1=1, so then the rejection region for this test is $R=\{\chi 2:\chi 2>3.841\}$.

(3) *Test Statistics*

The Chi-Squared statistic is computed as follows:

$\chi 2= i = 1\sum n\ Ei\ (Oi−Ei)\ 2 = 0 + 0.001 = 0.001$

The Chi^2 value is 0.001. The p-value is .97181. The result is not significant at p < .05.

(4) *Decision about the null hypothesis*

Since it is observed that $\chi 2 = 0.001 \leq \chi c2 = 3.841$, it is then concluded that *the null hypothesis is not rejected.*

(5) *Conclusion*

It is concluded that the null hypothesis Ho is *not rejected.* Therefore, there is NOT enough evidence to claim that some of the population proportions differ from those stated in the null hypothesis, at the α=.05 significance level.

Assessment & Evaluation [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?]

Categories	Observed	Expected	(fo-fe)2/fe
Not Prepared	7	14*.4=5.6	(7-5.6)2/5.6 = 0.35
Prepared	7	14*.6=8.4	(7-8.4)2/8.4 = 0.233
Sum =	14	14	0.583

(1) *Null and Alternative Hypotheses*

The following null and alternative hypotheses need to be tested:

H_0: p_1 = .4, p_2 = .6 $H0 : p1 =.4, p2 = .6$

H_aHa: Some of the population proportions differ from the values stated in the null hypothesis

This corresponds to a Chi-Square test for Goodness of Fit.

(2) *Rejection Region*

Based on the information provided, the significance level is α=.05, the number of degrees of freedom is df=2−1=1, so then the rejection region for this test is R={$\chi 2:\chi 2>3.841$}.

(3) *Test Statistics*

The Chi-Squared statistic is computed as follows:

$\chi 2= i = 1\sum n\ Ei\ (Oi−Ei)\ 2 = 0.35 + 0.233 = 0.583$

The Chi^2 value is 0.583. The p-value is .44501. The result is not significant at p < .05.

(4) *Decision about the null hypothesis*

Since it is observed that $\chi 2 = 0.583 \leq \chi c2 = 3.841$, it is then concluded that *the null hypothesis is not rejected.*

(5) *Conclusion*

It is concluded that the null hypothesis Ho is *not rejected.* Therefore, there is NOT enough evidence to claim that some of the population proportions differ from those stated in the null hypothesis, at the α=.05 significance level.

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

Categories	Observed	Expected	(fo-fe)2/fe
Not Prepared	4	14*.44=6.16	(4-6.16)2/6.16 = 0.757
Prepared	10	14*.56=7.84	(10-7.84)2/7.84 = 0.595
Sum =	14	14	1.353

(1) *Null and Alternative Hypotheses*

The following null and alternative hypotheses need to be tested:

H_0: p_1 = .44, p_2 = .56 $H0 : p1 = .44, p2 = .56$

H_a*Ha*: Some of the population proportions differ from the values stated in the null hypothesis

This corresponds to a Chi-Square test for Goodness of Fit.

(2) *Rejection Region*

Based on the information provided, the significance level is α=.05, the number of degrees of freedom is df=2−1=1, so then the rejection region for this test is $R=\{\chi 2:\chi 2>3.841\}$.

(3) *Test Statistics*

The Chi-Squared statistic is computed as follows:

$\chi 2= i = 1\sum n\ Ei\ (Oi−Ei)\ 2 = 0.757 + 0.595 = 1.353$

The Chi^2 value is 1.353. The p-value is .24484. The result is not significant at p < .05.

(4) *Decision about the null hypothesis*

Since it is observed that $\chi 2=1.353\leq \chi c2=3.841$, it is then concluded that *the null hypothesis is not rejected.*

(5) *Conclusion*

It is concluded that the null hypothesis Ho is *not rejected.* Therefore, there is NOT enough evidence to claim that some of the population proportions differ from those stated in the null hypothesis, at the α=.05 significance level.