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AN ANALYSIS OF TEACHER AND SCHOOL ADMINISTRATOR TECHNOLOGY BELIEFS AND SKILLS AS THEY ENTER INTO A HIGH ACHIEVING SCHOOLS PROGRAM

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AN ANALYSIS OF TEACHER AND SCHOOL ADMINISTRATOR TECHNOLOGY BELIEFS AND SKILLS AS THEY ENTER INTO A HIGH ACHIEVING SCHOOLS PROGRAM

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Abstract

Teachers and administrators possess varied technology abilities and beliefs. In a study by Williams, Atkinson, Cate, and O'Hair (2008), technology integration and learning community development were positively related. As the teachers and administrators engaged in learning community development and technology integration substantive school improvement occurred. In this quantitative study, the researcher examines how teacher and administrator technology abilities and beliefs compare, and where educators' technological abilities and beliefs currently lie as they embark upon the journey towards becoming a high-achieving school.

The study includes a quantitative, non-experimental, ex post facto design. The study examined schools in Oklahoma that entered into the University of Oklahoma K20 Center's OK-ACTS high-achieving schools program during 2007 and 2008. The data were analyzed using descriptive and inferential statistics, independent t-tests and analysis of variances. The analysis concluded administrators possess higher technology skills than teachers and that they also rank their technology beliefs higher. Statistically significant differences in teacher and administrator technology skills and beliefs were found. However, there were no regional differences in teacher and administrator technology skills and beliefs. The information obtained by this study will inform technology trainers where the technology beliefs and skills of school personnel generally exist prior to embarking upon the journey towards a high-achieving learning community infused with technology.

Chapter One: Introduction

Introduction to the Study

No Child Left Behind, a federal law that strongly affects public schools requires schools to boost student achievement and enhance practices and strategies to ensure all students are showing gains in academic achievement levels. Teachers and administrators search for effective and efficient ways to increase achievement, resulting in a change from the traditional, teacher-centered school to a more democratic, student-centered school. Teachers design more authentic critical thinking activities for the students instead of rote-memory activities.

Traditional schools have teachers teaching in isolation (Williams, Atkinson, Cate, & O'Hair, 2008). School personnel engage in discussions that center on everyday functions of the school, such as procedures and rules (Cate, Vaughn, & O'Hair, 2006). Teachers focus on presenting content information and not on student learning (Jerald, 2007). Traditional school actions are stumbling blocks for school change and student learning (Darling-Hammond, 1997; Schmoker, 2006).

Democratic schools engage students in authentic instructional lessons, which increase their understanding and retention of knowledge (Apple & Beane, 2007). The constructivist theory states that students construct their own knowledge as they engage in problem-solving and critical-thinking activities (Bransford, Brown, & Cocking, 2000). These practices boost student achievement because students are able to understand the concepts better (Apple & Beane, 2007; Bransford et al., 2000). Democratic schools focus on the intellectual growth of the students as well as the personnel. Leadership is dispersed across the faculty making decisions on authentic pedagogy, examining equity issues, and building trust (Cate, 2006; Kensler, 2008; Mitchell, 2007).

In the development of a democratic learning community, technology provides an avenue to efficiency. Collective learning among teachers and administrators is enhanced by technology usage (Burns, 2002; Riel & Fulton, 2001; Williams et al., 2007). The teachers share best practices building each other's knowledge and developing trust. Technology plays a large part in today's society, and teachers integrate it according to their growing comfort levels. Teachers design authentic lessons integrated with technology. The lessons require students to engage in critical-thinking and problem-solving practices. Teachers and administrators possess varied technology abilities and beliefs. In a study by Williams et al. (2007) technology integration and learning community development are positively related. As the teachers and administrators engaged in learning community development and technology integration substantive school improvement occurred. In this quantitative study, the researcher examines how teacher and administrator technology abilities and beliefs compare, and where educators' technological abilities and beliefs currently lie.

Need for the Study

In the mid-1600s grammar schools began to evolve primarily in the northern colonies. These schools prepared boys for politics or clergy positions. The schools were formed in partnership with community and religious leaders (Mitchell, 2007). As America began to sever its ties with England in the 1770s, Thomas Jefferson expressed his realization that "the responsibility of self-government could be assumed successfully only by an enlightened people" (Jewett, 1996, p. 1). Thomas Jefferson identified educated citizenry as “the great defense against tyranny” (Carpenter, 2004, p. 140). He was a great supporter of public education and was often referred to as American’s first education president (Wagoner, 2004). Jefferson believed “democracy could only exist with an educated and informed electorate” (Jewett, 1996, p. 3). The poor and wealthy alike deserved an education if sound self-governance was to exist (Jewett, 1996).

From the mid-1800s through the early-1900s the Industrial Revolution impacted schools (Murphy, 2006). Students were taught by assembly-line methodologies, encouraging memorization (Wood, 2005). Teachers taught in isolation, lecturing in front of the class. Schools were thought to be more efficient (Kochan & Reed, 2005). The same curriculum was provided to mass-educate the youth in preparation of a trade (Applegate, 2008).

In 1916, John Dewey published *Democracy and Education*. He expressed his belief that education had a social purpose to assist students in becoming responsible members of society (Neill, 2005). John Dewey characterized democracy to be the “producing and managing” of social institutions by everyone who lived within the institution (Dewey, n.d.). Dewey was instrumental in the progressive movement of public schools. He supported the concept of students learning from their experiences (Dewey, 1938).

However, after World War II, public schools began to initiate wide-scale reform due to suggestions from educational experts and the federal government (Mitchell, 2007). The National Defense Education Act (NDEA) was passed in 1958 and increased funding for science education and scientific research (Moritz, 1999). In 1965, the Elementary and Secondary Education Act (ESEA) was passed and provided Title I funding for low socioeconomic children (Schugurensky, 2002). The federal government influence on education kept increasing. In 1972, Title IX of the Education Amendments of 1972 prohibited discrimination based on sex (USDL, 2009). Education had to be provided to all students regardless of disabilities with the passage of the 1975 federal law, Education of All Handicapped Children Act. In the 1980s, the focus was on teacher training and school reform. *A Nation At Risk* was published in 1983 calling for the nation's commitment to schools. American children were falling behind academically compared to other countries. Goals 2000, in the 1990s, and No Child Left Behind, 2001, resulted in national standards, instructional accountability, and federal penalties if schools did not meet adequately yearly progress (USDE, 2002).

Mitchell stated, "change is a creative process with struggle and conflict" (2007, p. 5). Numerous educational reforms have been applied through the centuries. Schools continue to struggle to educate the youth in preparation of becoming a responsible democratic society member. Society is changing due to advancements in industry, technology, and commerce. To effectively prepare students, school stakeholders have joined together to identify needs, develop action plans, initiate change, and celebrate successes. This collective action is evidence of a professional learning community.

Since the 1990s, professional learning communities have become popular initiatives in public schools (Berlinger-Gustafson, 2004; Buffum & Hinman, 2006; DuFour & Eaker, 1998; DuFour, 2004; Fullan, 2006; Hallinger, 2003; Hord, 1997a; Kornelis, 2003; Lieberman, 1999; Newmann & Wehlage, 1995; Robert & Pruitt, 2003; Schussler, 2003; Yamraj, 2008). Professional learning communities, or PLCs, are identified as schools with shared leadership, engaged in inquiry and discourse about instructional practices (Cate, Vaughn, & O'Hair, 2006; DuFour, 2005; Fullan, 2005; Lieberman, 2000). A professional learning community is also a school that has built trust among its members, increasing the likelihood that dialogue is open and honest (Hord, 1997b). Trust in a PLC is defined as "a group's generalized expectancy that the words, actions, and promises of another individual, group, or organization can be relied upon" (Hoy & Kupersmith, in Hoffman, Sabo, Bliss, & Hoy, 1994, p. 486). Trust and confidence among teachers will increase as they engage in collaborative sessions (Schmoker, 2004). As teachers collaborate on instructional strategies, decentralization occurs. Decentralization, or the dispersion of decision-making governance, invented a 'new understanding of leading and learning in schools' and resulted in the evolution of a PLC (Bezzina, 2006, p. 159).

Cate et al. (2006) stated that PLCs, which evolve towards a democratic learning community, or DLC, develop authentic learning opportunities for students. Democratic learning communities serve students, families, teachers, communities, or otherwise the schools stakeholders. To become a democratic school, schools practice the democratic IDEALS. The democratic IDEALS framework represents Inquiry, Discourse, Equity, Authenticity, Leadership, and Service (O'Hair, McLaughlin, & Reitzug, 2000). Through the use of technology, all students can access authentic lessons equitably. However to achieve technology integration within the schools, administrators and teachers must have the knowledge and beliefs necessary to be successful. Technology is a tool used to assist with the goals of developing into a high achieving democratic learning community (Atkinson, O'Hair, O'Hair, & Williams, 2008; Williams, Atkinson, Cate, & O'Hair, 2008).

Students are often referred to as "digital natives" (Prensky, 2005). Throughout their lives they have been exposed to technological advancements. The majority of high school student populations are familiar with digital languages because applications, such as, MySpace, Facebook, Twitter, Second Life, and YouTube. Cell phones and technology allow the students synchronous and asynchronous communication with their friends, as well as connections throughout the world to all types of information. Twenty-first century learners, those born after 1982, have experienced instant information and continuous entertainment (Rodgers, Runyon, Starrett, Von Holzen, 2006). Video games, emails, television, vodcast, mp3 players, and cell phones have monopolized their time. Reading a book for pleasure or playing outside to occupy time has been pushed aside by the capabilities of technology. Students are in control of their own learning by networking, problem solving, and engaging in high-order thinking skills through the use of technology (McCoog, 2008).

Technology is defined by the International Technology Education Association as: "(1) Human innovation in action that involves the generation of knowledge and processes to develop systems that solve problems and extend human capabilities; and (2) The innovation, change, or modification of the natural environment to satisfy perceived human needs and wants" (Valdez, 2004, section 3). Valdez (2004) states three reasons why school administrators should use instructional technology "first, the need to prepare students for an Internet-using society; second, the need to make students competent in using tools found in almost all work areas; and the third is the need to make education more effective and efficient" (section 3).

It is beneficial to prepare students for a technological society regardless of their life-long goals. Many careers incorporate technology into their employment positions. Auto mechanics use computers to diagnose engine problems as well as air traffic controllers manage flight patterns through the use of technology. Technology is used in almost all careers; therefore, technology-integrated curriculum provides students beneficial experiences. Over the last two decades, schools are furnishing computers in individual classrooms and labs. However being of the "digital immigrant" generation, some teachers and administrators are slow to accept and utilize technology at the level necessary to see increased student achievement (Prensky, 2005). Technology allows instructors to design lessons that are authentic and applicable to the students. Students are required to problem solve, think critically, and experience the democratic principle of making their own decisions when they progress through a lesson, using technology to produce a final product. A high school physics teacher might use technology by storing course information electronically on an open-source classroom management system such as Moodle. An English teacher might integrate technology by using the search engines through the Internet in preparation for the course research paper. Another example might be a mathematics teacher presenting the curriculum using a software package that resembles video games. Therefore, by incorporating technology as a tool to impact productivity and efficiency, acquire information and develop knowledge, schools can begin to see a difference in student achievement (Bransford et al., 2000; Burns, 2005; O'Hair, & Reitzug, 2006).

Technology provides the educators with additional tools to engage and motivate students towards increased achievement levels (Atkinson et al., 2008; Bransford, Brown,

& Cocking, 2000). Kensler (2008) stated, "for teachers, the change to new ways of teaching and working requires learning" (p. 1). School administrators act as technology leaders to secure technology tools for their schools, and to support their school's development into a high achieving school. The vision for technology integration must continue to remain on teaching and learning, which in turn increases achievement levels.

Technology is engrained throughout society, and schools are implementing, encouraging, and supporting technology integration. Teachers and administrators possess technology skills and beliefs that vary in range. Understanding the degree to which this range extends will assist school personnel when planning systemic change. To design professional development sessions that benefit the greatest number of people takes knowledge about the people being affected. To implement change, an understanding of the current beliefs and abilities of the personnel also is needed. The teachers in question for this study will include Oklahoma elementary, middle school, and high school teachers, as well as K-8 and 7-12 teachers, and even technology specialist, counselors, and librarians. The administrator group for this study consisted of Oklahoma superintendents, assistant superintendents, principals, assistant principals, and technology directors/specialist.

Schools continue to strive towards higher student achievement. They are systemically reforming into PLCs that are evolving into DLCs. Through the use of technology, schools are leveling the educational inequalities often found. The opportunities provided by technology integrations are endless. To capture these opportunities more schools are engaging in PLC strategies using technology. To design professional development that will assist with enhancing technology integration in schools, knowledge levels of technology beliefs and abilities of the teachers and administrators are beneficial. Therefore, the purpose of this study is to provide knowledge about the teachers' and administrators' technology skills and technology beliefs.

Statement of the Problem

While building a school climate that prepares students to function in a technological society, schools begin to integrate technology in the curriculum. Therefore, it is important to the instructional leaders to understand the technology beliefs and skills of personnel when initiating technology integration (Atkinson et al., 2008; Burns, 2002). To design professional development for the integration of technology, teachers and administrators need to be on the same page. A common vision is based upon collective inquiry (Eaker, 2002). The school's vision becomes the hinge for all teaching and learning (Hord & Rutherford, 1998). DuFour and Eaker (1998) suggest a clear, shared vision motivates and energizes people, creates a proactive orientation, gives direction to people within the organization, establishes specific standards of excellence, and creates a clear agenda for action. The personnel engage in inquiry and discourse to determine the areas for improvement. They identify the type of training needed to use the technology according to their abilities. Teachers benefit when professional development sessions are designed to maximize time and focused on the skills needed by teachers (Kocher & Moore, 2001). The time set aside for training will not benefit the maximum number of people if the training does not meet everyone's needs. According to Beasley and Sutton (1993), a minimum of 30 hours of technology related professional development (training and practice) might be needed to reduce teacher anxiety towards technology integration.

Successful professional development sessions influence teachers' beliefs about teaching and learning by modeling effective pedagogy using technology (Guhlin, Ornelas, & Diem, 2002; Reitzug, n.d.). The more technology professional development teachers are exposed to the more their technology beliefs are influenced (Ertmer, 2005).

Research studies have been conducted on technology skills of both administrators and teachers (Anderson, 2000; Kocher & Moore, 2001). Richardson and McLeod (2009) conducted a meta-analysis on technology leadership. Over a ten year span, 1997 to 2007, they found only 120 dissertations, 47 articles, and 62 conference presentations focusing on technology leadership. The minimal number of educational studies affiliated with technology leadership leads to the need for additional studies in this field. The Anderson (2000) study reported that the educators surveyed "rated themselves highest on basics such as word processing, file management, and email, and then least skilled in spreadsheets, databases, and curriculum integration" (p. 26). Teachers whose classrooms were equipped with computers rated themselves with "higher skill levels in managing instruction, planning lessons, delivering instruction, and word processing" (Mann, Shakeshaft, Becker, & Kottkamp, 1999, p. 38). In 2002, Shakeshaft, Mann, Becker, and Sweeney revealed that teachers with high technology confidence levels used technology more. As school leaders experience and understand the benefits technology provides the more likely they are to learn and utilize technology (Hughes, McLeod, Brahier, Dikker, & Whiteside, 2005). This study will reveal what the technology skills are of administrators and teachers who commit to a high-achieving school improvement program.

A limited number of belief studies have been conducted in the general areas of pedagogy, as well as content areas: science, reading, history, and mathematics (Lin, 2008; Méndez-Morse, 1992; Pajares, 1992; Raths, 2001; Snider & Roehl, 2007). Within these studies, the beliefs of superintendents, principals, and teachers have shown minimal differences (Méndez-Morse, 1992). The Lin (2008) study reflected positive attitudes about teaching mathematics using technology. Pajares (1992) suggested beliefs are “strong predictors of behavior” (p. 311). The beliefs of teachers influence their planning, instructional styles, and procedures. In the 2001 study conducted by Raths, it was suggested teacher beliefs about teaching practices should be considered ‘dispositions’ instead of ‘beliefs’.

Only a few studies have been conducted to evaluate educators’ technology beliefs (Albion & Ertmer, 2002; Bai & Ertmer, 2008; Ertmer, 2005; Hanks, 2002). As teachers experience how to use technology and witnessed what teaching with technology looked liked, their self-efficacy levels increased, which altered their beliefs about technology integration (Albion & Ertmer, 2002). Ertmer (2005) suggested if a teachers’ technology usage is to increase, their pedagogical beliefs about teaching need to be considered. Integrating technology effectively contributes to the development of a professional community (Dexter, Seashore, & Anderson, 2002). Teachers and administrators who engage in collaborative learning and constructivist ideas are likely to report higher confidence levels and computer usage (Mann et al., 1999). Administrators believe that students come first (Mendez-Morse, 1992). Support, professional development, and experience impacts confidence levels in turn the amount of time using technology increases (Mann et al., 1999; Shakeshaft et al., 2002). This study will contribute to the body of research about technology beliefs and skills of both teachers and administrators. As teachers and administrators enter into a high-achieving schools program, the analysis of their technology beliefs and abilities will provide a better understanding for program designers when developing technology training. This understanding will facilitate a climate of change boosting student achievement.

Problem in Context

Schools, in general, strive to find ways to increase student achievement. For the purpose of this study, Oklahoma schools were targeted. These schools consisted of public and charter pre-kindergarten through twelfth grade schools. When Oklahoma schools commit to the University of Oklahoma's K20 Center for Educational and Community Renewal OK-ACTS program, they embark upon a journey focused on strategies for high-achieving schools. These schools are in the beginning of a PLC development. The K20 Center is committed to researching and developing interactive learning communities emphasizing technology integration (University of Oklahoma (1), n.d.). The K-12 division of the Center is aimed at "systemic school improvement and increasing student achievement" through the use of technology (University of Oklahoma (1), n.d.). The program designed to facilitate this initiative is OK-ACTS, Oklahoma-Achievement through Collaboration and Technology Support.

The K20 Center's mission is divided into four phases with the first focusing on school leaders, the second focusing on the whole-school development, the third on the teachers, and the fourth on student engagement. Phase I, or OK-ACTS, facilitates the school administrators' development of their technology beliefs and skills. The administrative roles vary from district superintendents to building principals to technology directors. At the end of Phase I, each school has the opportunity to write for the OETT (Oklahoma Education Technology Trust) grant. If awarded the school moves on to Phase II participation, which includes financial assistance for technology upgrades, expert presented professional development, and financial means to cover faculty release time for training. Phase II focuses on the whole school evaluating ways to enhance student achievement by embracing attributes of a professional learning community. Phase II involves the professional development of all personnel focusing on the Ten Key Practices of High Achieving Schools assisted through the use of technology (University of Oklahoma (2), n.d.). The practices are: shared vision, authenticity, shared leadership, personalized environments, teacher collaboration, inquiry and discourse, supportive leaders, community connections, equity concerns, and external expertise (Cate et al., 2006; O'Hair et al., 2000). The Ten Key Practices are governed by the democratic IDEALS framework: Inquiry, Discourse, Equity, Authenticity, Leadership, and Service (O'Hair et al., 2000). Schools begin to experience higher student achievement when they incorporate the IDEALS framework (Atkinson et al., 2008; Williams et al., 2008).

As schools review student achievement data, hold discussions about improvement strategies, and evaluate equity issues of availability and accessibility of resources, they are developing learning communities. Additionally, learning communities evolve when schools engage in professional development focused on technology-enriched authentic lesson design, disperse leadership roles to ensure a common vision, and implement community service projects. These are examples of the IDEALS framework in action that support and influence student learning (Williams et al., 2008).

By integrating technology, teachers experience opportunities to collaborate and share best practices, learn together collectively, and develop coherence and trust among each other (Atkinson et al., 2008). Technology enriched authentic instruction allows students to engage in problem-solving, higher-order thinking skills. Students have the opportunities to construct their own knowledge, communicate worldwide, and design presentations using technology (Atkinson et al., 2008). Student achievement is impacted by technology-enriched instruction. Research studies that involve schools transforming into a learning community and integrating technology have resulted in student achievement increases. Theses schools outperformed traditional schools 75% to 82% better on state accountability standards (Atkinson et al., 2008; Williams et al., 2008).

The participation of school leaders in the K20 Center's OK-ACTS program is voluntary and based upon an open enrollment. Interested leaders complete an application and are contacted to participate in a 2-day leadership seminar. The administrators represented a percentage of the total that applied for their specific regional location. However, according to the K20 Center Associate Director, J. Cate, everyone who has completed an application has had the opportunity to participate in Phase I during one of the scheduled 2-day seminars (personal communication, April 25, 2009). During Phase I, administrators who participate in the initial 2-day leadership seminar are asked to complete the TIPS-A for administrators survey. The administrators are encouraged to log 75 hours of technology usage, have their teachers complete the TIP-T survey, and have the staff complete an action plan geared towards one of the 10 Key Practices of Highly Effective Schools. The Phase I - TIPS data analysis provides the K20 Center with knowledge to prepare professional development sessions for the Phase II programs. This study provides a better understanding of the technology beliefs and skills of teachers and administrators. Knowing what and how educators believe about technology will provide schools information to assist with the systemic change towards a PLC and continue the journey towards a democratic learning community.

Research Questions

The purpose of the study is to understand the level of technology knowledge and the technology beliefs administrators and teachers possess. The administrators range from superintendents to technology directors. However, the teacher category includes not only teachers but also counselors, librarians, and technology specialist. The following research questions guided this quantitative study:

Question One: What are the technology beliefs and technology skills of teachers?

Question Two: What are the technology beliefs and technology skills of administrators?

Question Three: Are there statistically significant differences between the technology beliefs of the teachers versus administrators?

Question Four: Are there statistically significant differences between the technology skill sets of teachers versus administrators?

Question Five: Are there statistically significant differences between teachers and administrators by region across Oklahoma?

Oklahoma schools, which were committed to the OK-ACTS program during 2007 and 2008 completed online technology surveys, TIPS-T for teachers and TIPS-A for administrators. A copy of the completed surveys can be found in Appendix A for TIPS-T and Appendix B for TIPS-A. The results of the TIPS-T and TIPS-A surveys were analyzed using descriptive and inferential statistics. The results of the analysis are located in chapter four. Within this study, the respondents who answered the surveys represent 101 of the 547 public and charter schools.

Geographically, Oklahoma can be divided fairly evenly into four quadrants. The major interstates, I-35 and I-40, intersect perpendicularly in the middle of the state. There are two urban school districts, Oklahoma City and Tulsa. Tulsa is located in the northeast quadrants; whereas Oklahoma City is divided by the interstates. For the purpose of this study, Oklahoma City was considered part of the northwest quadrant because the administrative offices are located in the northwest region.

Figure 1: State of Oklahoma, retrieved April 15, 2009, from http://www.state-maps.org/ok-map.htm

Oklahoma consists of urban, suburban, and rural communities. There are 547 public and charter school districts throughout the state. Table 1 represents the division of school districts in 2007 – 2008 based upon student population (Oklahoma State Department of Education [OSDE], 2008b). Oklahoma is predominately comprised of school districts that have a student population less than 500, (58% of the school districts). Only 4% of the school districts have a student population greater than 5000. It is evident that the majority of Oklahoma school districts are small.

Table 1:

School district division

Student Population	Number of School Districts	% of Total School Districts
0 - 500	317	58%
501 – 1500	147	27%
1501 – 5000	63	11%
5001 & over	20	4%

Note. Data compiled from school district database. (Oklahoma State Department of Education [OSDE], 2008b)

Oklahoma is recognized as the third largest gas producing state in the nation. Agriculturally, Oklahoma is fourth in the nation producing wheat, fourth in cattle and calf production, 5th in producing pecans, sixth in peanut production and eighth in peach production. In 2007, the states population was 3,617,316 with Oklahoma City and Tulsa consisting of 38% of the population (State of Oklahoma, 2009).

The eastern side of the state has about twice as many school districts than the western this is due to the denser population. Geographically the northeast region is comprised of Ozark Forest, Crosstimbers, and caves and prairies (Oklahoma Tourism, 2007). Large oil corporations are located in the northeast region as well as the national hub for all oil pipelines. The University of Tulsa and Oklahoma State University are located in the northeast region. The southeast region is densely populated and geographically has regions described as Hardwood Forest, Quachita Mountains, Cypress Swamps & Forest and Crosstimbers (Oklahoma Tourism, 2007). Two regional state universities are located in this region along with the University of Oklahoma. A military weapons plant, logging and other large manufacturing centers are located in this area.

Geographically, the southwest region is classified as Crosstimbers and the farther west transforms into the Central Great Plains (Oklahoma Tourism, 2007). Farming, cattle production, oil and gas production and manufacturing plants are dispersed throughout this region. A large army base is located in this region, the Wichita Mountains, and two regional state universities. The population declines the further west of I 35. The northwest region is classified as Central Great Plains to Southwestern Tableland in the far northwest. Farming, cattle production and oil and gas production dominate the commerce. The semi-arid climate requires farmers to irrigate (Oklahoma Tourism, 2007). An air force base is located in the northwest region as well as three regional state universities.

Within the four geographical quadrants, northeast, southeast, southwest, and northwest, the school districts have a division that is represented in Table 2. The majority of the school districts in Oklahoma have a student population of less than 500. Within small schools, often times rural schools, the faculty is close in proximity to one another. The administration (superintendents and principals) work side-by-side as instructional leaders. In addition, the administration works close in proximity to the teachers. The National Center for Educational Statistics classifies rural areas based upon the location from an urbanized area. Rural territory ranges in definition from "fringe" to "remote" determined by the distance from the urbanized area or urban cluster. For example, a school classified as rural remote is more than 25 miles from an urbanized area and is also more than 10 miles from an urban cluster. The definition of school size was revised in 2006 to provide a more precise classification besides relying on population.

Now the physical address as well as the latitude and longitude are used to distinguish a school's proximity to urbanized areas (NCES, n.d.).

Table 2:

Regional division of school districts

Regional Location	Student Population	Number of School Districts	% of Total Districts per Region
Northeast N = 195	0 – 500	89	46%
	501 – 1500	66	34%
	1501 – 5000	30	15%
	5001 & over	10	5%
Southeast N = 166	0 – 500	107	64%
	501 – 1500	43	26%
	1501 – 5000	13	8%
	5001 & over	3	2%
Southwest N = 98	0 – 500	61	62%
	501 – 1500	25	26%
	1501 – 5000	10	10%
	5001 & over	2	2%
Northwest N = 88	0 – 500	60	68%
	501 – 1500	13	15%
	1501 – 5000	10	11%
	5001 & over	5	6%

This study does not distinguish between school sizes; instead the regional locations are of interest. Even though the school districts are not evenly distributed among the four geographical regions, the researcher is interested in finding whether teachers and administrators in the regions have different abilities and beliefs. This study does not provide the steps or how-to change into a DLC, nor does it identity if a school is functioning as a PLC or DLC. However, it will provide an awareness of the technology knowledge and beliefs current educator's posses as they commit to the journey towards a high-achieving school.

Limitations of the Study

The study sample was limited to Oklahoma schools that have leaders committed to school improvement by entering into the University of Oklahoma K20 Center's OK-ACTS program and are on the journey to develop technology enriched professional learning communities and even further into democratic learning communities. Only OK-ACTS schools that entered in 2007 or 2008 comprised the study sample. Also, schools whose personnel completed the electronic TIPS surveys represent the technology skills and beliefs of all the school's personnel. The TIPS surveys varied slightly in a few of their questions regarding technology skills and beliefs. The belief question for the teachers included positive and negative statements; whereas, the administrator belief question only had positive statements.

Assumptions

It is assumed that the respondents of the surveys truthfully marked each question. The administrator participation in the two-day leadership conference did not influence the TIPS-A responses anticipating writing for the Phase II grant. It is also assumed each respondent willfully participated in and supported the advancement of their school towards a technology enriched learning environment.

Summary

Schools continue to search for ways to boost student achievement. Through the literature on professional learning communities, it is known that as schools engage in PLC strategies students performance increases (DuFour & Eaker, 1998; Hord, 1997a). Additional studies have shown that there is a positive relationship between PLC strategies and technology integration (Atkinson, 2005; Dexter, Seashore, & Anderson, 2002; Williams et al., 2008). With society heavily influenced by technology, it only seems certain that teachers should integrate technology into their curriculum. Furthermore, to impact the beliefs and abilities of school personnel, there must be an understanding of the current levels to effect change.

This study analyzed the technology beliefs and skills of Oklahoma school personnel who committed to a high-achieving schools program. The remainder of this dissertation consists of four chapters and appendices. Chapter two is a literature review on high achieving schools and technology integration. It provides an evaluation of a professional learning community. Additionally, chapter two describes the evolvement into a democratic learning community, as well as the integration of technology. Chapter three describes the quantitative research methodology utilized in this study. Chapter four contains the analysis of the findings for the five research questions. In conclusion, chapter five contains a discussion of the analysis and recommendations for future research studies.

Chapter Two: Literature Review

Introduction

Educational trends have varied over the last several decades. Instructional tools are progressing from blackboard and chalk to more advanced manipulative whiteboards such as SMARTBoards. Some schools have advanced from the traditional mode of information acquisition to the more appealing environment of a learning community filled with authentic lesson activities, and have moved from a top-down hierarchical dictatorship to a shared leadership (Cate, 2006; Fahey, 2008; Kensler, 2008; O'Hair et al., 2000; Woods, 2007). A school that embarks upon this transformational journey often refers to themselves as a high achieving school, or more specifically, a professional learning community (PLC).

Schools have ample reform strategies to pick from in order to boost student achievement. For the purpose of this literature review, the K20 Center's democratic IDEALS framework was emphasized. Technology integration to influence student achievement was addressed. This chapter delineates the attributes of a professional learning community, discussing the advantages and challenges of a PLC, and addressing strategies to initiate, develop, and sustain a PLC. The second segment of this chapter provides a short overview of democratic learning communities (DLC) and what constitutes these characteristics. The third portion of this chapter reviews the literature about educator technology skills and beliefs. Lastly, the fourth portion discusses the importance of technology integration as schools strive towards higher student achievement. Technology usage barriers were also addressed. Technology standards and the change process were discussed. Additionally, program evaluation, along with sustaining systemic change was covered. This chapter continues to tie back to the IDEALS framework to provide the reader a better understanding of strategies used to boost student achievement.

The IDEALS framework represents: Inquiry, Discourse, Equity, Authenticity, Leadership, and Service (O'Hair et al., 2000). As schools develop their missions and goals, and design strategies to progress towards higher student achievement, the IDEALS framework provides guidelines for assistance. Schools that engage in inquiry and discourse are more informed of instructional practices and areas of weaknesses and strengths throughout the school. The members are conscious of equity concerns to ensure students are provided equal opportunities to succeed. Authentic instructional lessons provide students learning opportunities, which challenge them in ways that enhance retention. Schools that disperse leadership responsibilities, sharing them among teachers and administrators, strengthen the connection among the members in the learning community. This supports the shared vision of the school and supports the mission. The service component encourages the school to give back to the community. When schools engage in community service projects, the community in turn provides support to the school. The IDEALS framework provides suggestions for actions to become a high-achieving school.

High Achieving School

"Professional learning community" is a phrase heard throughout education over the last 10 to 20 years. School leaders have searched for strategies to enhance student achievement levels. Several publications were found on professional learning communities but few studies have been conducted on the transformation of schools to a

PLC. In the 1980s, teacher collegiality was the emphasis for Little's research into student achievement (Fullan, 2006). As research progressed, the emphasis was on stakeholder collaboration focused on learning (Professional learning, 2007). Educational stakeholders and teachers involved in the collaboration began to have a voice in the realm of student achievement. Professional learning communities are often related to staff development initiatives for school reform and student achievement (Hord, 1997a).

In 1995, Kruse concluded effective professional learning communities resulted from: reflective dialogue, deprivatization of practice, collective focus on student learning, collaboration, and shared norms and values (Fullan, 2006). Administrators, teachers, parents, community partners, and even the students became involved in the decision making for student achievement. Shared personal practice is one attribute variation in Hord's 1997b view of a PLC. Teacher teaming, decentralization, and shared decision making are all factors having positive influence on student improvement (Hord, 1997a). In 1998, DuFour and Eaker identified six core elements of a professional learning community: "1) focus on learning, 2) collaborative culture with a focus on learning for all, 3) collective inquiry into best practices, 4) an action orientation (learning by doing), 5) commitment to continuous improvement, and 6) focus on results" (pp. 25-29).

A group of networks was how Lieberman (1999) viewed PLC. Senge, Cambron-McCabe, Luca, Smith, Dutton, and Kleiner (2000) identified areas of a PLC as: personal mastery, mental models, shared vision, team learning, and systems thinking. In 2002, Joyce and Showers researched PLC focusing on staff development and school improvement. Professional learning community focused on improving student learning was the view of Kornelis (2003). Berlinger-Gustafson (2004) states a PLC "engages learning among the entire group of professionals within a supportive self-centered community" (p. 1). Berlinger-Gustafson (2004) identified PLC attributes that support such operations as supportive and shared leadership, shared values and vision, collective creativity, supportive conditions, physical conditions, and human capacities.

As professional learning communities evolved, the one constant among all the previously mentioned researchers is the focus on learning. Improvement in student learning results in the PLC redesign of the school culture. As stated by Schmoker (2006), PLCs are "continuously improving instruction and student performance" (p. 106). The students as well as the adults are learning.

As schools embark upon systemic change to enhance student achievement, teachers and administrators ask themselves various questions, including: how well are all the students performing, at what level do we want them all to perform, and how are we going to alter our strategies to ensure students achieve our desired outcome? Schools that evaluate their actions and seek ways to positively influence their results are primed for the PLC journey (Gregory & Kuzmich, 2007). For good companies or schools to become great companies or schools, Collins (2001) identifies discipline to be the key. Disciplined people with disciplined thought, having disciplined actions result in great companies (Collins, 2001) or schools (Collins, 2005). Schools that function as PLCs produce high student achievement; therefore, they are viewed as great schools.

Utilizing technology to assist with the core elements of a professional learning community allows the school to enhance the efficiency and effectiveness of the teacher's initiatives (Burns, 2002; Riel & Fulton, 2001). Learning is the key. Technology increases the ability to "work and learn from one another' (Riel & Fulton, 2001, p. 519).

According to Glickman (1993), successful schools have established goals and have collaborated to achieve them. Communication technologies allow teachers to collectively learn from each other, reflect on practices, share instructional strategies, and discuss new approaches to curriculum (Riel & Fulton, 2001). For schools to be successful in student achievement, involvement from all stakeholders is important to establish a common vision. Effective leaders guide the process towards a common vision, which in turn, strengthens the learning community coherence (Lambert, 2003). The vision is influenced by the values and beliefs of the leaders (Méndez-Morse, 1992). Sharing the vision can also mean sharing leadership roles (Porter, 2005). With learning the focus and high student achievement the vision, individual administrators cannot enhance curriculum alone. To effectively and positively change the curriculum, stakeholders work democratically together (Reeves, 2006). Apple and Beane (1995) suggest democratic schools engage in "critical reflection and take actions based on the concern for a greater good while securing dignity of all" (p. 4). Instructional lessons are designed for students to engage in critical thinking, inquiry, creativity, and problem-solving strategies (Fahey, 2008; Woods, 2007).

Using the democratic IDEALS framework, school leaders begin to see their schools change towards high student achievement. Inquiry, Discourse, Equity, Authenticity, Leadership, and Service represent the IDEALS framework (O'Hair et al., 2000). To develop into a professional learning community, leaders incorporate the IDEALS framework to steer their actions. Within the democratic IDEALS framework, ten key practices of high achieving schools are outlined: (1) shared vision, (2) authenticity, (3) shared leadership, (4) personalized environments, (5) teacher collaboration, (6) inquiry and discourse, (7) supportive leaders, (8) community connections, (9) equity concerns, and (10) external expertise (Cate et al., 2006; O'Hair et al., 2000). Through these practices schools build trust and support among their members. The knowledge among the learning community members increases to support the vision of high-achieving schools. The following figure depicts the IDEALS framework and is the model used throughout the K20 Center.

Figure 2: K20 Center's 10 Practices of High Achieving Schools

Teacher collaboration focused on learning must be inquisitive. Inquiry into how the teachers are teaching, how students are learning, the results of the students learning, and how the students are being assessed are all questions teachers reflect upon (Schmoker, 2006). Additional inquiry into how technology is being used, the results of technology integration and any additional needs, will assist in further technology integration.

It is a team effort consisting of faculty, staff, students, parents, community members and administration to design, analyze, and implement a shared vision (Averso, 2004). To ensure student success, schools analyze and review their practices on a periodic basis (Glickman, 1993). Inquiry and analysis of achievement data, as well as, engagement in discourse about the data assist stakeholders to identify the needs of the school. This collaboration provides stakeholders the opportunity to plan and make decisions for school reform that focuses on student achievement (Lachat, 2001). Through this process the current performance of the schools can be identified. The use of communication technology makes the collaborative process easier. Video-conferencing, emails, and googledocs allow for synchronous and asynchronous communication (Dexter, Seashore, & Anderson, 2002).

Teachers who engage in effective discourse within their curriculum departments or during faculty meetings allow a collective effort to bring awareness about current strategies and instructional results (O'Hair et al., 2000). Teachers learn best from each other (Schmoker, 2006). Technology can assist during inquiry and discourse. Administrators can display student data on charts and graphs generated by software. Discussions can occur through blogs or emails. Teachers and administrators can even stay current on educational trends through Internet accessible articles.

Discourse about the school's vision and goals provide awareness of the school's technology integration. Teachers reflect on their instructional strategies and assessment techniques (Hord & Rutherford, 1998). The teachers and administrators design action plans needed to accomplish goals set forth from the analysis of the student performance data. To assist with student achievement, teachers and administrators involved in the planning decide what technology tools to implement. Within a high achieving school, teachers collaborate about student successes and failures (DuFour, 2004). The collaborative sessions are focused around the shared vision set for the school and around the techniques and materials needed to accomplish the goals of the school. High achieving schools are data-driven. Data is used to help guide collaborative efforts, support policy changes, and foster instructional reform (Lachat, 2001). By identifying problems and designing strategies, teachers feel a sense of empowerment, which leads to their commitment to the vision (Jenkins, 2009).

Teachers learn from one another in successful schools, which allow equitable opportunities for all students. The teachers share ideas, strategies, and knowledge among one another. These ideas are then implemented by their peers. Instead of two English teachers presenting separate novels, they provide the students the same information. Many school districts use curriculum maps; teachers know what and how to present curriculum topics. High achieving schools are student centered with decisions based on data (Lachat, 2001; O’Hair et al., 2000). The data help identify areas of weaknesses within the curriculum or student populations who are struggling in certain contents. When the needs are identified, teachers can assist all students to improve academic performance. Within successful schools, teachers work together to address school improvement problems and influence student engagement and learning. Strong instructional program coherence allows for increased student achievement (Newmann, Smith, Allensworth, & Bryk, 2001).

If whole school results are desired, teamwork is required to develop instructional lessons that are authentic experiences for students. Authentic instruction provides students with connections to their frames of reference, which enhances retention. Technology can facilitate the development of authentic learning experiences for students and can serve as mediums for communication and for furthering democratic discourse (O'Hair & Reitzug, 2006). One common element of successful instruction is a teacher's use of rich data on student performance to make informed decisions about practice (Wise, 2008). Analyzing student performance through inquiry and discourse with colleagues provides teachers a clearer perspective of instructional areas of weaknesses and areas of strengthens. Specific areas of the curriculum can be identified that need to be altered and authentic lessons designed to benefit student achievement.

Leadership is a key component to the IDEALS framework. Effective leadership as described by O'Hair et al. (2000) is democratic in nature. All stakeholders play a critical role in the systemic change into a professional learning community focused on student achievement. School administrators are the ones to develop an atmosphere that provides all stakeholders a voice in the decision making (Lambert, 2003). Dispensing the leadership roles and developing leadership capacity has a direct impact on curriculum and instruction (Lambert, 2003). Leadership actions demonstrated such as inquiry, implementation, and monitoring have improved student achievement and educational equity (Reeves, 2006). The shared and supportive leadership within a PLC allows both administration and teachers to grow professionally striving towards a better school (Hoerr, 1996). Shared leadership and vision allow teachers to have ownership in the direction and processes that occur within the school. No longer are teachers isolated from each other, instead they are side-by-side engaged in lesson studies, book reviews, rubric development, assessment analysis, and so forth. The collective effort and intelligence of the teachers and administrators enhances student achievement (Schmoker, 2006). The higher the leadership capacity is within a school the higher the performance of the school (Lambert, 2003). When administration shares leadership responsibilities the school performance increases. Everyone has a role in the direction of the school's vision.

As schools engage in inquiry and discourse, address inequities, provide authentic learning opportunities, and disperse the decision-making process, a service is provided to the students and community. The last IDEALS component is service. Teachers provide a service to one another by sharing best practices. The school provides a service to the community by addressing inequalities among the students. Students provide a service to the community through projects that give back or directly affect the community. These are all examples of how schools can practice service (O'Hair et al., 2000).

School administrators support the efforts of teachers who engage in inquiry and discourse, develop authentic instruction, and encourage service learning projects. With the modern learning technologies available today, and with recent research on cognition and learning, educators now have the tools to change the school's learning environments dramatically (Carroll, 2000). Through reflection, inquiry, and discourse, teachers and administrators will be able to identify what tools are needed to develop into a high achieving school. By modeling technology usage during faculty meetings, providing release time to attend technology training, or securing technology resources to support instruction, administrators encourage teachers to continue their efforts of technology integration.

Characteristics of a Professional Learning Community

As educational stakeholders ponder whether or not to transform their school into a professional learning community, they must have an understanding of a PLC. In 1998, DuFour and Eaker identified six core elements of a PLC: “1) focus on learning, 2) collaborative culture with a focus on learning for all, 3) collective inquiry into best practices, 4) an action orientation (learning by doing), 5) commitment to continuous improvement, and 6) focus on results” (pp. 25-29). In 1998, Hord and Rutherford identified the key components of a PLC to be: supportive and shared leadership, shared values and vision, collective creativity, supportive conditions, and shared personal practice.

According to DuFour, Eaker, and DuFour (2005), PLCs differ greatly from our traditional schools. Traditionally, teachers taught in isolation and curriculum was disconnected; whereas a PLC is about a culture of collaboration focused on student achievement. Each person is working with the other to ensure success. The table below is comprised of recurring themes identified by DuFour, Eaker, and DuFour (2005).

Table 3:

Traditional versus PLC comparison

Traditional School	**Professional Learning Community**
Ensure all students are taught	Ensure all students learn
Culture of isolation	Culture of collaboration
Improve individuals for school improvement	Staff collectively work to improve school
Focus on the activities	Focus on the results

Assessment of learning	Assessment for learning
Charismatic leader	Dispersed leadership
Sense that external forces determine success	Sense of self-efficacy, that success is dependent on effort
Teachers viewed as implementers/followers	Teachers viewed as transformational leaders

Note. Recurring themes identified in *On Common Ground* by DuFour, Eaker, & DuFour (2005)

The table shows that the schools shift their focus from individuals to the whole culture, where everyone has the responsibility to affect achievement levels. It becomes a joint effort to uncover every detail about the instructional processes, evaluate the strategies and assessments, and strive to acquire the knowledge and skills to overcome any weaknesses. The support, guidance, and assistance of colleagues provide the motivation to continue towards the school's goals of boosting student achievement (DuFour, Eaker, & DuFour, 2005).

DuFour et al. (1996) divide the development of a professional learning community into stages: pre-initiation, initiation, developing, and sustaining. According to Eaker, DuFour, and DuFour (2002), pre-initiation occurs before any attribute of a PLC is addressed. Schools become uneasy about their progress and begin to seek ideas and information to help enhance their performance. The initiation stage happens when PLC attributes are identified and addressed but not all faculty are on board with the processes. When all faculty support and participate, the school develops into a PLC. Changes throughout the school complex are evident. Sustaining a PLC is just as challenging for a school as it is to initiate (Gregory & Kuzmich, 2007). Only when a school's culture is deeply engrained with the attributes will a school be able to sustain as a PLC. Successful PLCs are "always characterized as collaborative cultures" (Eaker, DuFour, & DuFour, 2002, p. 5).

The one constant in the definitions or descriptions of a professional learning community is the focus on learning. Teachers are learning to instruct and assess better. Administrators are learning to lead better. Both learning processes result in the improvement of student learning, the ultimate result. Characteristics of a culture supportive of learning are safe, inclusive, enthusiastic, trusting, sharing, open for taking risk, and accepting of challenges (Gregory & Kuzmich, 2007). Schools that change their culture into a PLC have collaboration occurring regularly. The schools develop mission statements, visions, values, and goals. These schools also celebrate successes and are persistent in their efforts (Eaker, DuFour, & DuFour, 2002). Teachers are open with one another, sharing ideas and beliefs. They problem solve together, building trust and support networks. This allows the teachers to feel comfortable enough to try new strategies or even participate in peer evaluations. A common vision ensures the teachers focus on the same result, high student achievement. The success of a PLC is based upon the student achievement results (DuFour, 2005). However to ensure success, the principals and teachers must strive towards the goals together. The climate of learning that is established because of the attributes of a PLC enhances the overall professional culture of a school (Annenberg Institute, n.d.). The roles of administrators and teachers in PLCs are extremely important to ensure a successful transformation.

Instructional Leaders

School administrators are pivotal in the climate of schools. School administrators are instructional leaders who focus on curriculum and student achievement. They may have the role of a principal or superintendent or even a technology director, but school administrators make decisions to enhance the educational process. Instructional leaders prepare and plan for the future (technology integration) and assist with change by moving towards a high achieving school through the use of technology. Their strong leadership enhances technology-based school reform (Anderson & Dexter, 2005). Administrators vary in their leadership styles, such as: (1) laissez-faire – 'leave it be,' experienced staff are on their own during decision making, (2) autocratic – 'my way or the highway,' the leader makes all the decisions, (3) bureaucratic – 'by the book,' no flexibility in decision making, everything is left up to policy, (4) charismatic – 'cheerleader,' not truly about teamwork, school initiatives are not sustained if the leader leaves, and (5) democratic – whole school decision making, may take longer but better results in the end (Leadership styles, n.d.). The values and beliefs of administrators impact their leadership style that resonates throughout the school (Goldman, 1998).

Effective leaders analyze the whole school to determine what, when, how and why to implement educational initiatives (Waters, Marzano, & McNulty, 2003). Leadership within a high achieving school is supportive and democratic in style. Leaders of high achieving schools possess a democratic leadership style (Averso, 2004). They are individuals "who can inspire others to work better to accomplish shared goals" (Riel & Fulton, 2001, p. 519). There will be some decisions that only the administrator needs to make, but there will be many times when the administrator incorporates the expertise of the faculty members. By incorporating not only the faculty, but also other educational stakeholders into the decision making process, a shared vision emerges resulting in coherence throughout campus (Newmann et al., 2001). When teachers are allowed to become a part of the decision-making process, they feel ownership and pride in the overall function of the school. Decisions are not made hastily or without merit. The more teacher involvement; the more support and ownership the teachers have of the initiative. Once again, the shared leadership allows for the performance of the school to enhance (Lambert, 2003).

Setting a climate of democratic leadership is a key to high achieving schools. Democratic leadership as defined by O'Hair et al. is "facilitating processes that engage members of the school community in inquiry into and discussing issues, dilemmas, goals, and directions" (2000, p. 405). Supportive leaders provide teachers educational materials and design professional development opportunities or encourage teachers to initiate new instructional techniques in their classrooms. They are current on the latest research and incorporate technological advancements throughout their own presentations and model the desired expectations set for the teachers. Instructional leaders are the guiding force and encouragers within the schools. As Collins (2005) states, "true leadership only exist if people follow when they have the freedom not to" (p. 13). If administrators force initiatives upon teachers without justification, the support will be lacking which may result in wasted time and energy. In the areas of leadership, Schmoker (2005) suggest, "less is more" (p. 128).

Leading schools toward high achievement is not the primary responsibility of the administration; the whole school community plays a role. Collaboratively teachers and administrators incorporate strategies and utilize tools to support efforts to achieve their goals (Schmoker, 2005). They identify the needs of the school, design plans to remedy the problems identified, and follow through with the plans developed. Effective leaders address the needs of the students and also the needs of the teachers, the campus, and the community. Leaders of high achieving schools have the ability to know how to incorporate change (Waters et al., 2003). They lead the process of setting directions, developing people, and developing a high achieving school.

For school administrators to become technology leaders, fear cannot be a factor. Fear of the unknown, failure, and looking "stupid" must not play into the equation of integrating technology to boost student achievement. School administrators are not experts on everything; therefore, outside experts are used to assist in the development of a plan for systemic change from a traditional instructional style school, into a technology-assisted school culture.

To set in motion the whole school initiatives, stakeholders collaborate to develop a vision of how the school is going to integrate technology. Leaders provide the time, resources, and support needed for the teachers to achieve the goals of the school. Time to analyze student data, collaborate on assessments and discuss curriculum objectives is important to ensure student success. Supportive administrators ensure teachers have the necessary equipment to fully provide authentic instruction and learning opportunities for their students. Professional development and training, in how and when to use resources or designing authentic lessons, also assist in developing an atmosphere of high student achievement. One way to boost the efficiency of data analysis or enhance student motivation to learn is by infusing the technology throughout all the intertwining aspects of the school day (Jansen, 2007; McKenzie, 2001). Creating opportunities for teachers to learn transforms a traditional school into a professional learning community (Lambert, 2003). Principals and teachers engage in these activities to bring about positive student achievement results. The sections below describe strategies that are evident of teachers and administrators (more specifically, principals because of the close interaction they have with teachers and students) engaging in a PLC.

Principals. According to DuFour and Eaker (1998), the role of the school principal in a professional learning community setting is to:

> (1) lead through shared vision and values rather than through rules and procedures, (2) involve faculty members in the schools decision-making processes and empower individuals to act, (3) provide staff with the information, training and parameters they need to make good decisions, (4) establish credibility by modeling behavior that is congruent with the vision and values of their school, and (5) be results oriented. (pp. 184-186)

School leaders focus on learning, support a collaborative culture, remain focused on results, and provide timely, relevant information to all members of the PLC (Eaker, DuFour, & DuFour, 2002). They set priorities to ensure the PLC journey is maintained. The principal is viewed as “a leader of leaders” (Eaker, DuFour, & DuFour, 2002, p. 22).

Teachers. Teachers have the task of developing effective teamwork. Teamwork enhances the climate of the school. It is in connection to the efforts of the teachers that students learn. If the following professional standards are met by teachers, then successful PLCs occur: (1) emphasize student learning, (2) incorporate authentic inquiry-based instruction, (3) focus on student achievement, (4) collaborate on teaching and learning, (5) current on educational research, (6) accept responsibility for student success, and (7) be a transformational leader, one whose behavior accomplishes change (DuFour & Eaker, 1998). Teachers who engage in these practices are focused on learning and together they impact student achievement.

In a PLC, teachers collaborate, encourage and reflect with one another on their instructional strategies, curriculum, and assessments (Schmoker, 2006). They continue to enhance their own knowledge of content and instructional strategies. Teachers also have a voice in the direction of the school. Through inquiry and discourse, instructional strategies, assessment procedures, and resources are identified, suggested, and addressed.

Advantages / Benefits of a Professional Learning Community

As schools function as a professional learning community, they become more effective resulting in higher student achievement (Hord, 1997a). The individual teachers are more efficient as well as the school (Louis, 1992). Benefits of a PLC are identified as: teacher isolation reduction, school-wide vision commitment, shared responsibility among all faculty, each member engaged in powerful learning, and increased likelihood of fundamental systemic change (Professional learning, n.d.). Administration and teachers work collaboratively toward improving student achievement. In so doing, each member is stimulated with good teaching ideas and content knowledge which influences personal beliefs about teaching and learning (Hord, 1997a). Teacher morale improves and job satisfaction increases which decreases absenteeism, when they feel an integral part of the systemic change (Berlinger-Gustafson, 2004). They see themselves not only as teachers but also as colleagues, leaders, learners, pedagogues, and parent partners (Roberts & Pruitt, 2003).

Student learning benefits surface when a school's vision focuses on achievement strategies and when teachers feel ownership in the process. Students value the school experience that results in a decline in dropouts, truancy, and skipping classes (Berlinger-Gustafson, 2004). Student achievement gains in math, science, history, and reading outshine achievement gains in traditional functioning schools (Hord, 1997b). Student achievement inequalities dwindle when faculty focus and collaborate on best practices (Berlinger-Gustafson, 2004). A positive cultural change focusing on student learning emerges (Annenberg Institute, n.d.). Students and faculty both benefit from schools functioning as PLCs.

Challenges of a Professional Learning Community

Challenges arise as schools embark upon educational reform, systemic change or more appropriately restructuring into a professional learning community. Hall and Hord (1987) identified change as occurring among the individuals not among the organization. For schools to function as effective PLCs, a cultural change is required (Fullan, 2006). Roberts and Pruitt (2003) suggested, "to maintain a strong, positive culture in the learning communities, it is important to see that the culture is passed on to new teachers" (p. 173).

Personnel turn-over is a challenge for any type of change. As personnel changes occur over time, school visions alter. Schools once identified as PLCs can quickly loose their focus on student learning. Training new teachers half-way through a systemic change can stifle the process. Cuban (1988) identified the "lack of attention to implementation" as the cause for educational reform failures (Hord, 1992, p. 1).

Teachers are creatures of habit. Allowing themselves to be vulnerable to the critique of their peers is very difficult; therefore, teachers struggle to expose their instructional strategies. Some common mistakes schools make when initiating and developing a PLC are: complacency, weak leadership teams, failing to acknowledge successes, neglecting the overall school culture, and afraid to trust (Berlinger-Gustafson, 2004; Kornelis, 2003). Time is also a challenge schools face (Hord, 1997a). Schools struggle to find time for collaborative sessions not to waste instructional time. Teacher location to one another along with meeting space is identified as challenges for professional learning communities (Annenberg Institute, n.d.). Other challenges for schools transforming into PLCs are sustaining financial, technical and political external support (Hord, 1997a). Schussler (2003) also identified curriculum and assessment as barriers schools must overcome to develop into a PLC.

The challenges vary from school to school, but in order for a PLC to be effective, schools must overcome the following stumbling blocks:

> (1) focusing on process diverts attention from instructional content and approaches, (2) reluctance to make work public limits more rigorous feedback, (3) deep-seated issues of trust and equity are often not addressed, (4) leadership capacity often remains underdeveloped, (5) effects of changes in practice and improved student learning are often poorly documented, and (6) structural changes alone do not ensure change in practice. (Annenberg Institute, n.d., pp. 5-7)

In successful PLCs, school personnel engage in discourse regarding challenges they may or are currently experiencing. Examples of these challenges would be low student performance, decreased student motivation, or designing lessons and assessments to boost student achievement. Challenges can be overcome as long as each school member is willing to acknowledge and act upon the challenge. Successful school change happens when member's work together focused on a common vision.

Strategies for Sustaining a Professional Learning Community

Development into a professional learning community is about the journey teachers and administrators travel. This journey results in a cultural change. Patience and persistence are necessary for stakeholders who value changing their traditional school into a PLC. It is not a process that occurs overnight but instead may take several years (Hord, Rutherford, Huling, & Hall, 2006). According to McKenzie (2001) making good change:

> "requires a focus on a purpose likely to win broad acceptance, demands the cultivation and engagement of the key stakeholders within the school community, especially the teachers; involves a strategic and balanced deployment of resources, necessitates time away from the 'daily press' of teaching, and deserves a prolonged and focused commitment over three to four years." (p. 5)

Having a sense of interconnectedness enhances the development of a PLC (Annenberg Institute, n.d.). This is accomplished through the collaboration on shared vision, goals, and best practices for implementation (Professional learning, n.d.).

Schools that embark upon a long-term commitment require continual support from all stakeholders (Buffum & Hinman, 2006). Professional learning communities do not happen overnight. According to Berlinger-Gustafson (2004), initial steps schools should take are: (1) identifying the readiness of the school and staff, (2) determine if it would be beneficial to secure the assistance of an external change facilitator, (3) identify barriers and boosters, and (4) start with the learning. They go on to identify procedures schools can take to develop into a PLC:

> collaboration embedded into daily work, training in collaboration, collective work-shared lessons and student work, protecting shared values, celebrating progress of the individual and the collective group, reflective dialogue, curricular focus, and role of leadership (shared decision making, focus on learning rather than teaching, be fixated on results). (p. 2)

Continual dialogue, collaboration, and sharing of information allows for the sustainment of a PLC (DuFour & Eaker, 1998; Haythornthwaite, 2002; Hord & Rutherford, 1998). According to Fullan (2005), sustainability is the capacity a school has to continuously engage in improvement initiatives consistent with the schools' vision. In 2005, Fullan stated the eight elements of sustainability: (*1) public service with a moral purpose* – everyone takes on the moral obligation of student achievement, (*2) commitment to changing the context* – everyone involved is committed to school improvement initiatives, (*3) lateral capacity building* – everyone collaborates throughout a district to boost school improvement, (*4) intelligent accountability* – internal and external evaluations of the whole system is used to identify and address problems, (*5) deep learning* – everyone utilizes data to identify problems, collaborate on strategies to solve the problems, and learn from the strategies of what works and what does not work, (*6) dual commitment to short- and long-term results* – everyone involved is committed to the school improvement, (*7) cyclical energizing* – the energy required to succeed is physical, emotional, mental and spiritual, and (*8) long lever of leadership* – leadership at different levels must all be on the same page in terms of the school improvement efforts.

Leadership teams engaged in study groups focused on student learning will maintain the school's vision for student achievement (Berlinger-Gustafson, 2004). Schools see an improvement in their student achievements when they use data constructively (Reeves, 2006). Student achievement, discipline, absenteeism, and curricular data are all important when analyzing how the school is functioning and focusing on the goals of student achievement. Teachers and administrators look at how the students perform in all aspects of the curriculum. Schools review discipline and absenteeism data to assist in identifying students who are affected by outside issues that could hinder their achievement abilities. The data provide schools the information needed to adjust current strategies to continue increasing student achievement.

Developing into a professional learning community takes time. To sustain these efforts, time must continue to be structured for teachers to meet, talk, analyze data, attend professional development and problem solve. Teachers must see themselves as life-long learners and be involved in the planning and evaluation of their instruction (Annenberg Institute, n.d.). Collective creativity is supported through professional development that is on-going, embedded in context specific needs, aligned with the vision, and engrained with collaborative inquiry based learning (Annenberg Institute, n.d.). According to Lieberman (2000), "sustaining educator's commitment and interest hinges on keeping the work focused on practice" (p. 223). A supportive, trusting, collaborative environment is needed. If the shared vision is focused on learning and the other PLC attributes are still in place, then the school will sustain high-achievement. DuFour and Eaker (1998) identify daily communication, meaningful collaboration, and a culture accepting of change as the keys to sustaining a PLC. Effective and efficient communication capabilities are necessary. The faculty autonomy is important, as well as the school's climate that is supportive and trusting where faculty can depend upon one another.

An additional factor, besides time, schools should consider while developing and sustaining a PLC, is the physical proximity the teachers are within each other (Boyd, 1992; Hord, 1997a). Increased teacher interaction occurs and isolation is reduced when small teacher teams for collaborations are formed or structures are built to support continual dialogue. Restructuring schools allow for greater success (Yamraj, 2008). As goals are achieved and successes are communicated, celebrations aide in the motivation of teachers to sustain their PLC culture (Roberts & Pruitt, 2003).

Learning is the ultimate focus of a professional learning community. Principals, teachers, and students learn from one another. Principals analyze the student data, learning where the instructional deficiencies are located. Teachers are learning from the principals the areas to emphasize and acquire additional instructional strategies to boost the student achievement. Principals are learning from the teachers what resources are needed to accomplish the goals set by the community. The students are also learning from the teachers the content in an authentic manner. Not only is there learning in a linear triangular motion, there is an overlap of learning. The overlapping of the learning cycles strengthens the focus of the professional learning community. The Venn diagram below provides a visual of the learning overlap that occurs among the members of a PLC. The teachers, students, and principals (or administrators) learn from each other. As each group learns from one another, sharing best practices, collaborating, and celebrating successes, the learning community members experience a boost in trust and support (Schmoker, 2006). The circles in the diagram represent the continual sharing of knowledge among the member that PLCs exhibit. The core of the diagram represents the professional learning community that evolves from the shared learning among the groups.

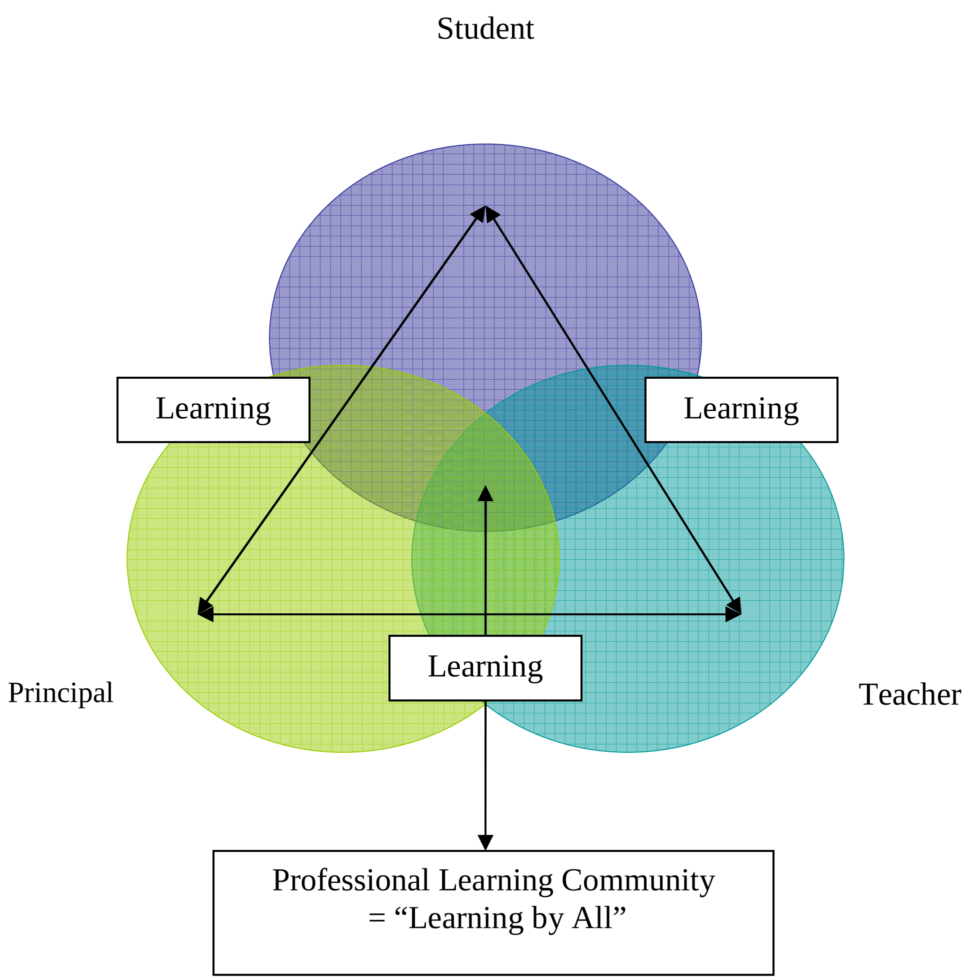

Figure 3: Venn diagram of the shared learning that occurs in a PLC

The professional learning community journey is continuous. Before undocking, schools have their course and are committed to conquer the many challenges they will experience. As schools begin to see achievement improvements due to their efforts, they must not become complacent. “It is much easier to become great, than to remain great”

(Collins, 2001, p. 204). An effective PLC resembles Jim Collins' phrase, "The Flywheel Effect" (2001, p. 164). Success breeds support and commitment which in turn results in more success and then the cycle repeats. Student learning is the ultimate goal of all professional learning communities. As schools see the achievement levels increase, they realize their journey through the stages and attributes of a PLC were worth their time, energy, and effort. The school begins to work even harder to continue down the path of higher achievement. Success is contagious and for PLCs, students win.

Democratic Learning Community

Throughout the journey towards a professional learning community, educators build trust among each other, explore new authentic ways to instruct, and assess student data to identify target areas (Cate, 2006; Kensler, 2008; Newman & Wehlage, 1995). Due to this journey, educators participate in democratic strategies such as building leadership capacity, critically analyzing their actions, and developing a purpose and vision (Apple & Beane, 1995; Kensler, 2008; Lambert, 2003). They exhibit designing choices for students, examining equity issues, and developing human potentialities (Cate, 2006; Kensler, 2008; O'Hair et al, 2000; Woods, 2007). Going back to John Dewey, democratic societies are concerned about the greater good of everyone within the society (Dewey, n.d.). Students continue to read about democratic values and beliefs in their social studies books (Carpenter, 2004). By giving students choices to impact their own education, teachers provide students' democratic experiences (Fahey, 2008; Slater, 2008).

Following the democratic IDEALS framework as schools progress forward as a PLC, they develop into a democratic learning community, or DLC (O'Hair et al, 2000). The WorldBlu Democratic Design System developed by Kensler (2008) identifies several democratic principles. The principles are: purpose and vision, dialogue and listening, decentralization, fairness and dignity, accountability, individual and collective, transparency, choice, and finally integrity. To quicken communication among learning members, technology is used to display data, collect information, and connect to community members. Technology allows the progression towards a DLC to be more efficient. As schools practice the DLC principles, which coincide with the IDEALS framework, trust is developed among the members resulting in continuous individual and team learning (Kensler, 2008). Technology assists the learning teams when they engage in DLC practices.

Educator Beliefs

The beliefs of educators influence how they teach (Raths, 2001). Méndez-Morse, (1992) identified beliefs to be ideas that people consider true and will act upon, such as all children can learn. In the beliefs studies examined by Méndez-Morse, superintendents, principals, and teachers placed a high value on the learning of students (1992). Albion and Ertmer (2002) suggest the beliefs about teaching are developed through the experiences the individuals had as a student and even as a teacher. Additional studies support the notion that teacher beliefs evolve from the many hours, and even years, of educational experiences (Kennedy, 1997; Richardson, 2003; Zeichner & Tabachnick, 1981). Some pre-service teachers believe they already know everything there is about teaching (Raths, 2001). Nespor described beliefs as “relying on episodic memory, with information being drawn from personal experiences or cultural source” of knowledge (as cited in Albion & Ertmer, 2002, p. 34). As students experience traditional style instruction or authentic technology-enriched instruction, beliefs about teaching are created. These beliefs can be formed by chance, experience, or a succession of events (Pajares, 1992). Instructional decisions and classroom practices are influenced by the beliefs of teachers (Bai & Ertmer, 2008). The core beliefs, those developed through personal experiences, are referred to as Type A beliefs (Albion & Ertmer, 2002).

Often times, core beliefs guide the teachers decisions on “learner characteristics and classroom constraints” (Snider & Roehl, 2007, p. 875). The teachers rely on experiences and intuition to make the decisions. In regards to technology, teachers’ beliefs, about the value of technology integration is related to level of use (Hanks, 2002). As teachers grasp how to use technology, beliefs in the relevance of technology as a learning tool, increases (Kanaya, Light, & Culp, 2005). In a 2002 study conducted by Hanks, teachers had a positive perception of technology and its use to improve student performance. Teachers’ beliefs influence instructional planning and decisions as well as classroom practices (Albion & Ertmer, 2002). The stronger the teachers’ beliefs are in the impact of technology on student achievement, the higher the chance they will integrate technology into their curriculum.

Dwyer, Ringstaff, and Sandholtz (1991) suggested technology use by teachers evolved through attitudes and practice (cited in Atkinson et al., 2008). Negative attitudes towards technology integration are directly related to inexperience and lack of knowledge (Summer, 1990). Type A beliefs, beliefs about teaching and learning, are difficult to change and will require considerable planning and practice for successful technology integration (Albion & Ertmer, 2002; Ertmer, 1997; Pajares, 1992). As anxiety levels decline, teacher attitudes regarding technology is affected (Guhlin, Ornelas, & Diem, 2002). Changing beliefs takes time (Bezzina, 2006). Since beliefs are developed through experiences, then the more practice teachers have with technology, the more likely they are to use it (Albion & Ertmer, 2002; Ertmer, 2005).

In 1996, the Interstate School Leader Licensure Consortium (ISLLC) standards for school leaders were developed (Council of Chief State School Officers [CCSSO], 1996). The ISLLC standards describe six standards for school administrators. Each standard is divided into three areas: knowledge, disposition, and performance. The ISLLC dispositions or beliefs administrators are committed to cover a wide range such as the belief that all students can learn, the belief in the variety of ways to instruct, the belief to prepare students to be successful, as well as the belief in a free equitable education for all (CCSSO, 1996).

In 2008, the OSDE Office of Standards and Curriculum identified the Oklahoma Nine Essential Elements to address strategies for high achieving schools. Essential Element Four covers 'school culture' identifying specific strategies to satisfy the leadership and teacher beliefs. They are "(4.2) Leadership beliefs and practices focus on high achievement for all students, and (4.3) Teacher beliefs and practices focus on high achievement for all students" (OSDE, 2008a, p. 7). Within the limited number of belief studies the common belief among educators emerged 'all students can learn' (Méndez-Morse, 1992). Superintendents have the belief that students come first. Principals believe in the importance of the instruction and meeting the needs of students. Teachers believe they have the ability to make a difference in the lives of their students (Méndez-Morse, 1992).

Technology Integration

Twenty-first century technology can enhance a school's ability to improve student achievement. Technology is another tool or innovation to incorporate within the journey towards high student achievement. Student learning and achievement in schools has less to do with technology itself than with how the technology is used (O'Hair & Reitzug, 2006). McDaniel and Arana (2006) state "technology can facilitate collaborative knowledge transfer and integration of authentic teaching and learning" (p. 11). Technology opens the doors to the classrooms of the world (Ullman, 2007). Teachers have the ability to share best practices and knowledge and collaborate with experts around the world on solutions to problems all due to technology.

Students utilize technology in many avenues of their lives. They are involved in social networking through MySpace or Facebook. Students use technology at their part-time cashier jobs. They even access the Internet using their cell phones. As a result, teachers are exploring the possibilities technology has to boost academic achievement. They use SMARTBoards for hands-on instruction, classroom response systems for formative assessments, and mobile laptop carts for classroom Internet research. Therefore, the support of the administration and external experts is crucial to maintain the systemic change towards technology integration.

In Becker and Riel's (2000) study, instruction became more student centered and interactive due to technology integration. The lessons became more authentic and relevant to the students, having more meaning and ultimately boosting performance. Technology is not just the hardware and software, but the tools to support the learning process (Callahan & Switzer, 2001). Technology motivates learning for most students

(Prensky, 2005). Therefore, schools continue to find ways to integrate technology within the curriculum. Cradler, McNabb, Freeman, and Burchett (2002) suggest "technology influences student achievement and academic performance in relation to three primary curricular goals: (1) achievement in content area learning, (2) higher-order thinking and problem-solving skills, and (3) workforce preparation" (as cited in Atkinson, 2005, p. 35). Districts who invest in educational technology benefit all stakeholders. Benefits include: (1) reduce student boredom (Ely, 1995), (2) alleviate information access inequalities among students (Warschauer, Knobel, Stone, 2004), (3) provide assessment results and data to teachers in a timely manner (Wells & Lewis, 2006), (4) provide hands-on, interactive lessons (Branzbury, 2007), (5) improve communication among all educational stakeholders (CoSN, 2004), (6) help raise test scores (Good, 2001), and (7) provide instruction anytime, anyplace, to anyone (Good, 2001).

Technology integration is not just a computer sitting on a desk so students can play games. Technology can be a powerful instructional tool. The Internet allows student learners access to vast knowledge and learning opportunities (Carroll, 2000). Information acquisition can come from websites, CD-ROMs, simulated games, video-conferences, webquest, and so much more. By harnessing that knowledge, teachers have the chance to stimulate student learning in a new way. Technology can allow one classroom of 20 students, 20 different learning opportunities to occur simultaneously. A science teacher could assign an Internet webquest over electricity instead of lecturing and requiring students to take notes. In the computer lab, each student has the opportunity to individually access the Internet to conduct the webquest. This then allows the students to navigate the Internet according to their interests and desires accomplishing the task assigned in the webquest. Class projects, presentations, and webquest are a few ways technology is integrated and student knowledge assessed. Student assessments can be performed using computer-based software, as well as portable hand-held computerized devices. Equitable access, lesson choices and authentic instruction are examples of democratic learning strategies (Cate, 2006; Fahey, 2008).

Technology integration enhances instructional practices, motivates student learning, and eliminates time and space barriers (Atkinson et al, 2008; Bransford, Brown, & Cocking, 2000; Lange et al. 1999). Authentic lessons become more individualized (Carroll, 2000). Technology permits students to work independently and at their own ability and pace. The Internet has broadened the walls of the traditional classroom. With two-way interactive communication, students in different countries can simultaneously conduct projects with one another (Carroll, 2000). Various research studies have found a positive correlation between student achievement and technology integration (Lange, McCarty, Norman, & Upchurch, 1999; Lehrer, Harckham, Archer, & Pruzek, 1986; Wessler, 2002). Technology is an additional tool to impact student achievement.

Teachers are the key to technology integration. For integration to be successful, teachers must have the necessary knowledge and skills to utilize the technology effectively in their instruction. Some teachers are fearful to use technology because of their lack of knowledge (Jansen, 2007). They see a need for their students to grasp how to use technology but because of the generation gap, some teachers struggle to connect instruction with technology integration (Jansen, 2007). Some teachers are not comfortable using new technology as others; therefore, they are hesitant to integrate the new technology into their instructional practices. The more familiar teachers are with technology and how to integrate technology into their curriculum, the more likely they will do so (Ertmer, 2005). As more teachers integrate technology, "they collectively gain knowledge, share best practices, and work collaboratively to build leadership capacity" (Williams et al, 2008, p. 295). The more exposure teachers have to technology integration and training, the greater the chance their beliefs about teaching and learning change (Becker, 2007; Ertmer, 2005). Instead of teaching to the students, teachers are teaching for the students. Technology is part of the students' lives and finding ways to connect technology to the instruction allows students more authentic experiences.

In a 2000 report by the National Center for Educational Statistics, only 53% of teachers felt "somewhat prepared" to integrate technology. The U.S. Department of Education distributed a report in 2003 that showed 85% of teachers reporting they felt "somewhat well-prepared" to integrate technology (as cited in Ertmer, 2005, p. 25). For some teachers, it is still difficult to integrate technology effectively. Their beliefs about teaching and learning were shaped by their personal experiences as a child, student, and later as a teacher (Albion & Ertmer, 2002; Raths, 2001; Richardson, 2003; Zeichner & Tabachnick, 1981). Pajares (1992) stated "teachers' beliefs exert a powerful influence on teachers' instructional decisions and classroom practices" (as cited in Bai & Ertmer, 2008, p. 94). As teachers are exposed to technology and participate in training sessions to integrate technology, their beliefs about technology will change (Albion & Ertmer, 2002; Ertmer, 2005; Pajares, 1992).

Technology integration initiatives are supported by many administrators. These administrators allow time in daily schedules or district in-service days for technology training. Providing professional development sessions on a regular basis over various technological topics, strategies, and components enhances the faculty knowledge and reduces their anxiety. This also eliminates the fear teachers have of integrating technology within their curriculum (Guhlin, Ornelas, & Diem, 2002). The fear comes from not knowing and being afraid to fail or look uninformed in front of their students. However, by building the culture of learning, teachers realize the students may know more and can teach them how to use the technology. Meaningful, ongoing professional development provides teachers the knowledge to use technology effectively (Wise, 2008). Allowing teachers to attend technology professional development at their leisure transfers the power of learning over to them (McKenzie, 2001). The training will have more meaning to them than if they were forced to attend.

Without a doubt, appropriate professional development opportunities must be provided to teachers to achieve the goals of technology integration (Russell, 2001). The designed training sessions are not entertainment, and to satisfy state department requirements, but instead are to impact the established vision of the school to boost student achievement (Reeves, 2006). Therefore, with each training session, the teachers need to walk away knowing how the new technology, practice, or strategy will enhance student outcomes. They must have an "understanding of the interactions between the tools and the teaching" (Hammer, 2001, p. 402). Guhlin et al. (2002) reported "positive attitudes towards computers are positively correlated with teachers' experiences" (p. 3).

Schools use technology to support one-way presentations, define aspects of the curriculum, maintain student data, and provide communication avenues among the faculty (Carroll, 2001; Russell, 2001). Administrators are seen in a school as the individual who knows all. Through their modeling, knowledge, and support of technology, teachers identify the advantages of integrating technology within their classrooms. When the teachers analyze achievement results and determine there are positive gains because of the technology integration, they are encouraged. Teachers acquire additional technology tools and skills. Collins (2005) identifies this as the Flywheel Effect or the Hedgehog Concept. The continual effort towards the vision provides positive results, which motivates teachers to continue to do more, mirroring a wheel going around and around.

To boost student achievement through the use of technology integration, effective professional development must be in place. The K20 Center of the University of Oklahoma designs professional development for their Phase II program. Having a better understanding of the technology skills and beliefs of teachers and administrators who participate in Phase I of the program will assist with tailoring the professional development to the needs of the individual schools. Donald Ely (1995) stated, "the answers are not in the technology itself, but in the people who decide about the purpose of its use, the way in which it is used and the manner in which we evaluate the consequences of our decisions" (p. 14). Even with the challenges schools face, investing in educational technologies and the people who are to use it; school districts will provide students the skills they need to be successful in a technological society.

Technology Standards

To support administrators, various national educational organizations, state departments and universities came together to develop the "Technology Standards for School Administrators" or TSSA (International Society, n.d.). This initiative was designed to provide technology guidelines for administrators. The TSSA standards evolved into the National Educational Technology Standards for Administrators, or NETS-A and are identified as:

> (1) Leadership and Vision: Educational leaders inspire a shared vision for comprehensive integration of technology and foster an environment and culture conducive to the realization of that vision, (2) Learning and Teaching: Educational leaders ensure that curricular design, instructional strategies, and learning environments integrate appropriate technologies to maximize learning and teaching, (3) Productivity and Professional Practice: Educational leaders apply technology to enhance their professional practice and to increase their own productivity and that of others, (4) Support, Management, and Operations: Educational leaders ensure the integration of technology to support productive systems for learning and administration, (5) Assessment and Evaluation: Educational leaders use technology to plan and implement comprehensive systems of effective assessment and evaluation, and (6) Social, Legal, and Ethical Issues: Educational leaders understand the social, legal, and ethical issues related to technology and model responsible decision-making related to these issues. (pp. 6 & 7)

The standards are further broken down into performance indicators and specific administrative roles within the published document. These standards resemble strategies already addressed through the democratic IDEALS framework with an emphasis on technology. The NETS-A are specifically for administrators whereas the IDEALS are designed to impact the whole school culture. Stated earlier, IDEALS represents Inquiry, Discourse, Equity, Authenticity, Leadership, and Service (O'Hair et al., 2000). Tying this back to the NETS-A standards, all six standards would fall under inquiry and discourse. The educational leaders and leadership teams continue to assess the nature of their school's technology integration goals to ensure student achievement is occurring. Authenticity governs standard two and three. Technology integrated instruction provides real world experience to the students. Standards four and five are covered by leadership. In a learning community, the leadership is dispersed and shared among the stakeholders; therefore, it would be the actions of the leadership teams to cover standard four and five. Standard six falls under equity. Each member of the learning community has equal access to the technology and held accountable for their actions while using the technology. The last IDEALS is service which could also fall into standard six because by schools being socially, legally, and ethically responsible for technology issues provides a service to the community. The NETS-A now provides administrators suggestions, ideas, and guidance to support their technology integration initiatives.

Change Process

For any type of change to occur, it must be justified (Reeves, 2006). Hord (1992) suggests the "key strategy for initiating change is development of a vision of improved effectiveness" (p. 1). To change previous strategies and practices, teachers need to understand the purpose for the change. Technology leaders provide visual representations and strategies on how to integrate technology. As teachers engage in collaborative sessions about technology integration, they drive the change process. The process is no longer an administrative suggestion, but a team initiative. Getting everyone "on board" and supporting of the vision, whether they truly agree or not, is a key to success (Collins, 2001). Understanding the magnitude or "order" of change of the faculty will assist technology leaders when they design strategies to support the implementation of technology integration (Waters et al., 2003).

First order change for some teachers is an extension of their current practices and values. Teachers utilize existing knowledge when integrating new technologies for instruction, data collection, or curriculum projects. Second order change occurs when teachers alter their values, norms, and beliefs of instructional practices to integrate technology. Second order change has a higher resistance because it is seen by the teachers as irreversible (Albion & Ertmer, 2002; Ertmer, 2005). By providing the teachers with an "alternate vision of what teaching with technology looks like and opportunities to experience alternative approaches in supportive conditions" (p. 36), effective change can occur (Albion & Ertmer, 2002). The teachers are learning new strategies and approaches to instruction, data collection, and so forth (Waters et al., 2003).

As cited in Valdez (2004), Louis and Miles suggest five variables for successful school change: (1) clarity – knowledge clearly understood, (2) relevance – meaningful knowledge, (3) action images – knowledge exemplified and visualized, (4) will – motivated, action oriented knowledge, and (5) skill – behavioral ability. When schools transform from the traditional mode of instruction to technology integrated instruction, these five variables will determine the school's success. A clear vision of technology integration that has relevance to student achievement is needed. School personnel need to visualize what and how technology integration will benefit their vision. If these five variables are present, then the transformation to technology integrated instruction will occur.

Barriers to Technology Integration

Technology integration has two sides; the positive side is increased student achievement and authentic instruction, but the negative side deals with resistances and obstacles to overcome. Technology integration takes time and resources to support the teacher's initiatives. Former director of the U.S. Department of Education Office of Educational Technology Roberts, states "one reason that teachers don't do these kinds of things (integrate technology) is a lack of time" (Ullman, 2007, p. 6). Other barriers of technology integration include an unclear vision of technology integration, lack of knowledge of both hardware and software, lack of adequate training, and risk affiliated with using technology (Chiero, 1997; Dusick & Yildirim, 2000). The unknown is difficult for teachers to comfortably and willingly infuse into their instructional strategies.

Infrastructure also causes frustrations when the technology is not functioning properly. When the infrastructure is inadequate and unreliable, teachers are less likely to design instruction that utilizes technology. Technology leaders are challenged with the task to overcome these barriers in a creative, informative manner. Leaders are given the task of securing funds to provide dependable and appropriate hardware and software for the curricula. Teachers also need equitable access to the technology. Leaders need to ensure professional development is available for teachers and themselves to learn how to effectively and efficiently use the technology.

Program Evaluation

Once technology leaders have justified the benefits of integrating technology, provide the time, and the training, the faculty begins to implement technology within the curriculum. To ensure optimal student achievement, learning communities evaluate their progress. Forming a technology committee of educational stakeholders to assess how and to what extent students are achieving, and from whom to collect this information, broadens the effectiveness of a technology integration plan (McNamara, 1999; Reeves, 2006). Adamy (2001) states, as the technology committee conducts an evaluation of educational technology within the district or school:

> (1) the evaluation must focus less on specific quantifiable outcomes and more on the ways in which technology facilitates continued growth in the educational environment, and (2) equally important, the evaluator must avoid the pursuit of broadly generalizable results in favor of an understanding of how technology is functioning in a particular context to maximize the educative value of experiences for individual students. (p. 213)

Technology is a tool to support, impact, and enhance instruction. The choices teachers make in how to integrate determines the success of the integration (Reeves, 2006). Technology evaluations identify choices being made by personnel and identify weaknesses within the systemic change. Collaborative efforts and ongoing leadership will continue to impact technology integration (McKenzie, 2001).

Sustaining Systemic Change

Once change has occurred, technology leaders are challenged with finding ways to maintain the motion of the flywheel, the continual improvement after the experience of success. Through continued professional development, celebrations, time, resources, and collaborative learning sessions, teachers continue to enhance their understanding, strategies, and enthusiasm for technology integration. Sustaining systemic change takes the dedication and responsibility of everyone (Lambert, 2003). Release time for continued professional development, common planning times to collaborate on integration strategies and regular student data analysis are all different ways to maintain initiatives (Dusick & Yildirim, 2000).

The climate and culture leaders develop determine whether systemic change will take place. Technology experts from within and outside the schools plan learning sessions to strengthen the teacher's knowledge which benefit student achievement. As new technologies evolve, administrators and teachers continue to embark upon new and challenging technology integration strategies and resources. Sustaining technology integration takes a commitment from all stakeholders. The technology leaders along with the stakeholders continue to communicate and evaluate the schools vision, conduct collaborative sessions and reflect upon their accomplishments. Technology is evolving; therefore, to sustain integration efforts high achieving schools seek new ways technology can and will benefit student achievement.

Summary

Administrators play many roles in schools. They search for ways to assist teachers in the efforts to educate all children. They are technology leaders who support and encourage teachers. They develop a climate of learning and sharing revolved around student achievement supported by technology integration. Technology leaders survive due to the organizational and collaborative undertaking of all members of the school (Reeves, 2006).

Successful technology integration occurs because of the teachers' aspirations. As they begin to understand the benefits technology has on student achievement, their interest increases. Technology integration within the instructional lessons, student assessments, and even throughout the inquiry and discourse sessions, benefits the overall objective of education. As educators collaborate on strategies for technology integration, they strengthen the formation of a professional learning community (Atkinson et al., 2008; Williams et al., 2008). The stronger and closer the relationships between members of a PLC become the more the academic achievement of students is enhanced.

This study identifies the technology characteristics of teachers and administrators. Knowing the technology knowledge levels and the technology beliefs of the school personnel will provide an understanding of where to begin in designing technology training. The study also compares information about the technology beliefs and abilities of school personnel regionally throughout the state of Oklahoma. The geographical experiences are important to understand because the level of technology exposure and preparation for the students may play an important role in their future success.

Chapter Three: Design

Introduction

This chapter outlines the methodology, the research questions, sampling procedures and the treatment of the data sources. The study includes a quantitative, non-experimental, ex post facto design. The study examined schools in Oklahoma that entered into the University of Oklahoma K20 Center's OK-ACTS program during 2007 and 2008. The teachers and administrators of the schools identified have completed either the TIPS teacher or the TIPS administrator surveys. The results of the surveys were statistically compared analyzing the level of agreement between school leaders and teachers in relation to personal technology skills and their technology beliefs.

Research Questions

The purpose of the study was to understand the level of technology knowledge and the technology beliefs administrators and teachers possess to assist with the development of meaningful professional development. The following research questions guided this quantitative study:

Question One: What are the technology beliefs and technology skills of teachers?

Question Two: What are the technology beliefs and technology skills of administrators?

Question Three: Are there statistically significant differences between the technology beliefs of the teachers versus administrators?

Question Four: Are there statistically significant differences between the technology skill sets of the teachers versus administrators?

Question Five: Are there statistically significant differences between teachers and administrators by regions across Oklahoma?

Oklahoma schools that were committed to the 2007 or 2008 OK-ACTS program completed online technology surveys, TIPS-T for teachers and TIPS-A for administrators. The results of the TIPS-T and TIPS-A surveys were analyzed using descriptive and inferential statistics. The results of the analysis can be found in chapter four.

Research Methodology

This study is categorized as a non-experimental analysis using existing, ex post facto data. Quantitative research is used to make predictions or to better understand relationships among measures of a phenomenon, focusing on specific variables of an event (Laitsch, 2003). This positivistic approach focuses on a problem examining the "causes that influences outcomes" (Creswell, 2003, p. 7). Quantitative research utilizes statistical calculations to investigate variables and the relationships between them (Berry, 2005). Non-experimental quantitative studies utilize statistical calculations to make the predictions without manipulation of the variables (Johnson & Christensen, 2004; Lomax, 2001). The Latin meaning of ex post facto is "operating retroactively" (Gall, Gall, & Borg, 2003, p. 296). The existing data that were statistically analyzed derived from the TIPS-T and TIPS-A surveys completed during Phase I.

Descriptive statistics were used to describe and determine the condition of the variables in the study (Gall, Gall, & Borg, 2003). The administrator and teacher responses were analyzed to gain a better understanding of the respondents. To determine the relationships between the teachers and administrators in regards to technology beliefs and skill levels, inferential (comparative) statistics were utilized. Independent sample t-tests were conducted to determine the difference between two independent means: technology skills of teachers versus administrators, and technology beliefs of teachers versus administrators (Lomax, 2001). Analyses of variance, or ANOVA, were also used to determine if geographical location impacts the technology skills and beliefs of both teachers and administrators.

For research question one and two, descriptive analysis were used. Descriptive statistics determine the conditions of the phenomenon being studied (Gall, Gall, & Borg, 1996). The mean of the data sets, a central tendency measure, was determined as well as the standard deviation, a variability measure. Standard deviation describes the spread of the measures within the data sets (Creswell, 2003).

Means testing was used to address research questions 3 – 5. The overall means of the TIPS responses was calculated and analyzed. For research questions three and four, the data were analyzed using t-tests. Independent t-tests are used when analyzing dichotomous categorical independent variables and continuous dependent variables. T-tests determine if a statistically significant difference occured between the means (Lomax, 2001). Independent variables are variables that affect outcomes. They cause influence upon the dependent variables (Creswell, 2003). Dependent variables are the outcomes that are observed to change due to the influence of the independent variables (Creswell, 2003). The independent variables for the independent sample t-tests are the teachers and administrators. The dependent variables were either the technology beliefs for question three or technology skill sets for question four.

For research question five, the data were analyzed using an ANOVA. There were four regional location categories (northeast, southeast, southwest, or northwest) used in the analysis of the teachers and administrators technology beliefs and skills. A factorial ANOVA, analysis of variance, was used to "study the variability among means" (p. 267) in determining the phenomenon between the categorical independent variables (regional locations) and continuous dependent variables (survey results of the teachers and administrators) (Lomax, 2001).

Limitations of the Study

The study sample was limited to Oklahoma schools that have leaders committed to school improvement by entering into the University of Oklahoma K20 Center's OK-ACTS program and are on the journey to develop technology enriched professional learning communities and even further into democratic learning communities. Only OK-ACTS schools that entered in 2007 or 2008 comprised the study sample. Also, schools whose personnel completed the electronic TIPS surveys represent the technology skills and beliefs of all the school's personnel. The TIPS surveys varied slightly in a few of their questions regarding technology skills and beliefs. The belief question for the teachers included positive and negative statements; whereas, the administrator belief question only had positive statements.

Sample

This study examined schools in Oklahoma that entered into the OK-ACTS program at the University of Oklahoma's K20 Center. As a co-investigator of *Protocol No. FY2002-286: Developing Professional Learning Communities Through*

Administrator Leadership and Technology Integration, the researcher had access to the electronic survey data. The IRB continuing review approval can be found in Appendix C. The respondent data were collected from the completed 2007 and 2008 electronic TIPS surveys. The sample of the study was derived from the educational leaders who participated in the Phase I OK-ACTS program and from the faculty of the participating OK-ACTS Phase I schools.

The power of the study is a measurement of the probability to reject a false null hypothesis. When calculating the power of the analysis, there are several factors to be considered, which include sample size, the effect size of the study, the level of significance, and the type of analysis (Gall, Gall, & Borg, 2003). The size of the effect is a measurement of the magnitude of the relationship between independent and dependent variables in the analysis. The effect size measures the strength of the relationship between the variables (Gall, Gall, & Borg, 2003).

For the purpose of this study, the main statistical procedures are independent samples t-test and ANOVA analysis. There were 3446 subjects in the study, including 259 subjects in the administrator group and 3187 subjects in the teacher group. There were two groups when testing difference between administrator and teacher. Assuming that a moderate effect size (f2 = .50) and significance level = .05, power for testing expected effect size was 1.00 for t-test. When testing differences between school regions by ANOVA, the power for the administrator group was .90 and 1.00 for the teacher group. In other words, the probability of statistical tests to determine whether a significant difference between the groups occurs was sufficient (Gall, Gall, & Borg, 2003).

The teacher respondent group consisted of teachers from all levels as well as librarians, counselors, and technology specialist. The administrator respondent group consisted of superintendents, principals, and technology directors. The schools were cross referenced with information provided by the Oklahoma State Department of Education. The State Department of Oklahoma provided the student population numbers and the geographical locations of each school. The schools were categorized into regional locations: northwest, southwest, northeast, and southeast. The major Oklahoma interstates I-35 and I-40 intersection was used to determine the regional category of the schools. All school districts were categorized based upon where their administration offices were located.

The respondents were asked to identify themselves using the last 4-digits of their social security number. All the teacher respondents were combined to check for repeated identifiers, as well as the administrator respondents. Of the 3187 teacher respondents, 38 identifiers (< 2%) were repeated. The identifiers were from the same school but their responses varied from question to question; therefore, the information was used in the calculations. Of the 259 administrator respondents, there were 9 (3.5%) repeated identifiers but due to the variations in the survey responses, the 9 repeated identifiers were also kept for the overall analysis.

Data Sources

The TIPS surveys have been utilized by the K20 Center since 2007. Initially, the K20 Center used the TAGLIT (Taking A Gook Look at Instructional Technology) survey for the Phase I. The TAGLIT was developed as a component of the University of North Carolina's Center for School Leadership Development. It was designed to acquire information about how educators used educational technology for teaching and learning (T.E.S.T., 2007). The Gates Foundation partially funded the K20 Center's OK-ACTS program. As a requirement for participation, the TAGLIT had to be completed by the schools personnel. Since 2007, the TIPS surveys have been used replacing the TAGLIT. The TIPS surveys were designed to be administered separately to the teachers and administrations. Several of the TIPS questions were derived from the Technology Integration (TI) survey (Atkinson, 2005; Southwest Educational Development Laboratory [SEDL], 2003). Of the nine TI questions, eight were used in the TIPS surveys. The eight questions were rearranged and divided up into 19 or 16 questions to develop the TIPS-T and TIPS-A surveys, respectively.

The TI survey reliability and validity was addressed in the study conducted by Atkinson (2005). The internal consistency of the TI instrument was calculated using the Cronbach's alpha. Reliability tells the researcher how reproducible the survey is by determining if the survey is consistently measuring the items on the survey (Hopkins, 2000). Of all the constructs tested, the coefficient alphas fell within the range of .76 to .96. Therefore, the questions were considered reliable. The validity of the TI questions was checked during the SEDL's development of the instrument for survey purposes. The questions were checked by experts and the TI survey was piloted and refined (SEDL, 2003). Validity is important to determine because it informs the researcher how well surveys are measuring what they are intended to measure (Hopkins, 2000).

For this study, the teachers and administrators of the schools identified completed either the TIPS-T, teacher, or TIPS-A, administrator, electronic surveys. The TIPS surveys were accessible through a website called www.surveymonkey.com. The first section of each survey asked the respondent to provide demographic information. The next section of each survey involved questions about personal technology use and abilities. A 5-point or 6-point Likert scale was used in the surveys. This allowed the respondents to identify their level of agreement (Gall, Gall, & Borg, 2003). For the Likert scale, the lowest value, 1, represented the lowest level of agreement, such as never, non-user, or strongly disagree and the highest value, 5, represented the highest level of agreement: regularly, advanced, frequently, strongly agree and so on. A couple of the questions where a 6-point Likert scale was used had choices that included 'N/A' or 'not at our school'. These responses were considered missing values in the analysis.

The last section of the surveys addressed the respondent's beliefs about technology and how it has or will impact the teacher, school, or district. Once again, the respondents recorded their level of agreement using a 5-point Likert scale. The numerical data was entered into the statistical software Statistical Package for the Social Sciences, SPSS. The software was used to compute the descriptive and inferential statistics for the analysis. Open-ended questions also were included in the surveys. The questions solicited information about how to improve the school's technology integration; however, they were not considered for this quantitative study.

Analysis of Data

Descriptive statistics were used to determine the mean and standard deviation of the technology skills and beliefs for the survey questions for both the TIPS-T and TIPS-A of the sample schools. The mean of the survey questions were calculated to determine the average response of the teachers and administrators. The standard deviation was also calculated to indicate the spread of the scores for both the teachers and administrators.

This information can assist the OK-ACTS personnel in understanding the technology skill level of the school's faculty and administration. Standard deviation can assist in determining the degree of which there is a consensus in each school on the technology skills and beliefs.

The data analysis included the teachers as a whole and then the administrators as a whole. For research questions three and four, independent t-tests were calculated to determine if there was a relationship between the teachers and administrators using summary scores for the two groups on particular beliefs and skill set survey questions. The summary scores represent the mean score of all respondents for each measure. Estimates of statistical parameters can be based on different amounts of information or data. The number of independent pieces of information for estimate of a parameter is called the degrees of freedom (df). The larger the degrees of freedom, the more normal the t distribution becomes. The t distribution begins to resemble a normal distribution as the df approaches infinite (Lomax, 2001). Degrees of freedom, of an estimate are equal to the number of independent scores (for example the sample size) that go into the estimate minus the number of parameters estimated.

Significance levels were set at $p < .05$ and $p < .01$. These two significance levels are commonly used in statistics. Level of significance is the probability that the relationship between independent and dependent variables will occur. When setting $p < .05$ means less than 5% of the time a relationship will occur (Berry, 2005). The testing of differences will be significant at significant level .05 but not .01 if the p-value is $>.01$ but $<.05$. By setting the alpha level low ($p = .01$), the chance to commit Type I error decreases (Gall, Gall, & Borg, 2003). Type I error occurs when a researcher rejects the null hypothesis when it actually is true. A null hypothesis states there is no statistically significant difference between the variables examined (Gall, Gall, & Borg, 2003). Controlling for Type I error (setting $p = .01$) strengthens the confidence of the findings. The sample findings are more generalized to the populations (administrators and teachers throughout Oklahoma and beyond) when there is a small threshold for error.

For research question five, “Is there a statistically significant difference between teachers and administrators by regions across Oklahoma,” analysis of variance was used. The data analysis involved a test for statistical significance, analysis of variance (ANOVA). The factorial ANOVA statistical test examined the categorical independent variables (regional location) with the continuous dependent variables (beliefs and skills) (Lomax, 2001). The significance level was set at $p < .05$. In 1999, Lindstrom conducted a study that utilized analysis of variance to determine a relationship between geographic region or school type with the change constructs described in the study. The ANOVA determines if there is a relationship between regional location and technology beliefs or skills possessed by the teachers and administrators of the sample schools.

Reliability

The reliability of the electronic TIPS surveys was checked by calculating the Cronbach’s Alpha, α. The data housed on www.surveymonkey.com were used for the analysis. This consisted of six survey data collections during 2007 and 2008: spring 2007, fall 2007, winter 2008, spring 2008, summer 2008, and fall 2008. The higher reliability of a survey enables the research to be generalized to the population. In this case the population consists of all teachers and administrators. Internal consistency reliability is important to researchers. It determines the extent to which surveys assess the same characteristics, skills, or qualities (Colorado State University (2), n.d.). The acceptable range for reliability alphas is 0.7 to 1.0. If the Cronbach's alphas fall below 0.7, the surveys or questions are not considered very reliable. The internal reliability of the surveys was based on all the responses to the TIPS questions excluding the background information.

As can be seen in Table 4, the reliabilities of all constructed measures except average frequency of general computer use had moderate reliability; alphas were between .78 and .94; alphas for average frequency general computer use was .65 among administrators, and .52 among teachers. The average proficiency of using technology exhibited high reliability; alphas were .94 for administrators and .93 for teachers.

Table 4:

Internal coefficient alphas for the instruction measures

Sub-scale	Administrators N, Alpha	Teachers N, Alpha
Average_freq_general_comuse	4, .65	4, .52
Avearage_freq_tech_use	7, .78	7, .79
Average_proficiency_tech_use	14, .94	15, .93
Average_freq_com_comm	4, .86	5, .82
Average_stud_use_com	10, .92	9, .90
Average_believe_support	5, .85	5, .82
Average_agreement	6, .75	5, .86

The N refers to the number of measures on the TIPS questions that relates to the sub-scale components. For example, there are four statements on the TIPS survey over frequency of computer use. Therefore, the N for the reliability of testing the frequency of using computers was 4. However, all the survey data on the four statements were used in the two categories. All data for administrators were used for the administrator group and all data for the teachers were used for the teacher group to calculate the reliability alphas. Overall, the TIPS-A and TIPS-T surveys were reliable instruments.

Summary

This research study uses quantitative methodology to determine the differences in technology skills and beliefs among Oklahoma teachers and administrators who commit to a high-achieving schools program. Descriptive statistics was used to determine the level of technology skills and technology beliefs of the teachers and administrators. Whereas, parametric testing for mean differences, t-test and analysis of variance, was used to calculate statistical significant differences among the teachers and administrators.

The information acquired will assist professional development designers of technology training. As technology is integrated into the teaching and learning processes of a school, PLC characteristics emerge (Atkinson et al., 2008). The learning community unites. With the use of technology, students develop their interpersonal and intellectual skills (Riel & Fulton, 2001). The information obtained by this study will inform the trainers where the technology beliefs and skills of school personnel generally exist prior to embarking upon the journey towards a high-achieving school. The professional development can be tailored to maximize the training sessions.

Chapter Four: Results of the Study

Introduction

The purpose of the study was to understand the level of technology skills and the technology beliefs administrators and teachers possess to assist with the development of meaningful professional development. Accordingly, five research questions were formulated:

Question One: What are the technology beliefs and technology skills of teachers?

Question Two: What are the technology beliefs and technology skills of administrators?

Question Three: Are there statistically significant difference between the technology beliefs of the teachers versus administrators?

Question Four: Are there statistically significant difference between the technology skill sets of the teachers versus administrators?

Question Five: Are there statistically significant difference between teachers and administrators by regions across Oklahoma?

Prior to answering those questions, the power of the study was calculated for the statistical procedures and the reliability of the surveys was evaluated, which are located in Chapter 3. The variables to describe technology skills and technology beliefs of the teachers and administrators were constructed. In addition, the descriptive statistics (mean, standard deviation, distribution skewness) of variables of interest were summarized.

Description for Constructs of Interested Variables

The constructs used for the statistical procedures were designed to infer between the teachers and administrators. The technology beliefs included perception and agreement of importance of technology integration. The constructs calculated to represent beliefs consisted of support received in integration, as well as the average on the statements that schools have strong plans to integrate technology and technology integration is beneficial.

Technology skills were evaluated by items measuring frequency of general computer use and proficiency of using technology. The average of frequency using various technologies was calculated to measure frequency of using technology. The average of proficiency using various technology software and devices in teaching and management was used to measure proficiency of technology use. The frequency of student using technology software and devices in learning was also constructed to evaluate how technology integration was conducted by administrators and teachers.

Characteristics of Samples

The descriptive statistics of demographic variables are summarized in Tables 5 and 6, which show the four school regions from which data were collected. There were 257 administrators and 3187 teachers surveyed.

Table 5:

Frequency counts and percentages for demographic variables subjects surveyed

Variable	Frequency	Percentage
Subjects surveyed		
Administrator	259	7.5
Teacher	3187	92.5

Table 6:

Frequency counts and percentages for demographic variables school regions

School regions	Frequency	Percentage
Northeast	842	24.4
Southeast	1271	36.9
Southwest	416	12.1
Northwest	915	26.6

The normality of average frequency of general computer use, average frequency of using technology, average proficiency of using technology, average frequency of communication using technology, average of student using technology, average belief of support received, average agreement on statement of technology application were tested for all responses. Both distributions (teachers and administrators combined) presented in Table 7, show that the skewness of the variable distribution fell within acceptable range -1 and +1. Parametric statistics are conducted to determine the statistical significance based upon the assumption that the population scores are normally distributed about the mean (Gall, Gall, & Borg, 2003). The responses to the questions were converted to a 5-point Likert scale. The lowest agreement response was represented by one (1) and five (5) represented the highest level of agreement to the TIPS statements. The response categories that are represented by ‘N/A’ or ‘not at our school’ were considered no responses for the purpose of this study.

Table 7:

Descriptive statistics of variables constructed

Variable	Mean	Std Dev	Skewness
Average_freq_general_comuse	4.03	.79	-.83
Avearage_freq_tech_use	3.30	.85	.29
Average_proficiency_tech_use	2.53	.73	.42
Average_freq_com_comm	3.07	.96	-.25
Average_stud_use_com	2.11	.87	.84
Average_believe_support	2.90	.10	.18
Average_agreement	3.83	.63	-.25

Research Question One

Descriptive statistics were used to address research question one, what are the technology beliefs and technology skills of teachers? The means and standard deviations for the TIPS-T questions 7 through 19 are summarized in Table 8. Depending on the question, the number of data points ranged from N = 2528 to N = 3068. A 5-point Likert scale was used for the TIPS responses, one (1) representing the lowest level of agreement and five (5) representing the highest level of agreement. Question 7 (Ave_Q7_T) had a mean of 4.023, which represented a high agreement in the area of frequency of use. Question 15 (Ave_Q15_T) resulted in the lowest agreement level ($\bar{x}$ = 1.871) representing the teachers belief of the frequency students use computer applications.

The TIPS-T survey questions include subcategories for each question. Appendix D provides the mean, standard deviation, and skewness for each subcategory of the TIPS-T questions.

Table 8:

Means and standard deviations of technology skills and technology beliefs among teachers (TIPS-T)

Questions	N	Mean	Std. Deviation
Aver_Q7_T	3068	4.023	.7950
Aver_Q8_T	2528	3.314	.8332
Aver_Q9_T	2732	2.457	.7207
Aver_Q10_T	3026	2.851	.9139
Aver_Q11_T	2825	2.624	.9478
Aver_Q12_T	3030	3.795	1.2408
Aver_Q13_T	3022	3.014	1.0655
Aver_Q15_T	2703	1.871	.9636
Aver_Q16_T	2761	2.322	.9412
Aver_Q17_T	2955	2.848	.9828
Aver_Q19_T	2803	3.386	.3891

Table 9 depicts the average response of the TIPS-T questions and relates back to the ranking scale used in the surveys. Teachers reported using computers almost daily for school. They indicated their level of computer use to be intermediate. The teachers revealed deficiency in various technology applications but has used technology to assist with developing lesson plans and collecting data. However, teachers reported occasionally students use technology for class purposes.

Table 9:

Summary of technology skills and beliefs of teachers

Technology Skills or Beliefs of Teachers	Mean	Ranking scale equivalent (low to high range)
Q5. Freq_Com_Sch	4.63	Regularly – to – Daily
Q6. level_com	3.14	Intermediate – to - Advanced
Q7. Average_freq_general_comuse	4.023	Frequently - to - Regularly
Q8. Average_freq_tech_use	3.314	Sometime - to - Frequently
Q9. Average_proficiency_tech_use	2.457	Beginner - to - Intermediate
Q10. Average_freq_com_comm	2.851	Occasionally - to - Sometimes
Q11. Ave_freq_design_act	2.624	Occasionally - to - Sometimes
Q12. Ave_freq_col_data	3.795	Sometimes - to - Frequently
Q13. Ave_freq_les_plan	3.014	Sometimes - to - Frequently
Q15. Average_stud_use_com-1	1.871	Never - to - Occasionally
Q16. Average_stud_use_com-2	2.322	Occasionally - to - Sometimes
Q17. Average_believe_support	2.848	Hardly Any - to - Some
Q19. Average_agreement	3.386	Somewhat Agree – to - Agree

Question 19 of the TIPS-T survey has 12 belief statements, eight of which are positive statements and four are negative statements. When calculating the overall average of the teachers for question 19 as reported in Table 9, the mean was 3.386. The four negative statements resulted in a lower average (1.88 to 2.97) compared to the other eight statements (3.13 to 4.30). The teachers ranked wanting to learn more about how to use technology the highest ($\bar{x}$ = 4.30). They also ranked high ($\bar{x}$ = 4.20) learning how technology can be used by teachers and students is exciting. According to the Likert scaled used, the teachers ranked the lowest ($\bar{x}$ = 1.88) for the statement figuring out how to incorporate technology into instructional practices does not appeal to me. Table 10 summarizes the 12 belief statements with the ranking scale equivalent.

Table 10:

Summary of technology beliefs of teachers

Q19. Belief statements	Mean	Ranking scale equivalent (low to high range)
We have a strong district plan to integrate technology for teaching and learning.	3.63	Somewhat Agree – to – Agree
Stakeholders are involved in developing and implementing our technology plan.	3.13	Somewhat Agree – to – Agree
I think I am/will be a better teacher by using technology as part of my instructional practices.	4.11	Agree – to – Strongly Agree
I feel confident in my ability to use technology for teaching and learning.	3.66	Somewhat Agree – to – Agree
I think learning how technology can be used by teachers and students is exciting.	4.20	Agree – to – Strongly Agree
Students are more interested in learning when using technology to investigate an issue or solve a problem.	4.17	Agree – to – Strongly Agree
I want to learn more about using technology for teaching and learning.	4.30	Agree – to – Strongly Agree
Creating technology-based learning activities is too time consuming compared to what is learned.	2.38	Disagree – to – Somewhat Agree
Technology makes my work more complicated to complete.	2.22	Disagree – to - Somewhat Agree
Using technology can/does help students better understand what they are learning.	3.95	Somewhat Agree – to – Agree
It takes a special talent to creatively facilitate and manage technology-based learning activities.	2.97	Disagree – to – Somewhat Agree
Figuring out how to incorporate technology into instructional practices does not appeal to me.	1.88	Strongly Disagree – to - Disagree

Research Question Two

Descriptive statistics, included in Table 11, were used to address research question two, what are the technology beliefs and technology skills of administrators? Generally, the respondents agreed most readily to questions 7, 8, 10, 14, and 16. In the TIPS-A survey, questions 7, 8, and 10 dealt with frequency of use, hardware, software, and communication. Question 14 of the TIPS-A survey solicited the degree of support the administrators received for incorporating technology. Question 16 encompassed a variety of belief statements addressing technology plans, staff development, and student learning using technology. The administrator's responses to the subcategories of the individual TIPS-A questions are summarized in Appendix E.

Table 11:

Administrator technology skills and beliefs descriptive statistics

Questions	N	Mean	Std. Deviation
Aver_Q7	225	4.189	.7748
Aver_Q8	227	3.566	.8088
Aver_Q9	201	2.652	.7207
Aver_Q10	227	3.619	.8794
Aver_Q12	209	2.424	.8979
Aver_Q13	210	2.893	.8161
Aver_Q14	207	3.521	.9177
Aver_Q16	184	4.043	.5512

Table 12 depicts the average of the TIPS-A questions and relates that back to the ranking scale used in the surveys. The results indicate administrators use computers almost regularly, but rank their technology proficiency at the intermediate level. Administrators have strong technology beliefs and sense a strong support for technology integration. Even with strong support, technology use by students only occurs sometimes. Overall, the results indicate administrators have high technology skills and technology beliefs.

Table 12:

Summary of technology skills and beliefs of administrators

Technology Skills or Beliefs of Teachers	Mean	Ranking scale equivalent (low to high range)
Q5. Freq_Com_Sch	4.79	Frequently - to - Regularly
Q6. level_com	3.26	Intermediate – to - Advanced
Q7. Average_freq_general_comuse	4.189	Frequently - to - Regularly
Q8. Average_freq_tech_use	3.566	Sometime - to - Frequently
Q9. Average_proficiency_tech_use	2.652	Beginner - to - Intermediate
Q10. Average_freq_com_comm	3.619	Sometimes – to – Frequently
Q12. Average_stud_use_com-1	2.424	Occasionally – to - Sometimes
Q13. Average_stud_use_com-2	2.893	Occasionally - to - Sometimes
Q14. Average_believe_support	3.521	Some – to – Pretty Much
Q16. Average_agreement	4.043	Agree – to – Strongly Agree

Table 13 summarizes the six belief statements associated with question 16 of the TIPS-A survey. The results indicate administrators possess high technology beliefs. The administrators ranked technology being exciting for students the highest ($\bar{x}$ = 4.70). Also administrators ranked technology helping students understand what they are learning to be high ($\bar{x}$ = 4.52). The lower mean values resulted for statements about technology plans and staff development plans ($\bar{x}$ = 3.77, 3.45, and 3.35).

Table 13:

Summary of technology beliefs of administrators

Q16. Belief statements	Mean	Ranking scale equivalent (low to high range)
We have a strong district plan to integrate technology for teaching and learning.	3.77	Somewhat Agree – to – Agree
Stakeholders are involved in developing and implementing our technology plan.	3.45	Somewhat Agree – to – Agree
I think learning how technology can be used by teachers and students is exciting.	4.70	Agree – to – Strongly Agree
Students are more interested in learning when using technology to investigate an issue or solve a problem.	4.51	Agree – to – Strongly Agree
We have a good staff development plan to help teachers integrate technology for teaching and learning.	3.35	Somewhat Agree – to – Agree
Using technology can/does help students better understand what they are learning.	4.52	Agree – to – Strongly Agree

Research Question Three

A t-test was conducted to address question three, are there statistically significant differences in technology beliefs between teachers and administrators? The technology beliefs of the teachers and administrators were evaluated using the average belief of support received in technology integration and the average agreement on the statement that schools have strong plans to integrate technology and technology integration is beneficial. The alphas were set low ($p = .01$) to decrease the chance of committing Type I error (Gall, Gall, & Borg, 2003). Type I error occurs when the null hypothesis is rejected when it is actually true. The p-value of the test results are compared to .05; however to control for Type I error in the analysis the p-value were also compared to .01. The lower the p-values, the stronger the data analysis can be generalized to the population.

The results, summarized in Table 14, indicate that average belief of support received in technology among teachers had a mean of 2.86 and was significantly lower than the mean administrator belief of 3.52 (t (3217, 1) = 9.33, p-value = .00). Similarly, the average agreement on statements that schools have a strong plan to integrate technology and technology integration is beneficial among teachers had a mean value of 3.82, which was significantly lower than that among administrators ($\bar{x}$ = 4.01) (t (3220, 1) = 4.23, p-value = .00). In summary, there is statistically significant difference between technology beliefs of teachers and administrators. The administrators ranked their belief levels higher than the teachers.

Table 14:

t-test for the difference of technology beliefs between teachers and administrators

Tips	Mean	t	df	Sig.
Average_believe_support		9.33	3217	.00**
Administrator	3.521			
Teacher	2.861			
Average_agreement		4.23	3220	.00**
Administrator	4.013			
Teacher	3.820			

*, ** significance level at .05 and .01

Figure 4 shows the mean comparison of the two constructs tested. The t-test, with p = .05 and .01, concluded there was a statistically significant difference (.00) between the technology beliefs of the teachers and administrators. The figure visually shows the technology belief means of the administrators are higher than the teachers for the two constructed analyzed beliefs of technology support and agreement.

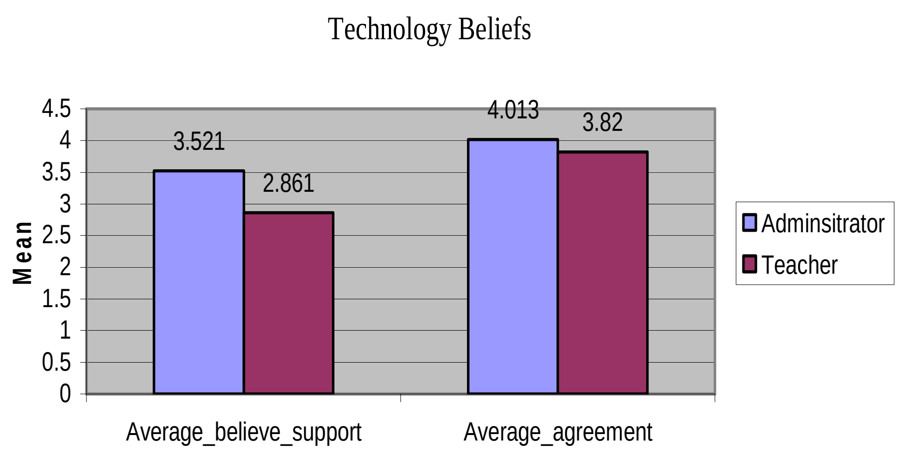

Figure 4: Mean comparison of technology beliefs

Research Question Four

An independent samples t-test was used to address research question four, are there statistically significant differences between the technology skill sets of teachers versus administrators? The technology skills were evaluated according to the average frequency of general use of computers and frequency and proficiency of using various technologies and the average frequency of communication by using computers. The results, displayed in Table 15, show the means of average frequency and proficiency of general use of computers and various technology, and communication by computers of administrators were significantly higher than that among teachers. The average frequency of general computer use for administrators was $\bar{x}$ = 4.19 were the teachers was $\bar{x}$ = 4.02 (t (3330, 1) = 2.99, p = .003). The average frequency of technology use for administrators was $\bar{x}$ = 3.57 and for teachers was $\bar{x}$ = 3.28 (t (3330, 1) = 4.89, p = .000). The administrator average proficiency of technology use was $\bar{x}$ = 2.65 and the teachers was $\bar{x}$ = 2.52 (t (3318, 1) = 2.74, t = .006). The average frequency of communication using technology for administrators was $\bar{x}$ = 3.62 where the teachers was $\bar{x}$ = 3.03 (t (3301, 1) = 9.05, p = .000). Additionally administrators ($\bar{x}$ = 2.63) rated the frequency of students using technology in school and class higher than teachers ($\bar{x}$ = 2.07) (t (2837, 1) = 9.06, p = 000). In summary, administrators reported higher technology skills than teachers. There was a statistically significant difference between the teachers and administrators as indicated by the independent t-test.

Table 15:

t-test for the difference of technology skills between teachers and administrators

Tips	Mean	t	df	Sig.
Average_freq_gen_com_use		2.99	3338	.003**
Administrator	4.19			
Teacher	4.02			
Average_freq_tech_use		4.89	3330	.000**
Administrator	3.57			
Teacher	3.28			
Average_proficiency_techuse		2.74	3318	.006**
Administrator	2.65			
Teacher	2.52			
Average_freq_com_comm		9.05	3301	.000**
Administrator	3.62			
Teacher	3.03			
Average_student_use_com		9.06	2837	.000**
Administrator	2.63			
Teacher	2.07			

*, ** significance level at .05 and .01

The mean comparison of technology skills for administrators and teachers is depicted in Figure 5. The bar graphs reveal that administrators reported higher technology skills than the teachers. Both the teachers and administrators ranked their proficiency of technology use and average student technology use to be lower than the other three constructs tested. The frequency of general computer use was the highest mean value for the teachers and administrators.

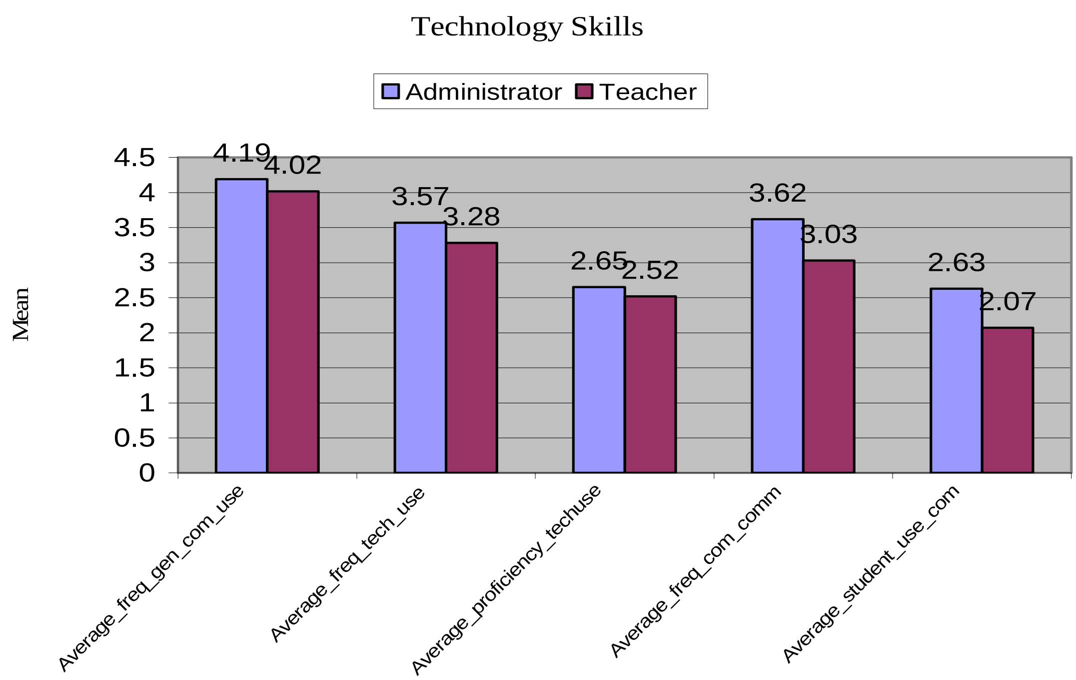

Figure 5: Mean comparison of technology skills

Research Question Five

Research question five asked, are there statistically significant differences between teachers and administrators by regions across Oklahoma? The two major interstates in Oklahoma, I-35 and I-40, were used to determine the four regions, northeast, southeast, southwest, and northwest. The four regions represented quadrants of the state as demarcated by Interstates 35 and 40.

A two-way factorial analysis of variance, ANOVA test was conducted with school region and teacher vs. administrator as two factors, an interaction between school region and teacher vs. administrator was included to inspect if there was a difference in the skills and beliefs between teacher and administrators across school regions. The results, summarized in Table 16, indicate there were statistically significant differences in technology beliefs and technology skills between teachers and administrators. These results are consistent with t-test results presented in research question three and research question four. However, there was no statistically significant difference in the constructs of technology skills and beliefs in teachers and administrators among different school regions.

The results indicate the interaction term between teachers vs. administrators and school regions was not significant for all constructs of technology skills and beliefs in teachers and administrator with p-value >.05. This implies that there is no significant difference in technology beliefs and technology skills between teachers and administrators among the different school regions. The results in Table 16 also indicate there was a significant difference in average frequency of communication using technology among school regions at significance level .05 (F (3301, 3) = 2.63, p =.049)).

Table 16:

Two-way ANOVA results for average technology beliefs and technology skills of administrators and teachers across school regions

	df	F value	Sig.
Average_freq_general_comuse			
Teachers vs Administ	1	9.39	.002**
School region	3	1.01	.290
Teachers vs Administ across sch reg	3	.71	.545
Total	3338		

Average_freq_tech_use			
Teachers vs Administ	1	17.34	.000**
School region	3	2.17	.090
Teachers vs Administ across sch reg	3	.22	.886
Total	3330		
Average_proficiency_techuse			
Teachers vs. Administ	1	4.47	.035*
School region	3	.66	.577
Teachers vs. Administ across sch reg	3	.23	.875
Total	2942		
Average_freq_com_comm			
Teachers vs. Administ	1	65.37	.00**
School region	3	2.63	.049*
Teachers vs Administ across sch reg	3	.71	.548
Total	3301		
Average_student_use_com			
Teachers vs. Administ	1	53.45	.00**
School region	3	1.71	.16
Teachers vs. Administ across sch reg	3	2.22	.07
Total	2837		
Average_believe_suppor			
Teachers vs. Administ	1	71.82	.00**
School region	3	1.76	.153
Teachers vs. Administ across sch reg	3	1.96	.118
Total	3218		
Average_agreement			
Teachers vs. Administ	1	12.11	.001**
School region	3	2.58	.052
Teachers vs. Administ across sch reg	3	1.34	.259
Total	3213		

*, ** significance level at .05 and .01

In order to further inspect how technology beliefs and technology use in teachers and administrators differ across school regions, a post-hoc test of Bonferroni test was conducted and the results were summarized in Table 17. The results in Table 17 indicate there was significant difference in average frequency of communication using technology between the northeast school region and the southwest school region (the northeast school region average was .321 higher than the southwest school region) with p-value = .000. There was significant difference in average frequency of communication using technology between the southeast school region and the southwest school region (the southeast school region average was .286 higher than the southwest school region) with p-value = .000, also between the northwest school region and the southwest school region (the northwest school region average was .327 higher than the southwest school region) with p-value = .000.

Table 17:

Post-hoc test for Average frequency of communication using technology across school regions (Bonferroni test)

(I) School region	(J) School Region	Mean Difference (I-J)	Std. Error	Sig.
Northeast	Southeast	.036	.0428	1.000
	Southwest	.321*	.0575	.000**
	Northwest	-.006	.0460	1.000
Southeast	Northeast	-.036	.0428	1.000
	Southwest	.286*	.0542	.000**
	Northwest	-.042	.0419	1.000
Southwest	Northeast	-.321*	.0575	.000**
	Southeast	-.286*	.0542	.000**
	Northwest	-.327*	.0568	.000**
Northwest	Northeast	.006	.0460	1.000
	Southeast	.042	.0419	1.000
	Southwest	.327*	.0568	.000**

*, ** significance level at .05 and .01

In summary, there were statistically significant differences in all constructs of technology beliefs and technology skills between teachers and administrators; there was significant difference in average frequency of communication using technology across school regions; there was not significant difference in technology skills and technology beliefs between teachers and administrators among different school regions.

Summary of the Finding

The results of the quantitative analysis were provided in this chapter. The questions were restated and variable constructs identified. A brief summary of the sample respondents was given as well as the overall average of the variable constructs. Each of the five research questions were addressed and analyzed by either descriptive or inferential (parametric) statistics. Based on current results and findings, conclusions were reached that administrators had higher technology skills and technology beliefs than teachers; there was statistically significant differences between the teachers and administrators.

However the two-way factorial ANOVA indicated there were not statistically significant differences between technology skills and technology beliefs among the teachers and administrators across school regions. The results did indicate a statistical significant difference in average frequency of communication using technology between the Oklahoma school regions. A post-hoc test (Bonferroni test) revealed there was significant difference in average frequency of communication using technology between the northeast school region and the southwest school region, between the southeast school region and the southwest school region, and between the northwest school region and the southwest school region.

Chapter 5: Summary and Discussion

Introduction

Studies have shown a positive relationship between technology integration and PLC attributes (Atkinson, 2005; Williams, et al., 2007). Technology skills and beliefs impact the success of a school's professional learning community journey. The analysis of the level of technology skills and beliefs of teachers and administrators will support or challenge previous studies conducted in these areas. This chapter summarizes the results of the analysis, provides implications for practice as well as recommendations for future research.

Problem

Technology has been shown to have a positive relationship with PLC initiatives (Atkinson, 2005; Dexter et al. 2002; Williams et al., 2008). As schools integrate technology and engage in PLC components, higher student achievement may occur (Hord, 2007a; Williams et al., 2008). The awareness of the levels of technology beliefs and skills school personnel possess provide professional development designers the knowledge needed to maximize technology training sessions. There are a limited number of research studies on technology skills of teachers and administrators as well as belief studies for both groups. According to Richardson and McLeod (2008), there are minimal research studies of technology leadership, causing school leaders to struggle with what technology leadership looks like. McLeod also indicates a lack of technology integration in educational leadership literature (2008). This study compared teachers and administrators in the areas of technology skills and technology beliefs to determine if a statically significant difference occurred. This study also analyzed different regions of the state of Oklahoma to determine if there were statistically significant differences between geographical locations of the school personnel. The purpose of this study was to understand the level of technology knowledge and technology beliefs teachers and administrators possessed.

Research Questions

By analyzing the TIPS data from Phase I participation in the University of Oklahoma K20 Center's OK-ACTS program, the following research questions were addressed:

Question One: What are the technology beliefs and technology skills of teachers?

Question Two: What are the technology beliefs and technology skills of administrators?

Question Three: Are there statistically significant differences between the technology beliefs of the teachers versus administrators?

Question Four: Are there statistically significant differences between the technology skill sets of the teachers versus administrators?

Question Five: Are there statistically significant differences between teachers and administrators by regions across Oklahoma?

The TIPS data were compiled from six different administrations of the surveys between 2007 and 2008: spring 2007, fall 2007, winter 2008, spring 2008, summer 2008, and fall 2008. Each survey session had both a TIPS-T for teachers and a TIPS-A for administrators to complete. The teacher respondent group consisted of content teachers, elective teachers, counselors, librarians, and technology specialist. The respondents for the administrator group varied from superintendents, assistant superintendents, principals to technology directors. The research questions were designed to analyze the technology beliefs and skills to the teachers and administrators and compare the two groups.

Review of Study's Methodology

The study was a non-experimental quantitative analysis. Ex post facto data were used in the statistical calculations. The TIPS survey responses from 2007 and 2008 were analyzed. Descriptive statistics were conducted to describe and understand the respondents, the teacher group and the administrator group. T-tests were calculated to ascertain whether there was a difference between teachers and administrators. In addition to gaining knowledge about the two groups the researcher was curious about the comparison of the four regional locations of Oklahoma: northeast, southeast, southwest, and northwest. Therefore, an analysis of variance, ANOVA, was also calculated to determine if there was a statistical significant difference among teachers and administrators within the four geographical school regions.

Summary of Results

The respondents of the TIPS data possessed similar beliefs about technology support. Referring back to Table 7, the standard deviation (.10) for the construct average_believe_support suggest the teachers and administrators believed they had 'some' support from their stakeholders to integrate technology. The construct freq_general_comuse resulted in a high mean score of 4.03 with a standard deviation of .79 and a skewness of -.83. The data set was negatively skewed, indicating the majority of the respondents ranked their general computer use to be high ('frequently'). In turn, the majority of the TIPS respondents ranked stud_use_com low ('occasionally'), with a mean of 2.11 and a skewness of .84. These results may indicate the teachers and administrators use computers frequently but students only use computers occasionally for purposes of school activities.

Question One: What are the technology beliefs and technology skills of teachers?

The teacher group that completed the TIPS-T surveys consisted of content teachers, counselors, librarians, and even technology specialist. The total number of respondents to the TIPS-T surveys was 3187. Descriptive statistics were used to determine the technology skills and beliefs of the teachers. The mean for the survey questions were calculated as well as for each subcategory within the TIPS-T questions.

The results of the descriptive statistical analysis indicated teachers use computers and technology often and consider themselves to be fairly advanced in using the technology, but yet they do not consider themselves proficient users of the technology. The teachers are proficient in word processing, emailing, and Internet usage, but not in spreadsheet or database applications. They also do not consider themselves proficient in using SMARTboards, graphics, and scanners. Technology is used in gathering information for lesson plans but is not a consistent instructional tool in the classroom. Teachers feel there is some support for using technology but the analysis revealed they still struggle with technology integration.

Table 10 revealed teachers were interested in technology integration; they want to learn more about how to use technology. According to the belief system results, teachers believe students are more motivated when technology is included in the instruction. Once the teachers know how to use the technology, they believe they become a better teacher.

Question Two: What are the technology beliefs and technology skills of administrators?

The administrator group that completed the TIPS-A surveys consisted of technology directors, principals, assistant superintendents and superintendents. According to the descriptive statistical analysis, administrators consider themselves to be frequent users of technology but still lack in proficiency levels. The administrators are weak in the areas of SMARTboards, graphics, hand-held devices, as well as database, and spreadsheet applications. They ranked higher proficiency levels in email, Internet, and word processing. They sense that students are using technology occasionally for course work, while the support from stakeholders is there to integrate technology.

The beliefs of the administrators about technology reveal to be high ($\bar{x}$ = 3.35 to 4.70). On the Likert scale 3 represented 'somewhat agree' and 5 represented 'strongly agree'. They are excited about technology and the affect it has on teaching and learning. They believe their staff development plan for technology integration is good but has room for improvement. Overall, administrators possess high technology skills and technology beliefs.

Question Three: Are there statistically significant differences between the technology beliefs of the teachers versus administrators?

The belief questions for the two surveys include similar statements. An independent t-test was conducted to determine if there was a statistically significant difference between the technology beliefs of teachers and administrators. The beliefs of the teachers and administrators were evaluated by the average belief of support received in technology integration and average agreement on the statements that schools have strong plans to integrate technology and technology integration is beneficial. The administrator means revealed higher agreement levels than the teacher means. The results indicated that administrators and teachers had a statistically significant difference in their technology beliefs (administrators are higher).

Question Four: Are there statistically significant differences between the technology skill sets of the teachers versus administrators?

The technology skills of the teachers and administrators were evaluated by conducting a t-test on five constructs, including average frequency of general use of computers, frequency and proficiency of using various technologies, average frequency of communication by using computers as well as the frequency of students using technology in school and class. The results of the t-tests indicated there were statistically significant differences between the teachers and administrators on all five constructs. The administrators ranked themselves higher in all five constructs for technology skill sets.

Question Five: Are there statistically significant differences between teachers and administrators by regions across Oklahoma?

An analysis of variance (ANOVA) was conducted to determine if there was a statistically significant difference between the four geographical regions in Oklahoma, northeast, southeast, southwest, and northwest. Seven survey constructs were used in the ANOVA analysis with $p < .05$, the two belief constructs (ave_believe_support and ave_agreement) and the five skills set constructs (ave_freq_gen_comuse, ave_freq_tech_use, ave_prof_techuse, ave_freq_com_comm, and ave_stud_use_com). In order to analyze the four geographical school regions together with the two groups, teachers and administrators, a two-way factorial analysis of variance was conducted. The two-way factorial ANOVA indicated that there was a statistically significant difference between the teachers and administrators for the seven constructs. However, the analysis indicated no statistically significant difference among the teachers and administrators across the four geographical school regions. The two-way factorial ANOVA did indicate a significant difference in the school regions for one of the constructs tested, average frequency of communication using technology. After conducting the Bonferroni test, the statically significant difference was between the southwest school region and the other three school regions; whereas, no other regional differences were indicated.

Interpretation of the Findings

Parametric test of means differences, t-test and analysis of variance, indicated that there was a statistically significant difference between technology skills and technology beliefs among the administrators and teachers surveyed in 2007 and 2008. Administrators on average ranked their technology beliefs higher than teachers. Administrator beliefs may be high due to the years of experience accessing database systems, writing formal and informal letters to parents, as well as participating in the K20 Center's two-day leadership seminar. The administrators also ranked their technology skills higher than the teachers. Due to No Child Left Behind, administrators are expected to analyze student achievement data to ensure academic growth. The majority of educational reports are also submitted online. Another reason administrator's rank their technology skills higher than teachers may be due to data accounting systems. Student attendance, grades, discipline, and financial programs are stored on electronic accounting systems. A lack of teacher preparation and experience in pre-service programs may also account for the lower teacher scores in technology skills and beliefs. In addition, the technology training provided may have had no follow up causing the teachers to revert back to familiar instructional strategies. The sustainability of technology integration declines reporting lower skills sets in turn lower technology beliefs for the teachers.

During this time, across Oklahoma regions there were no significant differences between the teachers and administrators. However, the findings indicated that the frequency of communication using technology had reached statistically significant difference levels between the southwest school region and the other three school regions. This difference may be due to the lower school participation (N = 88) for the southwest region.

Teachers are lagging behind the administrators in technology abilities and in technology beliefs. The administrator group for this study had participated in the Phase I two-day leadership seminar, which focused on technology integration for school improvement (University of Oklahoma, n.d.). The teacher group had committed to the K20 Center's high-achieving schools philosophy, IDEALS, but they were just embarking upon the PLC journey. These findings are consistent with the notion that the administrators had experienced more discussion and practice with outside technology experts; whereas, the teachers had only experienced what was provided at their school or practiced in their classrooms. Technology integration, even though has been around for decades, is still relatively a new concept for education. The teachers possess lower technology skills in turn may cause the low technology integration as reported by frequency of student use.

Relationship of Current Study to Previous Research

This study supports Anderson (2000), in that teachers and administrators ranked their proficiency levels higher for email usage, word processing, and Internet searches. As in the Anderson (2000) study, the teachers and administrators ranked their lowest proficiency in spreadsheets and database applications. Anderson also concluded educators reported low curriculum technology integration (2000). This study supports Anderson's findings due to the low ranking of the statements associated with designing student activities using computers and low to moderate student computer usage. The teachers are hesitant to design instruction using technology. This hesitation may be a result of the teachers having a low perception of their proficiency. The students often times are more knowledgeable than the teachers and the teachers do not want to show a lack of knowledge. Therefore, they continue with traditional instruction. The lack of preparation to integrate technology may be the cause for minimal to no instruction using technology. The teachers fear of not knowing in front of students as well as losing the control of the learning process. The more teachers use technology and integrate it into their curriculum, the more often they will continue to do so (Ertmer, 2005). With more exposure and training related to technology integration, the greater the chance of changing the educator's beliefs about teaching and learning with technology (Becker, 2007; Ertmer, 2005).

The Ertmer (2005) study suggested various tactics to enhance teachers' pedagogical beliefs about technology integration. In order to increase teachers' technology skills, their beliefs about integrating technology need to increase. By doing so, students enhance their 21st Century skills of creating new ideas, evaluating and analyzing materials, and developing high quality products (McCoog, 2008). This study revealed technology beliefs were somewhat lower than that of the technology skills of both the administrators and teachers. There was a statistically significant difference between the teachers and administrators among the constructs tested for technology skills and technology beliefs. The results of this study in relationship to the Ertmer (2005) study suggest that if the technology beliefs of the teachers and administrators increase then the technology skills would increase. The teacher's technology skills and beliefs are lower than administrator's skills and beliefs. In speculation, if the teacher's technology skills increase to the level of the administrators, then possibly the teacher's technology beliefs will increase.

As with the Lin (2008) study, this study revealed positive attitudes/beliefs about technology. Lin (2008) concluded that technology professional development fostered positive attitudes about technology integration. The administrators had experienced the two-day leadership seminar infused with technology training. Data analysis revealed administrators had reported higher technology beliefs than teachers, who had not attended a technology enriched training session. The more technology training, improving technology skills, may result in higher technology beliefs.

This study also supported Hanks (2002) suggestion that teachers had a positive perception of technology and its use to improve student performance. The average response to the TIPS-T or TIPS-A belief statements, Q19 or Q16, respectively, range from 'somewhat agree' to 'agree.' The educators agreed that technology motivates students to learn. However, due to their lower proficiency levels to integrate technology, students used technology only occasionally. Hanks (2002) concluded that technology beliefs are related to the frequency of technology use. Therefore, if the teachers and administrators integrate technology more then their beliefs about technology will increase.

Prensky (2005) suggested most students are motivated to learn when technology is involved. The OK-ACTS teachers and administrators surveyed agreed with Prensky in that students are more interested when using technology. However, the teachers did not agree with the administrators about how technology can/does help students better understand what they are learning. The teachers ($\bar{x}$ = 3.95) ranked their agreement to this statement lower than the administrators ($\bar{x}$ = 4.52). Teachers believe they are responsible not the technology for teaching the students and explaining the information well enough for the students to understand (Ertmer, 2005). The teachers have the knowledge to provide the students what they need to know. The teachers are responsible for the instruction. The technology is not the source of the knowledge. The administrators surveyed reported a higher level of agreement about how technology can/does help student better understand as compared to the teachers. This may be due to the additional professional development the administrators had received prior to completing the survey. Until technology beliefs are increased, technology integration will not increase.

The beliefs about technology were fairly high for both groups. The teachers and administrators beliefs ranged from ‘somewhat agree’ to ‘strongly agree’. The perception of proficiency and usage among the teachers and administrators was lower, ‘occassionally’ to ‘sometimes’. Raths (2001) suggested the beliefs of teachers influence how they teach. The more exposure the teachers and administrators have with technology and technology integration the more their beliefs about technology are affected. Beliefs are difficult to change (Raths, 2001). The more technology training the teachers and administrators engage in will result in higher technology skills. Higher technology skills will increase the teachers and administrators technology beliefs resulting in increased technology integration. Student learning will be affected by the increase in technology integration. Since teachers believe they are or will be better teachers when using technology, Table 10, an increase in technology use is bound to occur.

Implications for Practice

The respondents for this study were in schools beginning their professional learning community journey. As the teachers and administrators engage in technology integration and boost their abilities and beliefs about technology, they will see their PLC grow and evolve (Atkinson et al., 2008; Williams et al., 2008). The PLC growth will boost student achievement (Atkinson et al., 2008; DuFour & Eaker, 1998; Hord, 2007a; Williams et al., 2008). As schools journey towards PLC development, data analysis provides the personnel with information needed to guide the journey. By analyzing student data, school personnel can identify weaknesses and strengths.

The two groups, teachers and administrators, ranked their proficiency levels for spreadsheets and databases to be low at the ‘beginner’ ranking. Spreadsheets allow users to compile data and display the numerical values as charts and graphs. For the visual learners, the charts and graphs provide meaningful images of the areas of strengths and weaknesses within the school. Technology within a school can provide communication avenues among its members, can support one-way presentations of student data that has been maintained on a database, as well as assist with defining aspects of the curriculum to focus the member's energy (Carroll, 2001; Russell, 2001).

For the professional development designers of the K20 Center's Phase II program, it is beneficial to identify the areas of weaknesses in technology skills. Training in spreadsheets, such as Microsoft Excel, would increase the proficiency of teachers and administrators. They could generate charts and graphs displaying student performance levels to determine the vision and goals of their PLC journey. SMARTBoards provide opportunities for hands-on manipulation of displayed visuals, websites, and data analysis. The TIPS analysis revealed low proficiency levels in using SMARTBoards, this suggest additional technology training is needed to enhance the educators' SMARTBoard proficiency levels.

As educators learn how to use technology effectively, their beliefs about the relevance of technology as a learning tool improve (Kanaya, Light, & Culp, 2005). Hanks (2002) stated the level of technology use is related to the teacher's beliefs about the value of technology. This study revealed the educators possessed relatively high beliefs about technology, suggesting an increase in the use of technology as a learning tool.

The teachers and administrators ranked student use of computers to occur less than occasionally. Both groups used computers often but did not consider student computer use to be high within their schools. The data analysis revealed they believed students were more motivated to learn if technology was involved but their personal proficiency levels were low. Professional development designers can use this information to target training in technology applications and tools as well as training in technology integration. Hanks (2002) suggested the frequency of technology use is related to technology beliefs. It can be concluded that if technology beliefs are increased, then technology integration will increase.

The more teachers are exposed to the technology and learn how to integrate the technology the more likely they will design technology enriched authentic instruction. Based on the results of this study, the NETS-A and even the IDEALS framework may need to include a component for technology training within the statements. The standards suggest strategies of what to do with no mention of technology training to assist the educators in accomplishing the task. Educators engaged in learning opportunities about technology integration will see positive connections with the development of a professional learning community (Atkinson et al., 2008; Williams et al., 2008). As schools continue to collectively learn, share best practices, and celebrate successes, learning is occurring. With student achievement the goal, schools continue to find ways to boost their effectiveness. Technology is an additional tool to support the advancement towards a high-achieving school.

Recommendations for Future Research

Research studies on technology skills and technology beliefs of educators are minimal compared to all other educational research. This study only identified the level of technology skills of teachers and administrators and the technology beliefs of these individuals using ex post facto data collected in 2007 and 2008. Additional studies are needed to further develop the body of research in technology skills and technology beliefs of educators.

An in-depth look at the open-ended questions of the TIPS surveys would provide a qualitative analysis of the findings relative to this study. After reviewing the conclusions a question to address might be what causes or why do the administrators rank themselves higher in technology skills and technology beliefs than the teachers? Another question to investigate might be what caused the southwest region to have a significantly difference with the other three geographical regions or even why is the southwest region not represented as well as the other three geographical regions? Further review of the data might include a comparison study of technology skills and beliefs to school size, rural, suburban, urban, and even separating out the two largest school districts Tulsa and Oklahoma City. An additional study may also look at what is happening in the K20 Phase I training, how the training is conducted, and whether or not the training impacts the administrators technology beliefs and skills.

Technology is an integral part of the 21st Century. Students are exposed to technology on a regular basis. Integrating technology into the schools has been shown to increase student learning, enhance data analysis, and improve communication (Good, 2001; Prensky, 2005; Wells & Lewis, 2006). Due to the minimal number of research studies, it is evident that additional studies in this area of educational research, technology integration, technology leadership, and the basic technology skills and technology beliefs of educators, are needed to enhance this field of research. Finding ways to bring teachers and administrators together in what they believe about technology in the classroom can benefit the schools journey towards a professional learning community resulting in higher student achievement.

Study Limitations

The study sample was limited to Oklahoma schools that have leaders committed to school improvement by entering into the University of Oklahoma K20 Center's OK-ACTS program and are on the journey to develop technology enriched professional learning communities and even further into democratic learning communities. Only OK-ACTS schools that entered in 2007 or 2008 comprised the study sample. Also, schools whose personnel completed the electronic TIPS surveys represent the technology skills and beliefs of all the school's personnel. The TIPS surveys varied slightly in a few of their questions regarding technology skills and beliefs. The belief question for the teachers included positive and negative statements; whereas, the administrator belief question only had positive statements.

Summary

This study provided a clearer image of the level of technology skills teachers and administrators possessed when beginning a professional learning community journey. The administrator group ranked themselves higher than teachers in technology skills. In addition, administrators ranked their technology beliefs higher than the teachers. Teachers and administrators resulted in a statistically significant difference in both technology skills and technology beliefs.

For the purpose of Oklahoma educators, an analysis of the four regional locations, northeast, southeast, southwest, and northwest, was conducted. When analyzing the teachers and administrators across the four geographical regions, significant levels were not reached meaning there was no statistically significant difference among the teachers and administrators regionally. The southwest school region did indicate statically significant differences between the other three geographical regions when analyzing the frequency of communication using technology. However, there were no other differences among the geographical regions.

The information provided by the data analysis reveals teachers are lagging behind administrators. Exposing teachers to more technology training will boost their ability levels as well as their beliefs about technology. As school personnel share in the learning and celebrate their successes, their learning community strengthens. The professional learning community journey enhanced by technology integration increases the achievement levels of students. This study provided the information needed to understand the level at which teachers and administrators are, in relation to technology skills and technology beliefs. Knowing where to begin in the technology training will allow professional development to be more effective and efficient in preparing personnel to advance towards a high-achieving school.

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Appendices

Appendix A: TIPS-T Survey

TIP-T - Fall 2007

Demographical Data

*** 1. Please insert the last 5-digits of your Social Security Number (this will serve to allow pre- and post- pairings of your data and will not be used to identify you in any other way):**

*** 2. School**

*** 3. District**

4. My school position or role is a(n):

Technology Use and Skill Level

Please select the items that best describe your school and classroom.

5. How Frequently Do You Use a Computer at School?

6. What is Your Current Level of Expertise for Using a Computer?

7. Please Rate How Often You Use a Computer For the Following Purposes.

I Use a Computer for....

	Never	Occasionally	Sometimes	Frequently	Regularly
Personal Use (e.g., personal email)	○	○	○	○	○
Classroom Record Keeping (e.g., grades, attendance)	○	○	○	○	○
Classroom instruction (e.g., presentations, student activities)	○	○	○	○	○
School Communications (e.g., school email, communication with parents and/or administrators)	○	○	○	○	○

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8. Please Check How Often You Use the Following Software At Your School

	Never	Occasionally	Sometimes	Frequently	Regularly	Not Available At Our School
Word Processing Software (e.g., Microsoft Word, Word Perfect, Apple Works)						
Presentation Software (e.g., Microsoft PowerPoint, Apple Works)						
Spreadsheet Software (e.g., Microsoft Excel, Apple Works)						
Publishing Programs (e.g., Adobe Acrobat, Microsoft Publisher)						
Database Programs (e.g., Microsoft Access, FileMaker, Oracle)						
Internet (e.g., Internet Explorer, Netscape, Mozilla Foxfire)						
Email Access (e.g., Outlook, Eudora)						

9. Please Rate Your Current Proficiency To Use the Following Technology Applications or Tools

	Non-User	Beginner	Intermediate	Advanced	Expert
Word Processing (e.g., Microsoft Word, Word Perfect, Apple Works)					
Spreadsheet Programs (e.g., Excel, Apple Works)					
Presentation Software (e.g., Microsoft PowerPoint, Hyper Studio)					
Database Programs (e.g., Microsoft Access, FileMaker)					
Email					
Internet/Web Browsers					
Calendar or Scheduling Program					
Publishing program (e.g., Adobe Acrobat, Microsoft Publisher, Pagemaker)					
Graphics Programs (e.g., PhotoShop, Paint Shop Pro)					
Scanner					
Hand-Held Device (e.g., PDA, GPS)					
Graphing Calculator					
SmartBoard					
LCD Projector					
Removable Media (e.g.,					

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Drive)

Technology Use By Teachers

10. Please Rate How Often You Use Technology for Communication.

I Use Technology to Communicate With...

	Never	Occasionally	Sometimes	Frequently	Daily
Colleagues and Staff for Administrative Purposes	○	○	○	○	○
Colleagues and Staff on Issues Relating to Student Learning	○	○	○	○	○
Students	○	○	○	○	○
Parents	○	○	○	○	○
Community Members	○	○	○	○	○

11. How Often Do You Use Technology to Design Different Types of Student Activities?

I Use Technology to Design Student Activities that...

	Never	Occasionally	Sometimes	Frequently	Daily	N/A
Improve My Students' Basic Skills (e.g., reading, writing, math)	○	○	○	○	○	○
Increase My Students' Problem Solving Skills and Critical Thinking Skills	○	○	○	○	○	○
Encourage Students to Use Technology	○	○	○	○	○	○
Encourage Creative Expressions of Individual Leaders	○	○	○	○	○	○
Allow Students to Collaborate with Peers and Outside Experts	○	○	○	○	○	○
Facilitate Discussions of Ideas and Reflection on Learning	○	○	○	○	○	○
Involve Collecting, Manipulating, and Analyzing Data (e.g., spreadsheets)	○	○	○	○	○	○
Encourage Researching Information via the Internet	○	○	○	○	○	○
Allow for Opportunities to Create and Share Presentations Using Technology	○	○	○	○	○	○
Require That Students Use Technology Resources for Problem-Solving Activities	○	○	○	○	○	○

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Teach Students to Evaluate the Accuracy and Bias of Information They Gather Through Technology Means	○	○	○	○	○	○

12. How Often Do You Use Technology for Organization and Collection of Class Data?

I Use Technology to...

	Never	Occasionally	Sometimes	Frequently	Regularly
Organize Grade Information for Students	○	○	○	○	○
Organize Grade Information for Parents	○	○	○	○	○
Organize Grade Information for School Administrators	○	○	○	○	○
To Keep Attendance, Progress, and Demographic Information	○	○	○	○	○
Collect and Analyze Student Data	○	○	○	○	○
Assess Student Learning	○	○	○	○	○

13. Please Rate How Often Technology Is Involved With Your Lesson Plans.

I Use Technology to...

	Never	Occasionally	Sometimes	Frequently	Regularly
Create My Lesson Plan	○	○	○	○	○
Gather Information for My Lesson Plan (e.g., searching the web)	○	○	○	○	○
Deliver Instructional Information	○	○	○	○	○
Post Homework Assignments and Other Class Information for Students and Parents to Assess	○	○	○	○	○
I Incorporate Technology Into Student Learning Experiences	○	○	○	○	○

Technology Use by Students

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14. What Type(s) of Access do the Students Have to Computers?

- [ ] All students have a computer in our classroom
- [ ] We have 1-2 classroom computers
- [ ] We have several computers in our classroom
- [ ] We have no computers in our classroom
- [ ] In a lab
- [ ] In a media center or library
- [ ] Other (please specify)

15. How Often Do Your Students Use Computer Applications for the Following (e.g., word processing, spreadsheets, email, etc)

	Never	Occasionally	Sometimes	Frequently	Regularly	N/A
Preparing Assignments/Papers	○	○	○	○	○	○
Producing Class Presentations	○	○	○	○	○	○
Analyzing Data or Keeping Records	○	○	○	○	○	○
Collaborating on Assignments	○	○	○	○	○	○
Corresponding with Experts, Authors, or Others	○	○	○	○	○	○

16. How Often Do Your Students Use Technology to Enrich Their Learning in the Following Ways:

	Never	Occasionally	Sometimes	Frequently	Regularly	N/A
Research Information/Locating Materials for Assignments	○	○	○	○	○	○
Use Software to Learn or Practice New Skills	○	○	○	○	○	○
Use Software to Study for Tests	○	○	○	○	○	○
Participate in Virtual Field Trips	○	○	○	○	○	○

Technology Attitudes

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17. What degree of support have you received for incorporating technology into your teaching and learning activities from the following:

	None	Hardly Any	Some	Pretty Much	A Lot
Your Principal	○	○	○	○	○
Other Teachers at Your School	○	○	○	○	○
Organizations/Businesses in Your Community	○	○	○	○	○
Parents of Your Students	○	○	○	○	○
Students	○	○	○	○	○

18. For those you rated as supportive, please explain the types of support you receive.

19. Please rate your level of agreement with the following statements.

	Strongly Disagree	Disagree	Somewhat Agree	Agree	Strongly Agree
We have a strong school/district plan to integrate technology for teaching and learning.	○	○	○	○	○
Stakeholders are involved in developing and implementing our technology plan.	○	○	○	○	○
I think I am/will be a better teacher by using technology as part of my instructional practices.	○	○	○	○	○
I feel confident in my ability to use technology for teaching and learning.	○	○	○	○	○
I think learning how technology can be used by teachers and students is exciting.	○	○	○	○	○
Students are more interested in learning when using technology to investigate an issue or solve a problem.	○	○	○	○	○
I want to learn more about using technology for teaching and learning.	○	○	○	○	○
Creating technology-based learning activities is too time consuming compared to what is learned.	○	○	○	○	○
Technology makes my work more complicated to complete.	○	○	○	○	○
Using technology can/does help students better understand what	○	○	○	○	○

TIP-T - Fall 2007

they are learning.

It takes a special talent to creatively facilitate and manage technology-based learning activities. ○ ○ ○ ○ ○

Figuring out how to incorporate technology into instructional practices does not appeal to me. ○ ○ ○ ○ ○

20. Any comments concerning the statements above?

21. What are your school's current technology strengths? Please provide examples.

22. What are your current technology strengths? Please provide examples.

23. In what ways would you like to use technology in your classroom? Please provide examples.

24. What obstacles do you need to overcome in order to use technology in your teaching practices? Please explain.

25. What can be done in your school regarding curriculum, hardware/software, professional development, and other areas?

Thank you.

We appreciate your taking the time to complete this survey. These data will be used to help develop an action plan for the Ten Practices of High Achieving Schools that support technology integration for student learning at your school.

Appendix B: TIPS-A Survey

TIP-A - Fall 2007

Demographical Data

*** 1. Please insert the last 5-digits of your Social Security Number (this will serve to allow pre- and post- pairings of your data and will not be used to identify you in any other way):**

*** 2. School Name**

*** 3. School District**

4. My school position or role is a(n):

Technology Use and Skill Level

Please select the items that best describe your school and classroom.

5. How Frequently Do You Use a Computer at School?

6. What is Your Current Level of Expertise for Using a Computer?

7. Please Rate How Often You Use a Computer For the Following Purposes.

I Use a Computer for....

	Never	Occasionally	Sometimes	Frequently	Regularly
Personal Use (e.g., personal email)	○	○	○	○	○
School Record Keeping (e.g., grades, attendance)	○	○	○	○	○
Meetings (e.g., presentations, data display, videos)	○	○	○	○	○
School Communications (e.g., school email, communication with parents and/or administrators)	○	○	○	○	○

TIP-A - Fall 2007

8. Please Check How Often You Use the Following Software At Your School

	Never	Occasionally	Sometimes	Frequently	Regularly	Not Available At Our School
Word Processing Software (e.g., Microsoft Word, Word Perfect, Apple Works)	○	○	○	○	○	○
Presentation Software (e.g., Microsoft PowerPoint, Apple Works)	○	○	○	○	○	○
Spreadsheet Software (e.g., Microsoft Excel, Apple Works)	○	○	○	○	○	○
Publishing Programs (e.g., Adobe Acrobat, Microsoft Publisher)	○	○	○	○	○	○
Database Programs (e.g., Microsoft Access, FileMaker, Oracle)	○	○	○	○	○	○
Internet (e.g., Internet Explorer, Netscape, Mozilla Foxfire)	○	○	○	○	○	○
Email Access (e.g., Outlook, Eudora)	○	○	○	○	○	○

9. Please Rate Your Current Proficiency To Use the Following Technology Applications or Tools

	Non-User	Beginner	Intermediate	Advanced	Expert
Word Processing (e.g., Microsoft Word, Word Perfect, Apple Works)	○	○	○	○	○
Spreadsheet Programs (e.g., Excel, Apple Works)	○	○	○	○	○
Presentation Software (e.g., Microsoft PowerPoint, Hyper Studio)	○	○	○	○	○
Database Programs (e.g., Microsoft Access, FileMaker)	○	○	○	○	○
Email	○	○	○	○	○
Internet/Web Browsers	○	○	○	○	○
Calendar or Scheduling Program	○	○	○	○	○
Publishing program (e.g., Adobe Acrobat, Microsoft Publisher, Pagemaker)	○	○	○	○	○
Graphics Programs (e.g., PhotoShop, Paint Shop Pro)	○	○	○	○	○
Scanner	○	○	○	○	○
Hand-Held Device (e.g., PDA, GPS)	○	○	○	○	○
SmartBoard	○	○	○	○	○
LCD Projector	○	○	○	○	○
Removable Media (e.g., Zip Disk, CD Rom, "Junk" Drive)	○	○	○	○	○

TIP-A - Fall 2007

Technology Use

10. Please Rate How Often You Use Technology for Communication.

I Use Technology to Communicate With...

	Never	Occasionally	Sometimes	Frequently	Daily
Colleagues and Staff for Administrative Purposes	○	○	○	○	○
Colleagues and Staff on Issues Relating to Student Learning	○	○	○	○	○
Parents	○	○	○	○	○
Community Members	○	○	○	○	○

Technology Use by Students

11. What Type(s) of Access do the Students Have to Computers?

- ☐ All students have a computers in all classrooms
- ☐ We have 1-2 classroom computers in most classrooms
- ☐ We have more than two computer labs
- ☐ We have no computers in our classrooms
- ☐ We have a computer lab
- ☐ In a media center or library
- ☐ Other (please specify)

12. How Often Do Students in your school Use Computer Applications for the Following (e.g., word processing, spreadsheets, email, etc)

	Never	Occasionally	Sometimes	Frequently	Regularly	N/A
Preparing Assignments/Papers	○	○	○	○	○	○
Producing Class Presentations	○	○	○	○	○	○
Analyzing Data or Keeping Records	○	○	○	○	○	○
Collaborating on Assignments	○	○	○	○	○	○
Corresponding with Experts, Authors, or Others	○	○	○	○	○	○

TIP-A - Fall 2007

13. How Often Do Your Students Use Technology to Enrich Their Learning in the Following Ways:

	Never	Occasionally	Sometimes	Frequently	Regularly	N/A
Research Information/Locating Materials for Assignments	○	○	○	○	○	○
Use Software to Learn or Practice New Skills	○	○	○	○	○	○
Use Software to Study for Tests	○	○	○	○	○	○
Participate in Virtual Field Trips	○	○	○	○	○	○

Technology Attitudes

14. What degree of support have you received for incorporating technology into your teaching and learning activities from the following:

	None	Hardly Any	Some	Pretty Much	A Lot
School Board	○	○	○	○	○
Teachers	○	○	○	○	○
Organizations/Businesses in Your Community	○	○	○	○	○
Parents	○	○	○	○	○
Students	○	○	○	○	○

15. For those you rated as supportive, please explain the types of support you receive.

TIP-A - Fall 2007

16. Please rate your level of agreement with the following statements.

	Strongly Disagree	Disagree	Somewhat Agree	Agree	Strongly Agree
We have a strong school/district plan to integrate technology for teaching and learning.	○	○	○	○	○
Stakeholders are involved in developing and implementing our technology plan.	○	○	○	○	○
I think learning how technology can be used by teachers and students is exciting.	○	○	○	○	○
Students are more interested in learning when using technology to investigate an issue or solve a problem.	○	○	○	○	○
We have a good staff development plan to help teachers integrate technology for teaching and learning.	○	○	○	○	○
Using technology can/does help students better understand what they are learning.	○	○	○	○	○

17. Any comments concerning the statements above?

18. What are your school's/district's current technology strengths? Please provide examples.

19. What are your current technology strengths? Please provide examples.

20. In what ways would you like to use technology in your classroom? Please provide examples.

21. What obstacles do you need to overcome in order to use technology in your teaching practices? Please explain.

TIP-A - Fall 2007

22. What can be done in your school regarding curriculum, hardware/software, professional development, and other areas?

Thank you.

We appreciate your taking the time to complete this survey. These data will be used to help develop an action plan for the Ten Practices of High Achieving Schools that support technology integration for student learning.

Appendix C: IRB Approval

The University of Oklahoma

OFFICE FOR HUMAN RESEARCH PARTICIPANT PROTECTION

IRB Number: 10314
Approval Date: January 29, 2008

January 29, 2008

Mary John O'Hair, Ph.D.
Dept. of Education/K20 Center
3100 Monitor Drive, Suite 200
Norman, OK 73019

RE: Protocol No. FY2002-286: Developing Professional Learning Communities Through Administrator Leadership and Technology Integration

Dear Dr. O'Hair:

Thank you for completing and returning the IRB Application for Continuing Review (Progress Report) for the above-referenced study. You have indicated that the study is still active. I have reviewed and approved the Progress Report and determined that this study was appropriate for continuation.

This letter documents approval to conduct the research as described in:
Cont Review Form Dated: January 09, 2008
Protocol Dated: January 09, 2008
Other Dated: January 09, 2008 Summary of Study Activities
Consent form - Subject Dated: January 16, 2008 Revised

Please remember that any change in the protocol, consent document or other recruitment materials (adverstisements, etc.) must be approved by the IRB prior to its incorporation into the study procedures. Submit a completed Protocol Modification form to the IRB office.

Approximately two months prior to the expiration date of this approval, you will be contacted by the IRB staff about procedures necessary to maintain this approval in an active status. Although every attempt will be made to notify you when a study is due for review, it is the responsibility of the investigator to assure that their studies receive review prior to expiration.

The approval of this study expires on January 28, 2009 and must be reviewed by the convened IRB prior to this time if you wish to remain in an active status. Federal regulations do not allow for extensions to be given on the expiration date.

If we can be of further assistance, please call the IRB office at (405) 325-8110 or send an email to irb@ou.edu.

Cordially

Donald Baker, Ph.D.
Vice Chair, Institutional Review Board

University of Oklahoma
Institutional Review Board
Informed Consent to Participate in a Research Study

Project Title: ***Developing Professional Learning Communities through Administrator Leadership and Technology Integration***
Principal Investigator: ***Dr. Mary John O'Hair***
Department: ***ELPS & K20 Center***

You are being asked to volunteer for this research study. This study is being conducted at K20 Center for Educational and Community Renewal. You were selected as a possible participant because you have attended the OK-ACTS Leadership Seminar.

Please read this form and ask any questions that you may have before agreeing to take part in this study.

Purpose of the Research Study

The purpose of this study is: to understand what characteristics of professional development contribute to changes in practice; what strategies facilitate administrative use and leadership in school technology; what strategies facilitate the move to a professional learning community; and, what strategies administrators use to implement technology integration into their schools.

Number of Participants: About 1400 people will take part in this study.

Procedures

If you agree to be in this study, you will be asked to do the following:

- Complete online or paper/pencil surveys about leadership, school renewal, and technology integration
- Agree to a follow-up interview based on the practices of high-achieving schools, including leadership, school renewal, and technology integration.

Length of Participation: The study will occur as a part of the year-long professional development..

This study has the following risks: None

Benefits of being in the study are: adding to the understanding of the characteristics of professional development for school leaders that impact systemic, substantive change to increase student achievement.

Confidentiality: In published reports, there will be no information included that will make it possible to identify you without your permission. Research records will be stored securely and only approved researchers will have access to the records. There are organizations that may inspect and/or copy your research records for quality assurance and data analysis. These organizations include the K20 Center and the OU Institutional Review Board.

Compensation: You will not be reimbursed for you time and participation in this study.

Voluntary Nature of the Study

Participation in this study is voluntary. If you withdraw or decline participation, you will not be penalized or lose benefits or services unrelated to the study. If you decide to participate, you may decline to answer any question and may choose to withdraw at any time.

Waivers of Elements of Confidentiality

Your name will not be linked with your responses unless you specifically agree to be identified. Please select one of the following options

_____ I consent to being quoted directly. _____I do not consent to being quoted directly.

Audio Recording of Study Activities

To assist with accurate recording of participant responses, interviews may be recorded on an audio recording device. You have the right to refuse to allow such recording without penalty. Please select one of the following options.

I consent to audio recording. ___ Yes ___ No.

Video Recording of Study Activities

To assist with accurate recording of your responses, interviews may be recorded on a video recording device. You have the right to refuse to allow such recording. Please select one of the following options:

I consent to video recording. ___ Yes ___ No.

Photographing of Study Participants/Activities (Delete this section if not applicable.)

In order to preserve an image related to the research, photographs may be taken of participants. You have the right to refuse to allow photographs to be taken without penalty. Please select one of the following options.

I consent to photographs. ___ Yes ___ No.

Contacts and Questions

If you have concerns or complaints about the research, the researcher(s) conducting this study can be contacted at 405-325-1267, by email at mjohair@ou.edu, or by mail at The K20 Center, University of Oklahoma, 3100 Monitor Drive, Suite 200, Norman, OK 73072.
Contact the researcher(s) if you have questions or if you have experienced a research-related injury.

If you have any questions about your rights as a research participant, concerns, or complaints about the research and wish to talk to someone other than individuals on the research team or if you cannot reach the research team, you may contact the University of Oklahoma – Norman Campus Institutional Review Board (OU-NC IRB) at 405-325-8110 or irb@ou.edu.

You will be given a copy of this information to keep for your records. If you are not given a copy of this consent form, please request one.

Statement of Consent

I have read the above information. I have asked questions and have received satisfactory answers. I consent to participate in the study.

Signature Date

APPROVED JAN 2 9 2008

APPROVAL JAN 2 8 2009

The University of Oklahoma

OFFICE FOR HUMAN PARTICIPANT PROTECTION

IRB Number: 10314
Amendment Approval Date: March 15, 2007

March 15, 2007

Mary John O'Hair, Ph.D.
Education
640 Parrington Oval, SCI 308
Norman, OK 73019

RE: IRB No. 10314/Protocol No. FY2002-286: Developing Professional Learning Communities Through Administrator Leadership and Technology Integration

Dear Dr. O'Hair:

On behalf of the Institutional Review Board (IRB), I have reviewed your protocol modification form. It is my judgement that this modification allows for the rights and welfare of the research subjects to be respected. Further, it has been determined that the study will continue to be conducted in a manner consistent with the requirements of 45 CFR 46 as amended; and that the potential benefits to subjects and others warrant the risks subjects may choose to incur.

This letter documents approval to conduct the research as described in:

Amend Form Dated: March 06, 2007

Amendment Summary:

Add study personnel: Jean Cate and Shelly Hildebrand. Remove: George Moore and Randy Averso.

This letter covers only the approval of the above referenced modification. All other conditions, including the original expiration date, from the approval granted April 04, 2006 are still effective.

Any proposed change in approved research including the protocol, consent document, or other recruitment materials cannot be initiated without IRB approval except when necessary to eliminate immediate hazards to participants. Changes in approved research initiated without IRB approval to eliminate immediate hazards to the participant must be promptly reported to the IRB. Completion of approved research must be reported to the IRB. If consent form revisions are a part of this modification, you will be provided with a new stamped copy of your consent form. Please use this stamped copy for all future consent documentation. Please discontinue use of all outdated versions of this consent form.

If you have any questions about these procedures or need additional assistance, please do not hesitate to call the IRB office at (405) 325-8110 or send an email to irb@ou.edu.

Cordially,

E. Laurette Taylor, Ph.D.
Chair, Institutional Review Board

Ltr_Amend_Final_Appv_Exp

Appendix D: TIPS-T descriptive statistics for teachers

Descriptive statistics of the subcategories for technology skills and technology beliefs among teachers (TIPS-T)

Descriptive Statistics

	N	Mean	Std. Deviation	Skewness	
Question & Subcategory statement	Statistic	Statistic	Statistic	Statistic	Std. Error
Q5 - Freq_Com_Sch	3091	4.63	.830	-2.068	.044
Q6 - level_com	3085	3.14	.740	-.347	.044
Q7:1 - Freq_com_persoNal	3103	3.70	1.400	-.533	.044
Q7:2 - Freq_com_sch_record	3096	4.40	1.218	-1.969	.044
Q7:3 - Freq_com_preseNt	3097	3.61	1.300	-.527	.044
Q7:4 - Freq_com_Sch_comm	3100	4.39	1.014	-1.711	.044
Q8:1 - Freq_Wordprocess	3085	4.41	.964	-1.708	.044
Q8:2 - Freq_preseNtatioN	3036	2.75	1.463	.230	.044
Q8:3 - Freq_spreadsheet	3074	2.68	1.408	.319	.044
Q8:4 - Freq_publish	3025	2.84	1.442	.159	.045
Q8: 5 - Freq_database	2982	1.69	1.111	1.644	.045
Q8:6 - Freq_iNterNet	2797	4.45	.984	-1.840	.046
Q8:7 - Freq_email	2748	4.34	1.224	-1.753	.047
Q9:1 - ProficieNcy_word	3106	3.41	.814	-.167	.044
Q9:2 - ProficieNcy_spreadsheet	3093	2.48	.999	.189	.044
Q9:3 - ProficieNcy_preseNtatioN	3097	2.54	1.081	.194	.044
Q9:4 - ProficieNcy_database	3092	1.78	.894	.931	.044
Q9:5 - ProficieNcy_email	3068	3.64	.849	-.242	.044
Q9:6 - ProficieNcy_iNterNet	3043	3.56	.869	-.275	.044
Q9:7 - ProficieNcy_schedule	3055	2.48	1.086	.246	.044
Q9:8 - ProficieNcy_publish	3081	2.29	1.045	.419	.044
Q9:9 - ProficieNcy_graphics	3092	2.22	1.027	.553	.044
Q9:10 - ProficieNcy_scanner	3061	2.32	1.131	.455	.044
Q9:11 - ProficieNcy_Device	3077	1.79	1.023	1.210	.044
Q9:12 - ProficieNcy_calculator	3087	1.62	.956	1.604	.044
Q9:13 - ProficieNcy_smartboard	3090	1.89	1.068	1.024	.044

Q9:14 - ProficieNcy_projector	3079	2.11	1.186	.714	.044
Q9:15 - ProficieNcy_removablemedia	3083	2.62	1.214	.182	.044
Q10:1 - Freq_Comm_admiNist	3069	3.78	1.223	-.768	.044
Q10:2 - Freq_Comm_learNiNg	3067	3.39	1.241	-.404	.044
Q10:3 - Freq_Comm_stud	3065	2.14	1.297	.801	.044
Q10:4 - Freq_Comm_pareNt	3066	2.76	1.148	.081	.044
Q10:5 - Freq_Comm_commuNity	3052	2.18	1.079	.640	.044
Q11:1 - Freq_desigN_Stud_com_activity1	2976	3.32	1.197	-.341	.045
Q11:2 - Freq_desigN_Stud_com_activity2	2985	3.12	1.188	-.191	.045
Q11:3 - Freq_desigN_Stud_com_activity3	3002	3.33	1.213	-.351	.045
Q11:4 - Freq_desigN_Stud_com_activity4	2913	2.74	1.257	.116	.045
Q11:5 - Freq_desigN_Stud_com_activity5	2909	2.33	1.232	.488	.045
Q11:6 - Freq_desigN_Stud_com_activity6	2934	2.55	1.254	.296	.045
Q11:7 - Freq_desigN_Stud_com_activity7	2913	2.16	1.196	.706	.045
Q11:8 - Freq_desigN_Stud_com_activity8	2970	2.93	1.264	-.092	.045
Q11:9 - Freq_desigN_Stud_com_activity9	2920	2.27	1.214	.527	.045
Q11:10 - Freq_desigN_Stud_com_activity10	2923	2.28	1.223	.615	.045
Q11:11 - Freq_desigN_Stud_com_activity11	2902	2.10	1.181	.798	.045
Q12 - Average_freq_tech_org	3073	3.791	1.2403	-.893	.044
Q12:1 - Freq_tech_org1	3070	3.91	1.484	-1.035	.044
Q12:2 - Freq_tech_org2	3070	3.81	1.482	-.903	.044
Q12:3 - Freq_tech_org3	3059	3.86	1.469	-.971	.044
Q12:4 - Freq_tech_org4	3069	4.03	1.487	-1.213	.044
Q12:5 - Freq_tech_org5	3063	3.60	1.451	-.644	.044

Q12:6 - Freq_tech_org6	3058	3.55	1.407	-.577	.044
Q13:1 - Freq_Tech_lessoN_plaN1	3077	3.24	1.524	-.224	.044
Q13:2 - Freq_Tech_lessoN_plaN2	3065	3.55	1.228	-.459	.044
Q13:3 - Freq_Tech_lessoN_plaN3	3069	2.94	1.388	.052	.044
Q13:4 - Freq_Tech_lessoN_plaN4	3077	2.37	1.575	.637	.044
Q13:5 - Freq_Tech_lessoN_plaN5	3074	2.98	1.318	.084	.044
Q15:1 - Freq_StudeNts_Use_Com_assigN	2821	2.24	1.299	.773	.046
Q15:2 - Freq_StudeNts_Use_Com_preseNt	2810	2.06	1.164	.913	.046
Q15:3 - Freq_Stud_Use_Com_aNalyze	2775	1.72	1.118	1.570	.046
Q15:4 - Freq_Stud_Use_Comp_collab	2789	1.88	1.121	1.193	.046
Q15:5 - Freq_Stud_Use_Comp_corr	2766	1.52	.882	1.835	.047
Q16:1 - Freq_Stud_Use_Com_res	2867	2.58	1.263	.363	.046
Q16:2 - Freq_Stud_Use_Comp_practice	2918	2.90	1.410	.119	.045
Q16:3 - Freq_Stud_Use_Comp_test	2832	2.14	1.277	.836	.046
Q16:4 - Freq_Stud_Use_Comp_virtual	2846	1.75	1.014	1.333	.046
Q17:1 - support_leader	3009	3.76	1.197	-.687	.045
Q17:2 - support_teacher	3000	3.56	1.146	-.457	.045
Q17:3 - support_Org	2989	2.07	1.170	.887	.045
Q17:4 - support_pareNt	2994	2.18	1.231	.726	.045
Q17:5 - support_stud	2984	2.71	1.408	.213	.045
Q19:1 - agreemeNt_posit1	3002	3.63	1.033	-.525	.045
Q19:2 - agreemeNt_posit2	2928	3.13	1.050	-.176	.045
Q19:3 - agreemeNt_posit3	3001	4.11	.867	-.838	.045
Q19:4 - agreemeNt_posit4	3003	3.66	1.043	-.439	.045
Q19:5 - agreemeNt_posit5	3006	4.20	.794	-.757	.045
Q19:6 - agreemeNt_posit6	3008	4.17	.811	-.673	.045
Q19:7 - agreemeNt_posit7	3007	4.30	.769	-1.007	.045
Q19:10 - agreemeNt_posit8	2999	3.95	.826	-.439	.045
agreement_posit9	0				

Q19:8 - agreemeNt_Negt1	2985	2.38	1.007	.545	.045
Q19:9 - agreemeNt_Negt2	2989	2.22	.972	.751	.045
Q19:12 - agreemeNt_Negt3	2996	2.97	.984	.025	.045
Q19:13 - agreemeNt_Negt4	2989	1.88	.901	1.159	.045
Average_freq_design_stud_com_activity	2825	2.624	.9478	.246	.046
Average_Freq_tech_lesson_plan	3088	3.013	1.0672	.010	.044
Average_student_use_com	2634	2.0681	.86350	.910	.048
Average_believe_support	3012	2.8607	.98915	.219	.045
Average_agreement	3015	3.8204	.63626	-.251	.045
Valid N (listwise)	0				

Appendix E: TIPS-A descriptive statistics for administrators

Descriptive statistics of technology skills and technology beliefs among administrators (TIPS-A)

Descriptive Statistics

	N	Mean	Std. Deviation	Skewness	
Question & Subcategory statement	Statistic	Statistic	Statistic	Statistic	Std. Error
Q5 - Freq_Com_Sch	227	4.79	.600	-2.495	.162
Q6 - level_com	227	3.26	.709	.105	.162
Q7:1 - Freq_com_persoNal	227	4.11	1.196	-1.066	.162
Q7:2 - Freq_com_sch_record	226	4.36	1.075	-1.643	.162
Q7:3 - Freq_com_preseNt	225	3.67	1.285	-.553	.162
Q7:4 - Freq_com_Sch_comm	227	4.62	.819	-2.500	.162
Q8:1 - Freq_Wordprocess	225	4.64	.789	-2.629	.162
Q8:2 - Freq_preseNtatioN	223	3.13	1.419	-.099	.163
Q8:3 - Freq_spreadsheet	226	3.31	1.389	-.269	.162
Q8:4 - Freq_publish	220	2.85	1.367	.082	.164
Q8:5 - Freq_database	220	1.97	1.280	1.115	.164
Q8:6 - Freq_iNterNet	208	4.63	.830	-2.547	.169
Q8:7 - Freq_email	201	4.78	.715	-3.954	.172
Q9:1 - ProficieNcy_word	227	3.56	.729	-.209	.162
Q9:2 - ProficieNcy_spreadsheet	227	2.74	.972	.105	.162
Q9:3 - ProficieNcy_preseNtatioN	224	2.78	1.013	-.010	.163
Q9:4 - ProficieNcy_database	222	1.84	.903	.847	.163
Q9:5 - ProficieNcy_email	223	3.75	.676	-.009	.163
Q9:6 - ProficieNcy_iNterNet	225	3.57	.805	-.252	.162
Q9:7 - ProficieNcy_schedule	224	2.87	1.038	-.111	.163
Q9:8 - ProficieNcy_publish	227	2.31	.984	.407	.162
Q9:9 - ProficieNcy_graphics	227	2.09	.955	.652	.162
Q9:10 - ProficieNcy_scanner	222	2.19	1.051	.511	.163
Q9:11 - ProficieNcy_Device	224	2.27	1.075	.365	.163
ProficieNcy_calculator	0				

Q9:12 - ProficieNcy_smartboard	226	2.01	.933	.644	.162
Q9:13 - ProficieNcy_projector	226	2.43	1.098	.272	.162
Q9:14 - ProficieNcy_removablemedia	224	2.71	1.140	.029	.163
Q10:1 - Freq_Comm_admiNist	227	4.40	.869	-1.531	.162
Q10:2 - Freq_Comm_learNiNg	227	3.97	1.086	-1.066	.162
Q10:3 - Freq_Comm_stud	0				
Q10:4 - Freq_Comm_pareNt	226	3.22	1.088	-.294	.162
Q10:5 - Freq_Comm_commuNity	225	2.88	1.089	-.052	.162
Q12:1 - Freq_StudeNts_Use_Com_assigN	214	3.05	1.188	.002	.166
Q12:2 - Freq_StudeNts_Use_Com_preseNt	213	2.66	1.059	.206	.167
Q12:3 - Freq_Stud_Use_Com_aNalyze	214	2.15	1.150	.871	.166
Q12:4 - Freq_Stud_Use_Comp_collab	214	2.35	1.008	.484	.166
Q12:5 - Freq_Stud_Use_Comp_corr	210	1.90	.907	.849	.168
Q13:1 - Freq_Stud_Use_Com_res	215	3.36	1.097	-.117	.166
Q13:2Freq_Stud_Use_Comp_practice	216	3.34	1.045	.066	.166
Q13:3 - Freq_Stud_Use_Comp_test	214	2.87	1.121	.130	.166
Q13:4 - Freq_Stud_Use_Comp_virtual	211	2.02	.910	.804	.167
Q14:1 - support_leader	207	3.84	1.218	-.862	.169
Q14:2 - support_teacher	206	4.00	.905	-.518	.169
Q14:3 - support_Org	206	2.83	1.163	.148	.169
Q14:4 - support_pareNt	205	3.21	1.209	-.192	.170
Q14:5 - support_stud	205	3.77	1.214	-.769	.170
Q16:1 - agreemeNt_posit1	207	3.77	.996	-.454	.169
Q16:2 - agreemeNt_posit2	:206	3.45	.950	.000	.169
Q16:5 - agreemeNt_posit5	188	4.70	.503	-1.390	.177
Q16:6 - agreemeNt_posit6	187	4.51	.625	-1.031	.178

Q16:9 - agreemeNt_posit8	186	4.52	.617	-.920	.178
Q16:8 - agreement_posit9	187	3.35	1.039	.006	.178
Average_freq_general_comuse	227	4.187	.7716	-.977	.162
Average_freq_tech_use	227	3.566	.8088	-.556	.162
Average_proficiency_techuse	201	2.652	.7207	.360	.172
Average_freq_com_comm	227	3.619	.8794	-.697	.162
Average_student_use_com	205	2.631	.7801	.403	.170
Average_believe_support	207	3.521	.9177	-.407	.169
Average_agreement	207	4.013	.5827	-.161	.169