TECHNOLOGY AND THE CHANGING FACE OF EDUCATION IN THE 21ST CENTURY: ARE EDUCATIONAL LEADERSHIP PROGRAMS PREPARING FUTURE LEADERS FOR THIS CHANGE?

A Doctoral Research Project
Presented to
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In Partial Fulfillment of the
Requirements for the
Degree of Doctor of Education
In Educational Leadership

Abstract

Exponential technology change is impacting our world, our students, teaching and learning, and the role of school leaders. It is important that school leaders get the needed training necessary to gain the vision, knowledge, and ability for the task. The purpose of this study was to explore the extent to which future administrators are studying 21st century technological skills and literacy in higher education school leadership programs. Findings demonstrate that higher education faculty of educational administrative programs highly value the role of technology in education. However, faculty are using technology primarily for basic skills like "Word Processing" and "Internet Searching," while the more 21st century, "Web-Based Skills," have little to no usage. Survey results also show that 90.1% of faculty do not teach "Leadership Technology Courses." Faculty also report that "Technical Support Available" and having "Convenient Access to Computers," along with "Software and Needed Equipment for Teaching Tasks" are the top three capacities of importance for integrating technology into the curriculum. In the area of demographics, Chi-Square tests showed no significance in the area of gender, age, faculty position, or whether the institution was private or public when integrating technology into the curriculum.

Acknowledgements

I would first like to thank my God, Jesus Christ, for opening doors that no one else could open; without His help I would not be here. My husband, Mark, has been the light of my life, and I cannot thank him enough for all of his endless support, encouragement, and faithfulness. He picked up the slack that I left behind to pursue my educational goals, and he did it with joy and rallying support. I also want to thank my three beautiful children, Elizabeth, Julianna, and Mark, whose encouragement and love supported me through all of my ventures. I thank Julianna for enduring my endless questions regarding statistics.

I thank my incredible professors, who taught me lessons about education from their wealth of knowledge and experience. They never lacked in their efforts to give all they have. Dr. Daniel Alemu, my Chair, Dr. Ann Myers, Dr. James Butterworth, my Advisor, and Dr. Ray O'Connell are the most supportive professors of whom I cannot thank enough. Because of them, I leave this institution a better educator, leader, and person.

Many thanks go to Dr. Jan Hammond, my coach, who supported me through the process and invited me to the CADEA conference to present my dissertation topic and distribute my surveys.

I thank my colleague Dr. Andrew Taylor, who introduced me to this program and was an encouragement all the way through.

Last, but certainly not least, I thank my cohort, whose friendship, knowledge, and experience added invaluably to my entire experience; they became my family.

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CHAPTER I

Introduction

Exponential technology change is impacting our world, our students, teaching and learning, and the role of school leaders. School leaders need training to be change agents who understand technology integration and curriculum design for the 21st century, Internet safety, social networking, filtering, data driven decision making, and the impact of professional development. In order for school leaders to lead 21st century schools, they must become technology leaders and be able to administer large-scale district change. To accomplish this it is imperative that school leaders get the training necessary to gain the vision, knowledge, and ability for the task. *The New York State Technology Planning and Policy Report* states that, "Building the technological capacity of the education system in the U.S. is critical to the global leadership of the state of New York and the nation" (University of the State of New York (USNY) Technology Policy and Practices Council (TPPC), 2007, p. 5).

The New York State Board of Regents approved a new version of the *New York State Technology Plan* in February, 2010. The vision statement in the new plan recognizes that technology is a clear venue for teaching and learning and encourages students, teachers, and leaders to have an understanding of technology standards, technology integration into the curriculum, and what students should know to be successful in the 21st century (Steiner, 2010). In March of 2010, the United States Department of Education revealed a draft of its new *National Technology Plan*. This new document has goals to revamp today's educational system to incorporate a 21st century model. The plan states:

> We are now, however, at an inflection point for a much bolder transformation of education powered by technology. This revolutionary opportunity for change is

> driven by the continuing push of emerging technology and the pull of the critical national need to radically improve our education system (U.S. Department of Education (DoE) Office of Educational Technology, 2010, p. ix).

The new plan also reiterates the need for communication and collaboration between the K-12 environment and higher education, as well as the training of teachers and leaders to capture and implement the 21st century vision (U.S. DoE Office of Educational Technology, 2010).

Purpose Statement

The purpose of this study was to explore the extent to which future administrators in higher education are studying 21st century technological skills' leadership. Higher education college and university faculty in New York State were surveyed to determine what educational technologies are being offered and used to prepare pre-service administrators. The instrument used was a recent validated survey for digital age leaders that is Web-based and administered to professors of educational leadership programs in New York State.

Research Questions

The following four questions were addressed in the survey that was sent to 201 higher education faculty members. The instrument used was a validated digital-age survey to determine faculty perception and value of the role of technology in education, skills/knowledge, and what capacities are important to faculty in their colleges and universities to enhance technology integration for pre-service educational leaders, along with demographics. The survey consists of 16 questions with six questions having multiple components equaling 73 responses. The questions in the survey come from two validated survey sources. The survey authors granted permission to use their survey questions.

1. Is there a relationship between the perceived value of the role of technology in education and the degree to which faculty integrate technology into their curriculum?
2. Is there a relationship between faculty's 21st century technology skills (skills in four groups - basic technology tools, Web-based technology tools, student-centered teaching strategies, and leadership technology tools) and the degree to which they integrate technology into their curriculum?
3. Is there a relationship between the campus program's capacity to enhance technology implementation and faculty's integration of technology into their curriculum?
4. Is there any relationship between faculty demographics and their practice in integrating technology in their course(s)?

Definition of Terms

21st Century Literacy/Skills – creativity and innovation, communication and collaboration, research and information fluency, critical thinking, problem solving, decision making, digital citizenship, technology operations and concepts (International Society of Technology in Education, 2007).

Applied Skills – creativity, innovation, critical thinking and problem solving, teamwork, leadership, communication, lifelong learning, self direction, professional work ethics, social responsibility (Partnership for 21st Century Skills, 2006)

Basic Skills – English, reading, writing, math, science, government, economics, humanities, arts, foreign language, history, geography (Partnership for 21st Century Skills, 2006)

Capacity – time to develop computer-based instruction, reward, technology availability, instructional support, technical support, campus policies, and limit research literature

Demographics **-** title, age, gender, public or private school, prior work in a K-12 environment,

undergraduate major, doctoral status, delivery of educational technology courses for future administrators.

Traditional Pedagogy – drill and practice and memorization (Keller and Bichelmeyer, 2004)

Progressive Pedagogy – higher order thinking skills, communication, innovation, problem solving, teamwork (Keller and Bichelmeyer, 2004)

Significance of the Study

The 21st century has brought with it changes in the way people communicate, research, connect, and collaborate. Technology has revolutionized the amount of information to which we are exposed. In the 19th century teachers and books were the main source of information, which fostered teacher-centered teaching and learning. Today, however, in the 21st century, students must cope with a possible information overload. No longer are the teachers and the textbooks the main source of information. Students can research the Internet and get up to the minute information on any subject. This new technological literacy fosters the need for students to develop skills to analyze, validate, and synthesize information for deep learning, rather than memorization of facts. Critical thinking, innovation, creativity, collaboration, and communication are the skills that students need today to be successful in the globally connected world they are entering.

The intent of this study was to foster higher education programs that train pre-service administrators regarding how to lead schools in the 21st century to foster student readiness. This study examines the degree of technology integration, and technology leadership future administrators are acquiring in higher education educational administrative programs.

Organization of the Study

This study is divided into five chapters. Chapter I introduces the reader to the study. It contains the purpose of the study, the defining terms used, the questions that will be answered from the research, the significance of the study, and how the study is organized. Chapter II reviews the literature and research that looks at 21st century technological change and how this change affects teaching and learning for students, teaching, and leadership. Chapter II also looks at technology in educational administrative higher education programs. Chapter III provides the reader with the methodology regarding how the research was conducted. This includes the sample participants and size, the instrument used and its validity, the design of the study, and how the data was collected and analyzed.

Chapter IV reports the analyses of the data collected, the methods used to analyze the data, and the results for each question proposed in the study. Chapter V concludes the study with a summary of findings, conclusions and recommendations for future studies.

Delimitations

The study was delimited to include only faculty members in colleges and universities in New York State who teach graduate programs of study to prepare school administrators, such as programs termed “Educational Administration” and “Educational Leadership.”

CHAPTER II

Literature Review

Chapter II reviews the literature that examines 21st century technological change and how this change affects teaching and learning for students, and the role of school leadership. Technology use and integration into the curriculum in educational administrative higher education programs is reviewed as well.

Leadership and 21st Century Change

The 21st century brings with it many challenges for school leaders. With the changing complexity of family structure, changing demographics, digital and global connectivity, budget restraints, and growing diversity, district leaders will be required to form a greater sphere of relationships. They will need to know how to turn their district-office centered power over to a more systemic power where the stakeholders become a major part in decision-making. The 21st century leader must be certain that the curriculum for learning incorporates dramatic changes and will have to change the culture to get schools ready for students (Houston, 2001). "The reality is that, for superintendents to be successful in the future, they will need to completely change their approach to the job" (Houston, 2001, p. 4).

In the nineteenth century schools were structured to be the primary source of information for students. However, with the expansion of technology, the Internet, and various other multimedia technologies available in the 21st century, students are able to gain information on their own. Schools, however, are still operating in the Industrial era and have not made the adjustment to the 21st century (Senge, 2000). For the most part teachers are isolated unto themselves and their classrooms; administrators' input into the curriculum or its improvement is minimal. Administration is involved with organizing, managing, budgeting and protecting the

school from the outside instead of focusing on the instructional area of education (Elmore, 2002). Waters and Marzano (2006) found in a meta analysis research project they conducted that when building and district leadership "effectively address specific responsibilities, they have a profound, positive impact on student achievement in their districts" (p. 6). More than ever the leader must guide activities within the classroom to promote positive achievement for students and teachers (Solomon & Schrum, 2007). Schools of education, the very places where learning takes place, should be on the cutting edge of 21st century technological literacy and skills. They should be the leaders of teaching about change and innovation (Twery, 2003). In 2002, the United States Department of Commerce ranked 55 industrial sectors by their level of utilization of Information Technology (IT); education came in at 55, the lowest of all including coal mining (U.S. Department of Commerce, 2002). It is the school leaders' role to lead schools into the 21st century digital explosion and prepare students for life in this new globally connected world (Solomon & Schrum, 2007). Elmore (2000) believes that leaders have difficulty striving to meet the 21st century demands because they have not been trained properly. Leaders tend to continue with what they have learned and therefore keep schools in a status quo stance. "The way out of this problem is through the large scale improvement instruction, something public education has been unable to do to date, but which is possible with dramatic changes in the way public schools define and practice leadership" (Elmore, 2000, p. 2).

Technological Change in the 21st Century

Exponential technological changes are taking place. The Internet alone has catapulted our society into global connectivity that surpasses anything we could have imagined even 20 years ago (Karoly, Panis, Rand Corporation, & U.S. DOL, 2004). Students are inundated with information, and need to be taught discernment of what is useful and what is not. According to

the National School Boards Association's Institute for the Transfer of Technology to Education (n.d.), the following are statistics of change in the 21st century:

> Every two or three years, the knowledge base doubles; every day, 7,000 scientific and technical articles are published; satellites orbiting the globe send enough data to fill 19 million volumes in the Library of Congress – every two weeks; high school graduates have been exposed to more information than their grandparents were in a lifetime; only 15 percent of jobs will require college education, but nearly all jobs will require the equivalent knowledge of a college education; there will be as much change in the next three decades as there was in the last three centuries (n.d.).

The *New York Technology and Policy Report* (USNY TPPC, 2007) states that, "Building the technological capacity of the education system in the United States is critical to the global leadership of the state of New York and the nation" (p. 5). The report, commissioned by the New York State Department of Education, reports concern that America has not kept up the pace needed in a "knowledge-based society" (p. 5).

Technology and the Generation Gap

How does the digital revolution affect education and educational leadership? Students are coming into schools today as multitaskers, also known as 'techno-tasking' (Simon, 2005). They are able to use different technological tools, such as computers, various software products, and cell phones, at the same time (Geck, 2006). They are technological natives and their brains are wired differently than adults (Prensky, 2001). Prensky (2001) the author of *Digital Natives, Digital Immigrants,* describes today's students' views and attitudes as different from the past. It is not only that they have changed their fads and clothes, but they have changed so dramatically

that they cannot go back. Prensky believes these new views and attitudes toward change are from the exponential changes in digital technology (2001).

The Net Generation or Generation Z are students who were born in the year 1990 and after (Geck, 2006). They are the first generation to be born in a completely digital world. From the time they were born, they were surrounded by digital tools such as cell phones, the Internet, email, and video games. These students are coming into schools as advanced users of information seeking, global connectivity, and instantaneous feedback. Although they are technology natives, their knowledge does not have the depth needed for success in the 21st century. They need to learn how to analyze, synthesize, and validate the immense amount of information they receive each day. It is important for teachers to integrate 21st century pedagogy and technology literacy into their curriculum to teach the Net Generation how to search and validate the information with which they are bombarded (Geck, 2006).

Net Generation students are as familiar with technology as their baby boomer parents were familiar with the toaster at their age. These students are so used to the communication revolution that they look for interaction in whatever they do. The effect of students' interest in the classroom has also changed and teachers and higher education faculty need to change their method of teaching from teaching-centered to student-centered. Teachers are the speakers and providers of information while students listen. Educators need to learn a whole new way of teaching, learn new tools to teach with, and learn a new set of skills in order to effectively reach and engage the Generation Net students (Tapscott, 1998).

We are preparing students for an era that no longer exists and for a job market that no longer offers the same positions (Partnership for 21st Century Skills, 2006). "The future U.S. workforce is here – and it is woefully ill-prepared for the demands of today's (and tomorrow's)

workplace" (The Conference Board et al., 2006, p. 9). While basic skills (English, reading, writing, math, science, government/economics, humanities/arts foreign languages, history/geography) are still important, the need for applied skills (creativity/innovation, critical thinking and problem solving, teamwork, leadership, communication, lifelong learning/self direction, professional/work ethic, and ethics/social responsibility) is imperative for success (Partnership for 21st Century Skills, 2006).

Leadership and Accountability Requirements

In 2001 the United States Government instituted the *No Child Left Behind Act* (NCLB). The purpose of this act is to "close the achievement gap with accountability, flexibility, and choice, so that no child is left behind" (NCLB, 2001, p. 1). The NCLB act has come under scrutiny since its inception. It has brought about accountability requirements for all school children by their performance on large-scale; one size fits all, tests. The criticism comes from the fact that one test cannot fit all students and should not be the only tool to measure their abilities and achievement. According to Keller and Bichelmeyer, (2004), new accountability measures stifle technology integration into curriculum in schools today. When referring to technology integration, Keller and Bichelmeyer are not referring to lower-order pedagogy such as drill and practice and memorization; they are referring to progressive pedagogy, focusing on higher order thinking skills, communication, innovation, problem solving, and team work (2004). Many schools have computers, hardware, and Internet connections, but without professional development to train teachers to utilize the technology for progressive pedagogy and to foster process skills, schools are still utilizing technology at lower levels. In a study done by Cuban (2001), he reported that "In the schools we studied, we found no clear and substantial evidence of students increasing their academic achievement as a result of using information technologies"

(p. 133). With the immense pressure that the NCLB brings to schools to pass large scale tests, time for professional development with technology integration becomes a peripheral element of school goals. The pressure for teachers and leaders to meet the demands of accountability brought on by the NCLB are immense. It is understandable that technology integration and the promotion of process skills would take a back seat. One of the recommendations that Keller and Bichelmeyer make to relieve the tension is to consider the accountability requirements as a baseline of student achievement. School administrators should develop a vision that goes beyond the accountability requirements. Upon creating a vision that brings student achievement above narrow requirements, the school leader should develop a professional development plan that aligns teacher development with the new vision (2004). They also recommended that leaders focus on pedagogy improvement rather than technology integration (2004). Technologies are tools that promote progressive pedagogy. Keller and Bichelmeyer believe that as leaders focus on pedagogy, increased student achievement and technology integration will happen naturally (2004). Glickman (2003) challenges leaders to be risk takers and be ready to take the responsibility for their actions. He states that, "the open education movement gave educators choice with little responsibility. The accountability movement gave educators responsibility without choice" (Glickman, 2003, p. 217). Glickman states that somewhere between the two pillars of open education and accountability lies the answer to school improvement. His message to law makers is to continue holding schools accountable, but give schools the autonomy to reach their goals creatively (Glickman, 2003).

Leadership and 21st Century Technological Tools

On October 6, 2008, the National Assessment Governing Board (NAGB) announced that a technology literacy assessment would be a part of the National Assessment of Educational

Progress (NAEP), or The Nation's Report Card (NAGB, 2008). This technological assessment test will be ready to give to students in 2012 and is the first of its kind. The Governing Board was created by Congress in 1988 to create policy for NAEP. At present there are no nationwide guidelines or requirements for education technology literacy. The goal is to define and measure students' comprehension and knowledge of technological literacy (NAGB, 2008). Darvin Winick, Chariman of the Governing Board, states that, "Technology is changing and moving very fast, so accurate evaluation of student achievement in this area is essential" (NAGB, 2008, p. 1).

School leaders will need to add another assessment test to their already full loads and that is to ensure that students are technologically literate to pass the National Technological Literacy Assessment Test for 2012. The visionary leader will have to determine what technological tools will encourage literacy and which tools to block. The *Horizon Report: 2009 K-12 Education,* identifies technological tools and trends to be adopted in the coming years to promote digital literacy. After the 100 technologies considered for the report were ranked, 12 emerged. Research continued on the 12 technologies until 6 technologies were identified for the report (Johnson, Levine, Smith, & Smythe, 2009). The *Horizon Report: 2009 K-12 Education* finds social networking to be adopted in K-12 classrooms in one year or less. Many of these social networking sites are also referred to as Web 2.0. With Web 1.0 users find information, while with Web 2.0 the Web becomes interactive; users can now contribute to the Web via wikis or blogs, podcasting, and photo sharing, among many tools. People are no longer just searching for information on the Web, but they provide it as well (Solomon & Schrum, 2007). As students participate in social networking, the perils of the Internet become apparent. Most schools and parents filter and block any Internet site that may cause a problem. However, psychologists

question whether prohibiting students by blocking Internet sites is the right choice (Tynes, 2007). Tynes' research reveals that being too protective will block youth from the "…educational, psychosocial, and emotional benefits the Internet has to offer" (p. 576). Skills such as critical thinking are often sharpened with social networking and online video games are found to enhance cognitive skills. Many students also have dialogue with people from around the world which enhances cross-cultural awareness. Although chat rooms are not as popular as they once were, students are very much attracted to YouTube.com and digital videos. YouTube's large databases of videos enhance student knowledge in many aspects. Students' psychological benefits from social networking "can provide identity exploration, provide social cognitive skills such as perspective taking, and fulfill the need for social support, intimacy, and autonomy" (Tynes, 2007, p. 579).

According to a National School Boards Association study in 2007, children and adolescents from 9 to 17 years old spent more time using social networking than watching television. Students reported using social networking for educational uses sixty percent of the time. Students reported engaging in highly creative activities with adventurous spirits, sharing online art, stories, creating and viewing others' work. The top five uses by the students engaging in social networking were using personal Websites, downloading and uploading music and videos and instant messaging. They were also blogging, sharing and creating virtual objects, collaborating with projects, and making suggestions to websites (National School Boards Association, 2007). It is important for students to be trained on the dynamics of internet safety when thinking of social networking.

Internet Safety

Leaders have the challenging task of determining what sites to open and what sites to block or filter (Tynes, 2007). It is imperative for a leader to keep a school safe for all; however, the leader must also prepare students for the 21st century. The delicate balance is a daunting task. To add to the 21st century tasks of the school leader, on January 7, 2009, New York State enacted to amend the education law, in relation to courses of study in internet safety (2009) as follows:

> This act amends Subdivisions 1 and 2 of section 814 of the education law, as added by chapter 526 of the laws of 2006, are amended to ensure that all school districts, public and private, in New York State shall provide, to pupils in grades kindergarten through twelve, instruction designed to promote the proper and safe use of the internet (A01525).

This act will ensure that all students receive an age-appropriate Internet safety curriculum. The justification for the act is the fact that Internet use is on the rise globally by children. "The Internet is becoming what the New York State Commission of Investigations (NYSI) states, as a 'modem playground' for children as for such networking sites like Myspace and Facebook" (An Act to Amend the Education Law, in Relation to Courses of Study in Internet Safety, 01/07/2009). Along with understanding internet safety, the leader must be equally knowledgeable about cyber bullying. Cyber bullying is the act of repeated negative badgering through various digital tools such as the Internet, cell phones or email. The badgering can come in the form of threats, rumors, ruining reputations or just plain harassment. All forms of bullying can be detrimental for students and leaders need to understand the implications (Morrison, 2009).

Technology Literacy Skills and Student Achievement

Research is revealing a great deal about technology integration, problem-based inquiry, engaged learning and how they increase student learning. The United States Educational Technology Directors Association (SETDA) released its sixth annual report on the Enhancing Education Through Technology (EETT) program. This program is a component of the Title II, *Part D NCLB Act.* The Metiri Group was commissioned by SETDA to analyze survey data and write a National Trends Report. A survey was emailed to 51 state technology directors in the United States. Through emails and phone calls the response rate was 100%. The collection of data closed on October 16, 2008 and the report was published in March 2009 (SETDA, 2009). From the surveys, the SETDA found five trends:

> Trend One: Integrating Technology Leads to Positive Academic Results; Trend Two: Virtual Learning Options Increase for Students and Educators; Trend Three: Enhanced Capacity Building and Professional Learning Opportunities Ready Educators for Effective Technology Integration; Trend Four: State-Coordinated Research Is on the Rise; Trend Five: States Report Increases in Students' Technology Literacy (2009, n.p.).

Among the findings of this report is an increase in literacy with third and fourth grade students increasing 16 percent and above. Math students increased more than 13 percent. In a special needs middle school the integration of a Bridge Project which incorporated math and technology integration showed increased proficiency to the highest percentage in the district's history (SEDTA, 2009).

Edutopia did a synopsis on project-based learning research**.** Students in project-based learning (PBL) programs significantly outperformed the students in the traditional school in math

skills and conceptual and applied knowledge and three times as many students passed the national exam. A five-year study found that students using technology outperformed students who did not use technology in communication skills, problem-solving and teamwork (Edutopia, 2001). Three elementary schools conducted a study of learning by doing. After two years, students went from scoring well below average to well above average on the Iowa tests. One school increased from 39th percentile to 80th percentile. "After four years in the program, student scores were "above the district average in almost every area (Edutopia, 2001, p. 3).

Cuban (2001) found contrary results in his study. Cuban (2001) writes that computers are oversold and underused in schools. He argues that there have not been significant increases in student achievement even though computers have been in schools for ten years or more. Cuban argues that although teachers are not necessarily resistant to using technology, they mostly use it to "sustain existing patterns of teaching, rather than to innovate." (p. 134). Cuban suggests that teachers must be more included in technology planning and designing for the classroom, they should be provided time to create lessons and collaborate with other teachers, and that professional development should be designed with the teacher in mind (2001).

Technological 21st Century Literacy

Technology is redefining literacy. A new definition of literacy is the ability to use technology in the 21st century in order to thrive in the workplace and in life (McPherson, Wang, Hsu, Tsuei, 2007). The New York State Education Department's Office of Educational Technology Policy and Practice (2009) developed a list of attributes that define technology literacy in education including:

> 1) demonstrate understanding of concepts underlying hardware, software, networking connectivity and in use of computers and applications, 2);

> demonstrate understanding of ethics and safety issues in using electronic media and responsible use of technology, and, 3) use technology for communication, research and collaboration and problem-solving. 4) With proficient technology skills, students should be able to locate, collect, synthesize, and evaluate information from a variety of digital sources, and to use telecommunications and other media to interact or collaborate with peers, experts, and other audiences Teaching and learning in the 21st century looks different than in the 20th century (n.p.).

Information is readily accessible within seconds on the Internet. Educators of the 21st century need to add engagement to the core courses. Multiple choice memorization tests test students' basic knowledge for the NCLB Act, but these are lower-level skills. Silva (2008) reports that, "leaders in business, government, and higher education are increasingly emphatic in saying that such tests don't do enough" (p. 1). The intellectual demands of the 21st century require assessments that measure more advanced skills, citizens must be able to solve multifaceted problems by thinking creatively and generating original ideas from multiple sources of information, and tests must measure students' capacity to do such work (Silva, 2008). Although the New York State Education Department has not developed their own state technology standards, they have adopted the International Society of Technology in Education (ISTE) national technology standards (NETS-S) (NYSED Office of Educational Technology Policy and Practice, 2008). The new ISTE standards for students (NETS-S) were announced in 2007, which were updated from the 1998 NETS-S standards. The 2007 ISTE NETS-S promote higher-order thinking skills such as innovation, collaboration, information fluency, and problem solving, among other skills, while the 1998 NETS-S promoted more basic and operational skills

development (ISTE, 2007). ISTE released its updated national technology standards and performance indicators for administrators (NETS-A) in 2009. These standards, updated from 2001, redefine the responsibilities of school and district leaders relating to the effective use of technology in education. The ISTE NETS-A reflect a global perspective in technology school leadership as well as the impact of social networking and the role of leaders who, … "excel in supporting, implementing, and sustaining systemic reform for schools" (ISTE 2009, p. 1). The ISTE NETS-A promote leadership which has vision and understands a technological culture and citizenship (ISTE, 2009). (see Appendix B for a complete list of the NETS-A standards and performance indicators)

21st Century Technological Leadership is Visionary

Are school administrators being prepared to lead schools, considering the exponential growth in impact which technology in the 21st century has made on teaching and learning? According to the 2008 report, *Leadership in the 21st Century: The New Visionary Administrator,* more than one million students from 14,000 schools in all grades in the 50 United States were surveyed; the project was called *Project Tomorrow Speak Up* (Project Tomorrow and Blackboard, Inc., 2008). To understand administrator attitudes towards technology and learning, Project Tomorrow added a leadership survey. The data revealed a digital disconnect among most school leaders; however, the data suggested that administrators who are visionary are adapting to the new culture and digital world and are ready to transform schools in the 21st century. The report examined survey responses from visionary administrators and compared it with their peers and the students' responses. The key findings of the study revealed that nearly all visionary administrators believe that 1) technology integration improves student outcomes, 2) management of technology used to be more of a business service but now has become an

instructional service where administrators should be working closely with the curriculum and instruction, and 3) that the top challenges to technology integration are funding, professional development and evaluating emerging technologies. Visionary administrators are leading the way for online learning and bringing mobile devices into the classroom, and visionary administrators are more likely to have digital equipment for creating multimedia projects, interactive whiteboards in every classroom, online communication and collaboration between teachers, parents, and students (Project Tomorrow and Blackboard, Inc., 2008). Visionary administrators are more apt to participate in virtual reality environments and play online games; 84% use multimedia to create presentations, 55% download music and listen to podcasts, 45% have personalized RSS feeds, but they have not caught up with students' use of social networking as in MySpace or Facebook. The report also indicates that visionary administrators place more value on Web 2.0 tools than their peers (Project Tomorrow, & Blackboard, 2008). The report failed to state how the visionary administrators were trained.

Leadership and Instructional Technology

Today's school administrators must possess the vision necessary to lead districts into the 21st century. "It is no longer possible for administrators to be naïve about technology and be good leaders" (Ertmer, Bai, Dong, Khalill, Park, & Wang, 2002, p. 18). "What's needed is a conceptual knowledge of how technologies can restructure education and improve instruction and achievement for our nation's students" (Creighton, 2003, p. ix). When speaking of technology integration, we are not talking about understanding wires, software, or a box; we are talking about using technology integration as a tool to foster 21st century learning and teaching (Creighton, 2003). Administrators need to be examples of technology use, prepare teachers and students, and encourage others to use it (Persaud, 2006). School administrators must have an

understanding of technology literacy in relation to student learning, professional development, technology tools for students, teachers, and administrators, Internet safety, acceptable use policies, copyright issues, data analysis and funding issues (Persaud, 2006). In a mixed methods case study Persaud (2006) found that administrators are deficient in the area of instructional technology. Persaud states that, "Based on the results of this study it is not realistic to expect that principals and superintendents on their own will become trained in technology for instruction" (Persaud, 2006, p. 1). The results of the study are a wake-up call for needed change in education. The problem identified by Persaud's study is that although school leaders are expected to play key roles in technology integration, the role is not defined nor understood. School leaders do not have the time to train themselves; therefore other professional organizations like the Board of Cooperative Education Services (BOCES) must prepare and train them for 21st century technological leadership. Originally, teachers promoted instructional technology; however, because schools' need for change and reform creates a dynamic need in the 21st century, school administrators must add the role of technology leader and many do not have the training or vision to proceed (Persaud, 2006). Krueger (2009) wrote about Chip Kimball, a Chief Technology Coordinator who became a district superintendent. Kimball understands firsthand the office of both roles and the time constraints in the superintendency and agrees that the superintendent often becomes preoccupied with other pressing matters and challenges and must make deliberate efforts to give time to technology. Kimball believes, however, that his most important task is to prepare students for the 21st century workforce, college attendance and personal success by developing a 21st century curriculum that focuses on collaboration, communication, and problem solving (Krueger, 2009).

School Leadership and Training/Skill

In order for technology integration in curriculum design to facilitate 21st century literacy skills to be effective, strong leaders with a vision to sustain and promote it will be imperative. (Ertmer et al., 2002). Most of our administrators, however, lack the knowledge and skills to foster technology integration in schools. Many administrators have a conceptual understanding of the importance of technology use in schools, but the development of technology leadership skills has not been pressed or stressed in educational leadership programs (Ertmer et al., 2002). "Graduate school programs generally are doing a poor job in preparing school principals and superintendents to be technology leaders" (Mehlinger and Powers, 2002, p. 218). Ertmer et al. performed a mixed methods study to measure change in school administrators' knowledge and skills in technology leadership by having administrators participate in a semester-long online course in technology leadership. Pre- and post-course surveys were administered. Before taking the course, none of the eight administrators who participated in the research project thought of themselves as technology leaders nor was the subject of technology part of their every-day conversations. At the end of the course, all of the administrators believed their understanding and knowledge of technology integration increased as well as their vision of what their role as technology leaders should be. The administrators also stated that they saw the need to be models of technology users in the school environment and felt they now had the skills to support their teachers. When comparing the pre- and post-course survey results, "a two-tailed paired *t* test (*df*=7) indicated a significant increase in administrators' ratings of perceived ideas about technology integration" (Ertmer et al., 2002, p.15). The administrators reported that the online training for technology integration filled an important gap for school administrators. The report

confirmed the need for technology leadership training to increase school leaders' vision of its importance (Ertmer et al., 2002).

Educational Leadership Programs in Higher Education

Geer (2002) reports that there is a void of technology training for administrators and therefore it becomes difficult for them to develop a vision for the importance of digital literacy and makes it difficult for them to make wise decisions. How can leaders lead schools in technology integration and 21st century literacy skills if they are not taught (Geer, 2002)? Administrators raise questions about the effectiveness of pre-service leadership preparation. University educational leadership programs show a disconnect of the real-world authentic complexities happening in the K-12 environment (Davis, Darling-Hammond, LaPointe, & Meyerson, 2005). "The demands of the job have changed so that traditional methods of preparing administrators are no longer adequate to meet the leadership challenges posed by public schools" (Davis, Darling-Hammond, LaPointe, & Meyerson, 2005, p. 3). Although graduates of educational leadership college programs become certified to be school administrators, they are not equipped to shift their roles from managers to instructional leaders, because programs are deficient in 21st century training (Davis, Darling-Hammond, LaPointe, & Meyerson, 2005).

The Schools of Education Research Project (SERP) at Teachers College, Columbia University, conducted a study of pre-service school administrators' programs in the United States in 2005 (Levine, 2005). Dr. Arthur Levine, former President of Teachers College, conducted this unprecedented four year study of 1,206 education schools. Deans and Chairs of higher educational leadership programs, along with faculty, alumni of schools of education and school principals were the constituents surveyed for the report. The study questioned the quality

of educational administration programs to prepare school leaders to lead schools in this ever changing world and questioned how well these educational institutions were preparing leaders for today's jobs. Levine's report confirmed that in this exponentially changing world leaders should no longer be just managers, but need to lead schools and school systems in redesign. "In an outcome-based and accountability driven era, administrators have to lead their schools in the rethinking of goals, priorities, finances, staffing, curriculum, pedagogies, learning resources, assessment methods, technology, and use of time and space" (Levine, 2005, p.12). According to Levine, school district administrators are no longer just supervisors but are now being called upon to redesign their school systems. The report concludes that the "field of educational administration is deeply troubled" (Levine, 2005, p. 61). Levine found that schools of education are failing to prepare school leaders for their jobs. He recommends that university educational leadership programs begin to prepare students for the schools of today rather than those of yesterday. Among other courses recommended for a redesigned program that Levine recommends is a course in educational technology (Levine, 2005). The three top responses of administration alumni to the question regarding what the most important resources education schools need to do a better job are faculty with more experience as practitioners (56%), more relevant curriculum (40%), and upgraded technology (36%) (Levine, 2005, p. 36). Levine also recommends that educational leadership programs should collaborate with schools and state agencies to design courses that support the needs. The study came under scrutiny reporting that the research did not take into consideration the aggressive changes that are currently underway to improve educational leadership programs (Young, Crow, Orr, Ogawa, & Creighton, 2005). The challenge also reported that much collaboration is already taking place between associations and universities, naming the Interstate School Leaders Licensure Consortium (ISLLC), whose

standards for administrators are integrated into the National Council for Accreditation of Teacher Education (NCATE) and the Educational Leadership Constituent Council (ELCC) standards. These standards are being used to reform educational leadership programs across the country (Young et al., 2005). The report did agree with Levine's study by promoting the concept that quality leadership is vital (Levine, 2005).

Higher Education Technology Barriers

It is important to examine barriers to offering Educational Technology Leadership courses in higher education. With relation to integrating technology in higher education in courses, Ross (2006) writes:

> For over four decades technology, particularly instructional technology (IT), has been widely cited as a panacea for higher education's shortcomings and a way in which to enhance teaching and learning in a more cost-effective, efficient manner. In reality, the delivery on the promise of IT in higher education overall has been described as unsuccessful, disappointing, and less dramatic than what most had envisioned (p. 1).

Ross (2006) writes about a time-lag between the onset of a vision and the actual implementation in higher education programs consisting of five to ten years. In a study by Groves and Zemel (2000), the authors questioned the barriers to technology use at the College of Human Ecology at the University of Tennessee. A survey of 65 questions was used to determine what factors influenced the use of technology as well as the barriers to such use. The survey was given to the faculty and faculty teaching assistants. Sixty one percent of the faculty responded. The results revealed that the faculty barriers were the need for more hardware, training, and specific media. Most of the faculty were comfortable using word processing, but were less likely

to use newer technologies without the above mentioned barriers being met (Groves & Zemel, 2000).

Technological Capacity of Educational Leadership Programs

Hargrove (2000) looked at predictor variables that facilitated education technology integration as well as barriers to technology integration. The predictor variables studied were, "technical support, release time, tenure and promotion opportunities, and personal variables of faculty, such as computer self-efficacy, attitudes towards computers and perceived institutional support" (Hargrove, 2000, p. v). The report revealed that there was no significant relationship between self-efficacy about computers and technology integration. Hargrove found that the faculty was significantly positive in the belief that technology integration increases the quality of instruction. The report showed the motivators that encouraged integrating technology were a working computer, release time for development, and academic support. The barriers to technology integration were release time and the lack of professional development.

Ahadiat (2005) studied factors that influence or hinder technology use in higher education. Ahadiat found no differences between males and females toward instructional technology. Males and females both believe the factors that influence instructional technology use are having available equipment, increased student learning, improvements in teaching delivery and compatibility. They also see a lack of technological support and time, software and course irrelevance as barriers to instructional technology use (Ahadiat, 2005). Ahadiat found that the faculty's most significant barrier (56.1 percent) to using technology was lack of time. The next two factors showing significance were the need for relevant software and support. Ahadiat also reported that the older faculty was less interested in using technology than the younger faculty (2005).

According to Zhou and Xu, (2007b) technology has the ability to improve teaching in higher education; however, they find numerous barriers for higher education faculty to adopt educational technology. Zhou and Xu differentiate the use of technology as effective when it engages the student and promotes higher-order thinking skills, compared to simply providing students with information, or access to course work via technology. In their study, Zhou and Xu (2006) found that using technology for basic use was more common than using technology effectively in promoting higher-order pedagogy. The study revealed that a faculty member's internal motivation plays the greatest role in using technology effectively to promote higher-order pedagogy than workshops or training. Therefore, the authors recommended that university faculty be given the vision of the importance of education technology in learning. They should be given examples and evidence that support educational technology effectiveness. The authors also support a mentor program that will help promote effective and extensive technology use. It will be the responsibility of the university to identify faculty members who are examples of effective technology use in teaching to determine who the mentors will be (Zhou and Xu 2006).

One example of an educational leadership program that offers technology literacy courses is The Citadel, a military college in South Carolina. In their article, *Making Sense of Technology in Educational Leadership Programs,* Woelfel, Murray and Hambright (2004), state that cooperation among all the stakeholders is an important first step in defining standards for educational technology leadership programs. The Citadel is committed to utilizing technology standards by aligning its educational leadership program curricula to them. Aspiring superintendents and principals seeking advanced leadership degrees and certification must focus on technology literacy. In their course EDU529, *Micro-computers and School Management*, the students develop a technology plan, learn data management, and core technology knowledge.

Students are required to use Power Point to "electronically present plans that include statistical (pie chart/bar graph representation of student achievement data) and managerial (organization chart) skills relative to improving student performance" (Woelfel et al., 2004, p. 31). These aspiring school administrators are taught data management systems, have field experiences at a high school and elementary school and view distance learning activities, video production studios, and graphic arts centers. Other courses offered like School Law, and School Finance are utilizing technology as well. For instance, School Law courses involve research on using databases, and School Finance courses teach digital financial software. Electronic communication is also a part of the principal and superintendent internship to reflect and communicate with other interns as part of their internship experience. The Citadel supports their commitment to technology integration by providing professors and students the software and hardware needed, as well as help centers that are staffed day and night to provide technological assistance. Audio visual equipment and other multimedia peripherals are available for check out to professors and students. The three strategies that The Citadel recommends for other colleges and universities to bring clarity to technology integration in educational leadership programs are: 1) identify standards, 2) align curricula, and 3) support technology (Woelfel, et al., 2004, p.33).

Geer (2002) recommends courses for higher educational leadership that contain managerial, instructional, and leadership skills in technology as well as authentic learning, which is a real-world approach. Greer also recommends that computer, software, and internet access be available.

New York State Education Department and Educational Leadership

The New York State Education Department (NYSED) and the Board of Regents have been awarded a $3 million dollar grant from the Wallace Foundation to carry out goals to improve school leadership in New York State in a two-year period (Duncan-Poitier, 2009). An exemplary model of professional development for school leaders was created. NYSED believes that it is very important at this time in history to give school leaders the professional development they need to support teaching and learning, and school leaders need to be leaders of the future to prepare students for the new global economy. Their intent is to support teaching and learning with research-based strategies for teaching; introducing new technologies for student learning; using data driven-decision making; and strengthening collaborations with colleges, universities and the business community (Duncan-Poitier, 2009). Forums held for teachers in urban districts revealed that teachers feel school leadership has a direct effect on student achievement. The Board of Regents is committed to improving school leadership in order to enhance student achievement. This new work of New York State is called a Cohesive Leadership System and its primary goal is to "provide school leaders with the knowledge skills, abilities, dispositions and support in their role as instructional leaders to better serve all students" (Duncan-Poitier, 2009, p. 3). This new school leader model will start in the Rochester City School District, and a second leadership academy will begin in the Mid-Hudson Valley JMT, which covers Sullivan County BOCES, Dutchess BOCES, Orange-Ulster BOCES, and Ulster BOCES. Another goal to assist in the improvement of school leadership is to look at higher education educational leadership programs to ensure that school leadership pre-service preparation programs become "outcome-based, theory-driven, internally coherent and integrated, focused on teaching and learning, and grounded with an intensive clinical experience" (Duncan-

Poitier, 2009, p. 5). The standards used as the foundation of this program and for leadership evaluation will be from the Interstate Leaders Licensure Consortium (ISLLC) standards. NYSED also requested The New York State Council of School Superintendents (NYSCOSS) to create A Future Superintendents Academy to prepare new superintendents for the job. Participants will get to work with experts in the field (Duncan-Poitier, 2009).

In February, 2010, The New York State Board of Regents approved a new version of the New York State Technology Plan (Steiner, 2010). The vision statement in the new plan recognizes that technology is a clear venue for teaching and learning and encourages students, teachers, and leaders to have an understanding of technology standards, technology integration into the curriculum, and what students should know to be successful in the 21st century (Steiner, 2010).

CHAPTER III

Methodology

The intent of this quantitative study was to explore the extent to which future administrators in higher education are being taught 21st century technological skills in school leadership. The instrument used was a validated survey that was administered via a hard copy at the Collegiate Association for Developing Educational Administrators (CADEA) conference on January 28, 2010 in Albany, New York. CADEA is comprised of educational administrative faculty from New York State. A web-based version of the same survey was emailed to other faculty members of educational leadership programs in New York State through Survey Monkey. The following four questions were addressed in the study:

1. Is there a relationship between the perceived value of the role of technology in education and the degree to which faculty integrate technology into their curriculum?
2. Is there a relationship between faculty's 21st century technology skills (skills in four groups - basic technology tools, Web-based technology tools, student-centered teaching strategies, and leadership technology tools) and the degree to which they integrate technology into their curriculum?
3. Is there a relationship between the campus program's capacity to enhance technology implementation and faculty's integration of technology into their curriculum?
4. Is there any relationship between faculty demographics and their practice in integrating technology in their course(s)?

Participants

Participants for this study consisted of 201 faculty members (part-time and full-time faculty, as well as deans, chairs, or directors) of Educational Administration programs from 42

New York State colleges and universities. The colleges and universities surveyed covered vast geographical areas of New York State from as far south as New York University in New York City to the State University of New York at Buffalo. Survey participant responses were anonymous. The names of colleges or universities were not asked. The survey was distributed in two ways. One was at the CADEA Conference in Albany, New York on January 28, 2010, and the other was via email through Survey Monkey. The President of CADEA provided email addresses of faculty participants.

Sample Size

The population of the study was 201 faculty members from 42 public and private colleges and universities. The respondents consisted of 91 participants. Table 1 shows the breakdown of responses and the percentage of return.

Table 1

Sample Size

Population/Sample Size	Opted Out	New Total Population	Sample Size	Percentage of Return
201	17	184	91	49.5%

The table below shows a comparison between the original population and the response in relation to gender and public or private status of their employer (see Table 2). The sample data show an excellent representation of the population.

Table 2

Population/Response Comparison

	Participants	Male	Female	Public	Private
Population/Sample	201	62%	38%	40%	60%
Response	91	58%	42%	39.6%	60.4%

Instrument

The instrument used was a validated digital-age survey to determine faculty attitudes, skills/knowledge, and the capacities which are important to enhance technology integration for pre-service educational leaders, along with demographics. The instrument was developed in SurveyMonkey.com. The survey consisted of 16 questions with six questions having multiple components equaling 73 responses. The survey used multiple choice, ranking, and open ended questions to assess faculty demographics as well as their perceptions of technology in education, skill with using and teaching technology, and the capacities which are important in using technology. The questions in the survey came from two validated survey sources. The survey authors were asked permission to use their survey questions (see Appendix B). Questions 13 and 15 were added to the survey as an extension of the skills section to incorporate 21st century Web-based technology tools and leadership technology topics.

Design

This quantitative study utilized a survey of higher education faculty in educational leadership programs. A hard copy of the survey was given to participants who volunteered to take it at a CADEA Conference in Albany, New York. All participants who did not fill out the

survey at the conference, or who did not attend, were sent the survey via email using Survey Monkey.

Data Collection

The President of CADEA provided an email list of addresses for faculty participants in 42 New York State colleges and universities consist of part-time adjunct faculty members, full-time faculty members, and deans, chairs or directors.

Survey participant responses were anonymous; colleges and university affiliation was not asked. The survey was distributed in two ways. One was at the CADEA Conference in Albany, New York on January 28, 2010, and the other was via email through Survey Monkey. The procedure for distribution of the survey at the CADEA Conference was as follows:

Hard copies of the survey were available to participants at each table. An announcement was made explaining the purpose of the study and that participation was voluntary and anonymous. It was also announced that for each survey returned, $5 would be donated to a Haiti Relief Fund. Those who volunteered to participate were asked to drop the completed survey in a locked box in the rear of the room. They were also asked to cross their email address off a list that was provided to them, so they would not get another survey via email in Survey Monkey. Survey participants were asked not to collaborate with colleagues when filling out the survey. After the conference, the locked box was open and the surveys were counted with two people present. In total, 44 surveys were collected.

Email addresses of the conference participants were removed from the Survey Monkey email list and the survey was sent via email from Survey Monkey to the remainder of participants on the original list. It was determined that some of the email participants from the original list had retired, left, or their email addresses were not accurate. Through telephone calls

and Internet inquiries, correct email addresses and new faculty members were identified. The final number of surveys distributed was 201.

Validity

The questions in the survey came from two validated survey sources: Ahadiat, N. (2005) *Factors That May Influence Or Hinder Use Of Instructional Technology Among Accounting Faculty* and Zhou, G., & Xu, J. (2007) *Adoption Of Educational Technology: How Does Gender Matter?* A Cronbach Alpha test was run for all sections of the survey to determine reliability and internal consistency. All sections were found to be reliable and consistent.

Variables

There were four independent variables. These were: 1) perceived value or attitude towards technology in education, 2) technological skills in four groups - basic technology tools, Web-based technology tools, student-centered teaching strategies, and leadership technology tools, 3) college or university capacities including time to develop computer-based instruction, reward, technology availability, instructional support, technical support, campus policies, limit research literature, among others., and 4) demographics such as title, age, gender, public or private school, prior work in K-12 environment, undergraduate major, doctorate, teach an educational technology course for future administrators. The dependent variable was: integrating technology in the curriculum.

Data Analysis

The survey results from Survey Monkey were downloaded into an MS Excel file and imported into SPSS 17, for data analyses. Appropriate quantitative analyses were run for each question. Descriptive and correlation analyses were run for questions one through three. The last section of the survey addressed demographics and a chi-square test was run to determine if

there were any correlations between the demographic questions and integrating technology in the curriculum. ANOVA tests were run throughout for various analyses.

CHAPTER IV

Data Analysis

The purpose of this study was to explore the extent to which future administrators are studying 21st century technological skills and literacy in higher education school leadership programs. The survey looked at the relationship between faculty attitudes, skills, college capacity, and demographics with integrating technology in their curriculum.

This chapter reports the findings of the study which was based upon the following four research questions:

1. Is there a relationship between the perceived value of the role of technology in education and the degree to which faculty integrate technology into their curriculum?
2. Is there a relationship between faculty's 21st century technology skills (Skills in four groups - basic technology tools, Web-based technology tools, student-centered teaching strategies, and leadership technology tools) and the degree to which faculty integrate technology into their curriculum?
3. Is there a relationship between the campus program's capacity to enhance technology implementation and faculty's integration of technology into their curriculum?
4. Is there any relationship between faculty demographics and their practice in integrating technology in their course(s)?

Participants for this study consisted of 201 faculty members (part-time and full-time faculty, as well as deans, chairs, or directors) from 42 New York State colleges and universities with Educational Administration programs. The colleges and universities surveyed covered vast geographical areas of New York State from as far south as New York University in New York City to the State University of New York at Buffalo. Table 3 shows the sample size of the 91

participants consisted of 58.2% male, 42.8% female, 76.9% were age 56 and above, 68.1% were full-time faculty, and 60.4% were from a private college or university.

Table 3

Respondents Demographical Data

Demographics		*N*	Percent
Gender	Male	53	58.2
	Female	38	41.8
Age	20-30	0	0
	31-35	1	1.1
	36-40	3	3.3
	41-45	2	2.2
	46-50	6	6.6
	51-55	8	8.8
	56-60	24	26.4
	60+	46	50.5
Faculty Position	Part Time	22	24.2
	Full Time	62	68.1
	Director/Dean	15	16.5
College/University	Public	36	39.6
	Private	55	60.4
Doctoral Status	None	7	7.7
	Working on it	4	4.4
	Ed.D	40	44
	Ph.D	40	44
Degree in Education Leadership/Administration	Yes	77	84.6
	No	14	15.
Teach an Ed. Tech Course	Yes	9	9.9
	No	82	90.1
Teach 21st Century Pedagogy	No	11	12.1
	A Little	12	13.2
	Substantial	46	50.5
	Extensive	19	20.9

The survey results were organized around the four primary research questions.

Question 1. Is there a relationship between the perceived value of the role of technology in education and the degree to which faculty integrate technology into their curriculum?

Participants were asked to rate their perceived value of technology in education by rating 12 sub-components with a five-point scale, where 1=strongly disagree, 2=disagree, 3=undecided, 4=agree, and 5=strongly agree.

To answer this question both descriptive and inferential statistics were employed. Two different analyses were run in SPSS; a mean and standard deviation analysis, and a Pearson correlation was computed to determine the relationship between faculty's perceived value of technology in education and its association with integrating technology into the curriculum.

Table 4
Mean and Standard Deviation Statistics of Perceived Value of Technology in Education as Reported by Faculty

Perceived Value Sub-components	N	Mean	SD
Computers have the potential to enhance teaching and learning	91	4.55	.637
Future PK-12 administrators need to be technology leaders	91	4.23	.790
Computers enable me to make a subject more interesting	91	4.20	.792
Computers enable students to collaborate in learning	91	4.16	.764
Computers provide an environment appealing to different learning styles	91	4.13	.763
Using technology increases student interest	91	4.11	.836
I am comfortable using computers in teaching	89	4.07	.902
Students expect instructors to use computers in teaching	90	4.03	.965
I enjoy figuring out how to use computers in teaching	91	4.02	.856
Technology integration offers clear advantages over traditional learning	91	3.98	.943
Students can learn the material more easily or thoroughly using technology	91	3.79	.850
Faculty are better able to present more complex material to students when using technology	91	3.74	.929

Note. 1=strongly disagree", "2=disagree", "3=undecided", "4=agree", and "5=strongly agree.

Table 4 above shows most of the 91 faculty participants valued technology in education with mean scores ranging from 4.02 to 4.55 representing they agreed or strongly agreed for 9 of the 12 sub-components. The highest correlation was for the sub-component, "Computers have the potential to enhance teaching and learning" with a mean of 4.55, and the second highest

rating was a mean of 4.23 for the sub-component "Future PK-12 administrators need to be technology leaders." The next seven sub-components range from 4.20 to 4.02. "Computers enable me to make a subject more interesting," "Computers enable students to collaborate in learning," "Computers provide an environment appealing to different learning styles," "Using technology increases student interest," "I am comfortable using computers in teaching," "Students expect instructors to use computers in teaching," and "I enjoy figuring out how to use computers in teaching." Three sub-components show participants scored a mean of 3.74 to 3.98 showing they were undecided (3.0) or agreed (4.0) with "Technology integration offers clear advantages over traditional learning," "Students can learn the material more easily or thoroughly using technology," "Faculty are better able to present more complex material to students when using technology."

Table 5 below shows, positive, moderate correlation (p = 0.01) for the sub-components "I am comfortable using computers" (*r*=.435**), "Computers enable me to make a subject more interesting" (*r* = .430**), "Students expect instructors to use computers in teaching" (*r* = .412**), and "Computers provide an environment appealing to different learning styles" (*r* = .412**), "Students can learn the material more easily or thoroughly using technology" (*r* = .383**), Computers enable students to collaborate in learning" (*r* = .371), "Future PK-12 administrators need to be technology leaders" (*r* = .328), "Faculty are better able to present more complex material to students when using technology" (*r* = .325**), and "Technology integration offers clear advantages over traditional learning" (*r* = .300**). A slightly moderate positive correlation is significant for "Using technology increases student interest" (*r* = .283**). Two sub-components show a slightly moderate but positive significant correlation (p = 0.05), "I enjoy figuring out how to use computers in teaching" (*r* = .266*) and "Computers have the potential to

enhance teaching and learning" (r = .225*).

Table 5

Pearson Correlation between Integrating Technology Into the Curriculum and the Sub-Components of the Perceived Value of Technology in Education

Perceived Value Sub-components	N	Pearson Correlation r=	Sig. (2-tailed)
I am comfortable using computers in teaching	87	.435**	.000
Computers enable me to make a subject more interesting	88	.430**	.000
Students expect instructors to use computers in teaching	87	.412**	.000
Computers provide an environment appealing to different learning styles	88	.412**	.000
Students can learn the material more easily or thoroughly using technology	88	.383**	.000
Computers enable students to collaborate in learning	88	.371**	.000
Future PK-12 administrators need to be technology leaders	88	.328**	.001
Faculty are better able to present more complex material to students when using technology	88	.325**	.002
Technology integration offers clear advantages over traditional learning	88	.300**	.005
Using technology increases student interest	88	.283**	.008
I enjoy figuring out how to use computers in teaching	88	.266*	.012
Computers have the potential to enhance teaching and learning	88	.225*	.035

Note. **.Correlations are significant at the 0.01 level (2-tailed).
*.Correlations are significant at the 0.05 level (2-tailed).
1=strongly disagree, 2=disagree, 3=undecided, 4=agree, 5=strongly agree.

Note. Dependent Variable = Integrating Technology into the Curriculum.

Question 2. Is there a relationship between faculty's 21st century technology skills and the degree to which they integrate technology into their curriculum?

Participants were asked to rate their use of technology skills. The skill variable in this section is composed of four groups, "Basic Technology Skills" comprising of 5 sub-components, "Web-Based Technology Skills" comprised of 12 sub-components, "Student-Centered Teaching

Strategies" comprised of 11 sub-components, and "Leadership Skills" comprised of 9 sub-components, totaling 37 sub-components. Participants were asked to rate each of the 37 sub-components provided with a five-point scale, where 1=never, 2=a little 3=fair amount, 4=substantial, and 5=extensively.

To answer this question descriptive and inferential statistics were employed. Two different tests were computed in SPSS; a mean and standard deviation analysis and a Pearson correlation was computed to determine the relationship between faculties' ratings of their technology skills use and the degree to which they integrate technology into the curriculum.

Basic Technology Skills. The basic skills section is comprised of six sub-components, "word processing," Internet searching," "presentation tools," "spreadsheet software," "database software," and "drawing tools." Basic technology skills such as word processing, Internet searching, and presentation tools represent the more basic of the skills needed for the 21st century. Spreadsheet, database, and drawing tools software are the more advanced of the basic technology skills but are still considered basic.

Table 6

Mean and Standard Deviation Statistics of Basic Skill Use as Reported by Faculty

Basic Skills	N	Mean	SD
Word Processing	87	4.72	.641
Internet Searching	87	4.54	.696
Presentation Tools (e.g. MS Power Point)	86	3.77	1.145
Spreadsheet Software (e.g. MS Excel)	87	2.83	1.259
Database Software (e.g. MS Access)	86	2.19	1.122
Drawing Tools (e.g. Adobe Photoshop)	87	2.03	1.115

Note. 1=never", "2=a little", "3=fair amount", "4=substantial", and "5=extensively

Table 6 above shows a higher use of skills by faculty for "Word Processing" with a mean

score of 4.72 and for "Internet Searching" with a mean score 4.54 which shows substantial to extensive use. "Presentation Tools" shows a mean score of 3.77 which shows a fair amount of use, and "Spreadsheet Software", "Database Software", and "Drawing Tools", show lower usage with mean scores ranging from 2.03 – 2.83, which shows little use.

Table 7

Pearson Correlation between Integrating Technology Into the Curriculum and the Sub-Components of Basic Skills

Basic Skills	N	Pearson Correlation *r*=	Sig. (2-tailed)
Spreadsheet Software (e.g. MS Excel)	87	.441**	.000
Drawing Tools (e.g. Adobe Photoshop)	87	.428**	.000
Presentation Tools (e.g. MS Power Point)	86	.380**	.000
Internet Searching	87	.362**	.001
Database Software (e.g. MS Access)	86	.329**	.002
Word Processing	87	.235*	.028

Note. **.Correlations are significant at the 0.01 level (2-tailed).
*.Correlations are significant at the 0.05 level (2-tailed).
Note. 1=never", "2=a little", "3=fair amount", "4=substantial", and "5=extensively

Table 7 above shows a positive, significant correlation for all of the six sub-components of "Basic Skills". Accordingly, the data revealed a significant moderate correlation (p = 0.01) with "Spreadsheet Software", (*r* = .441**), "Drawing Tools" (*r* =.448**), "Presentation Tools" (*r* = .380), "Internet Searching (r = .362), "Database Software" (*r* = .329**). and "Word Processing" (*r* = .235*) shows a slightly moderate, but positive correlation (p = 0.05).

Web-Based Skills. The "Web-based skills" section, which represents more of the 21st century uses of technology skills, has 12 sub-components. "Course Management Systems," "Web 2.0 Tools," "Video Editing," "Gaming," and "Social Networking" are some of the web-

based skills the faculty was asked to rate. Web-based skills represent more of the interactive uses of the Web which promote more of applied skills and progressive pedagogy.

Table 8

Mean and Standard Deviation Statistics of Web-Based Skills Use as Reported by Faculty

Web-based Skills	N	Mean	SD
Course Management Systems (e.g. Blackboard, Moodle)	89	3.46	1.470
Internet Searching via the Deep Web	86	2.90	1.479
ePortfolio Development	87	2.39	1.489
Student Information Systems (e.g. School Tools)	88	2.37	1.316
Web 2.0 Tools	87	1.87	1.189
Social Networking	87	1.86	1.143
Wikis	87	1.71	1.140
Podcasting Software	87	1.70	1.024
Blog Creation	87	1.68	1.094
Video Editing	87	1.64	1.000
Gaming	87	1.21	0.573
Multi-User Virtual Reality (MUVE's)	86	1.21	.671

Note. 1=never", "2=a little", "3=fair amount", "4=substantial", and "5=extensively

Table 8 above shows that the sub-component "Course Management Systems," has a mean of 3.46; which is the highest mean score under the "Web-based skills" section. This demonstrates low use of Web-based skills by faculty members. The mean scores for the other 11 sub-components ranged from 1.21 to 2.90.

Table 9 below shows positive correlations (p = 0.01) for 11 of the 12 sub-components. Three sub-components show strong, positive correlations: "Course Management Systems" (*r* = .642**), "Web 2.0 Tools" (*r* =.596**), and "Student Information Systems" (r = .546**). There is a moderate, positive, but significant correlation for the sub-components, "Blog Creation" (*r* =

.447**), “Wikis” (*r* = .429**), Video Editing” (*r* = .418**), “Internet Searching via the Deep Web” (*r* = .414**), “ePortfolio Development” (*r* = .374**), “Social Networking” (.351**), and Podcasting Software” (*r* = .340**). A slightly moderate, positive significant correlation (p = 0.05) was revealed for “Gaming” (*r* = .265*), and the sub-component “MUVE’s” did not show a significant correlation.

Table 9

Pearson Correlation between Integrating Technology Into the Curriculum and the Sub-Components of Web-Based Skills

Web-based Skills	N	Pearson Correlation *r*=	Sig. (2-tailed)
Course Management Systems (e.g. Blackboard, Moodle)	88	.642**	.000
Web 2.0 Tools	86	.596**	.000
Student Information Systems (e.g. School Tools)	87	.546**	.000
Blog Creation	86	.447**	.000
Wikis	86	.429**	.000
Video Editing	86	.418**	.000
Internet Searching via the Deep Web	85	.414**	.000
ePortfolio Development	86	.374**	.000
Social Networking	86	.351**	.001
Podcasting Software	86	.340**	.001
Gaming	86	.265*	.014
Multi-User Virtual Reality (MUVE’s)	85	.194	.075

Note. **.Correlations are significant at the 0.01 level (2-tailed).
*.Correlations are significant at the 0.05 level (2-tailed).
Note. 1=never”, “2=a little”, “3=fair amount”, “4=substantial”, and “5=extensively.

Student-Centered Teaching Strategies. The “Student-Centered Teaching Strategies” section is comprised of 21st century teaching strategies that facilitate student-centered learning.

The students are active participants of their own learning and the teacher plays more of a facilitator role.

To answer this question descriptive and inferential statistics were employed. Three different tests were run in SPSS; a mean and standard deviation analysis and a Pearson correlation were computed to determine the relationship between faculty's ratings of their student-centered teaching strategies and the degree to which they integrate technology into the curriculum.

Table 10

Mean and Standard Deviation Statistics for Student-Centered Teaching Strategies as Reported by Faculty

Student-Centered Teaching Strategies	N	Mean	SD
Encourage students to share ideas with classmates	88	4.65	0.695
Facilitate intellectual development	87	4.59	0.691
Develop student's critical thinking skills	87	4.54	0.643
Engage students in small group discussion	88	4.47	0.857
Relate subject matter to social issues	88	4.39	0.836
Use real-world activities in the curriculum	88	4.31	0.793
Engage students in small group work	88	4.19	0.969
Use hands-on activities	88	4.17	1.008
Integrating problem-based learning in curriculum	88	3.95	0.993
Question student ideas before introducing new concepts	87	3.78	1.094

Note. 1=never", "2=a little", "3=fair amount", "4=substantial", and "5=extensively

Table 10 above shows the overall mean for Student-Centered Teaching Strategies was high, with nine out of 10 sub-components ranging from $M = 4.17$ to 4.65 demonstrating substantial and extensive use.

Table 11

Pearson Correlation between Integrating Technology Into the Curriculum and the Sub-Components of the Student-Centered Teaching Strategies

Student-Centered Teaching Strategies	N	Pearson Correlation *r*=	Sig. (2-tailed)
Integrating problem-based learning in curriculum	88	.398**	.000
Engage students in small group discussion	88	.189	.078
Use hands-on activities	88	.181	.092
Use real-world activities in the curriculum	88	.171	.111
Develop student's critical thinking skills	87	.135	.212
Relate subject matter to social issues	88	.118	.274
Encourage students to share ideas with classmates	88	.115	.287
Engage students in small group work	88	.077	.477
Question student ideas before introducing new concepts	87	.041	.708
Facilitate intellectual development	87	.001	.993

Note. **.Correlations are significant at the 0.01 level (2-tailed).
*.Correlations are significant at the 0.05 level (2-tailed).
Note. 1=never", "2=a little", "3=fair amount", "4=substantial", and "5=extensively.

Table 11 above shows that the "Student-Centered Teaching Strategies" showed a moderate, positive significant correlation (p = 0.01) for the sub-component "Integrating problem-based learning into the curriculum" (*r* =.398**). This section shows high mean scores for the sub-components; however, shows little to no correlation with integrating technology into the curriculum.

Leadership Technology Skills. The "Leadership Technology Skills" section represents various skills required for leading a 21st century school. Understanding "Digital Copyright & Plagiarism Laws," "Internet Safety", Data Analysis Software," among others above. are vital for the 21st century school leader.

To answer this question descriptive and inferential statistics were employed. Two different tests were run in SPSS, a mean and standard deviation analysis and a Pearson correlation were computed to determine the relationship between faculty's ratings of their technology skills and the degree to which they integrate technology into the curriculum.

Table 12

Mean and Standard Deviation Statistics for Leadership Technology Skills as Reported by Faculty

Leadership Technology Skills	N	Mean	SD
Digital Copyright & Plagiarism Laws	89	2.48	1.262
Internet Safety	90	2.34	1.317
Data Analysis Software	90	2.31	1.138
Prepare an Acceptable Use Policy	89	2.22	1.259
Design a Technology Plan	90	2.18	1.223
Cyberbullying	89	2.16	1.331
Creative Budgeting for Technology Infrastructure and Tools	89	2.15	1.192
Internet Filtering and Blocks	90	1.89	0.999
School Finance Software	90	1.84	1.016

Note. 1=never", "2=a little", "3=fair amount", "4=substantial", and "5=extensively

The descriptive data in Table 12 above shows low usage of these skills with mean scores ranging from 1.84 to 2.48 out of 5. "Digital Copyright & Plagiarism Laws," "Internet Safety," "Data Analysis Software," "Prepare and Acceptable Use Policy," "Design a Technology Plan," "Cyberbullying," and "Creative Budgeting for Technology Infrastructure and Tools" scored from 2.15 to 2.48 which represents little use. "Internet Filtering and Blocks" and "School Finance Software" scored 1.84 to 1.89 which represents none to little use.

Table 13

Pearson Correlation between Integrating Technology Into the Curriculum and the Sub-Components of Leadership Technology Skills

Leadership Technology Skills	N	Pearson Correlation *r*=	Sig. (2-tailed)
Digital Copyright & Plagiarism Laws	86	.481**	.000
Data Analysis Software	87	.411**	.000
Design a Technology Plan	87	.387**	.000
Internet Safety	87	.387**	.000
Prepare an Acceptable Use Policy	86	.362**	.001
Creative Budgeting for Technology Infrastruct. and Tools	87	.321**	.002
Internet Filtering and Blocks	87	.321**	.002
Cyberbullying	86	.283**	.008
School Finance Software	87	.223*	.038

Note. **.Correlations are significant at the 0.01 level (2-tailed).
*.Correlations are significant at the 0.05 level (2-tailed).
Note. 1=never", "2=a little", "3=fair amount", "4=substantial", and "5=extensively.

Table 13 above shows a positive, moderate, significant correlation for all of the nine sub-components in the "Leadership Technology Skill" section. The correlation (p= 0.01) revealed a moderate, positive significant correlation for the sub-components: "Digital Copyright & Plagiarism Laws" at (*r* = .481**) and "Data Analysis Software" at (*r* = .411**), "Design a Technology Plan (*r* = .387**), "Internet Safety" (*r* = .387**), "Prepare an Acceptable Use Policy" (*r* =.362**), "Creative Budgeting for Technology Infrastructure and Tools" (*r* = .321**), "Internet Filtering and Blocks" (*r* = .321**), and a slightly moderate positive significance for "Cyberbullying" (*r* = .283*). A slightly moderate, positive significance correlation shows (p = 0.05) for "School Finance Software" (*r* = .223*).

Question 3. Is there a relationship between the campus program's capacity to enhance technology implementation and faculty's integration of technology into their curriculum?

Participants were asked to rate the capacities at their college or university to enhance their ability to integrate technology into the curriculum. This section had 13 sub-component statements with a five-point scale, 1=not important, 2=little important, 3=somewhat important, 4=important, and 5=very important. Capacity was operationally defined as: time to develop computer-based instruction, reward, technology availability, instructional support, technical support, administrative support, campus policies, and research literature.

To answer this question both descriptive and inferential statistics were employed. Two different analyses were run in SPSS, a mean and standard deviation analyses, and a Pearson correlation were computed to determine the relationship between the importance of campus capacity with integrating technology into the curriculum.

Table 14 below shows the important campus capacities for integrating technology into the curriculum. Based on the faculty's reported scores, five sub-components scored in the important to very important range. "Technical support available" with a mean of 4.56, "Convenient access to computers" with a mean of 4.46, "Software and needed equipment for teaching tasks" with a mean of 4.26, "Instructional technology training made available to you" with a mean of 4.20, and "Instructional support available" with a mean of 4.14. The lowest two sub-components "Research literature convincing the use of computers" with a mean of 3.22 and "Reward from administration for using computers in teaching" with a mean of 2.91 scored in the little important to somewhat important range.

Table 14

Mean and Standard Deviation for Integrating Technology Into the Curriculum and the Importance of Campus Capacity for Technology Integration as Reported by Faculty

Capacity	N	Mean	SD
Technical support available	90	4.56	.809
Convenient access to computers, software and needed equipment for teaching tasks	89	4.46	.799
Stable hardware or software	90	4.26	1.034
Instructional technology training made available to you	89	4.20	.979
Technology training opportunities for university teachers	90	4.18	1.023
Instructional support available	90	4.14	1.012
Available computer tools fit the course I teach	89	4.12	1.032
Time needed for course development and preparation	89	3.96	1.054
Training to provide technology integration to promote higher-order pedagogy	87	3.92	1.164
Administrative support	88	3.76	1.083
University policies encourage faculty to use computers in teaching	90	3.42	1.254
Research literature convincing the use of computers	88	3.22	1.108
Reward from administration for using computers in teaching	90	2.91	1.321

Note. 1=not important", "2=little important", "3=somewhat important", "4=important", and "5=very important.

Table 15 below shows a correlation (p= 0.01) revealing a moderate, but significant association between faculty integration of technology and the sub-components "Available computer tools for the course I teach" (r = .319**) and "Stable hardware or software" (r = .279**). There is a slightly moderate positive significant correlation (p = 0.05) for the sub-components "Training to provide technology integration to promote higher order pedagogy" (r = .254*) and "Convenient access to computers, software and needed equipment for teaching tasks" (r = .224*).

Table 15

Pearson Correlation between Integrating Technology Into the Curriculum and the Important Sub-Components of College Capacity

Capacity	N	Pearson Correlation *r*=	Sig. (2-tailed)
Available computer tools fit the course I teach	86	.319**	.003
Stable hardware or software	87	.279**	.009
Training to provide technology integration to promote higher-order pedagogy	84	.254*	.020
Convenient access to computers, software and needed equipment for teaching tasks	87	.224*	.037
Reward from administration for using computers in teaching	87	.194	.072
Time needed for course development and preparation	86	.161	.138
Technology training opportunities for university teachers	87	.153	.158
University policies encourage faculty to use computers in teaching	87	.150	.165
Instructional technology training made available to you	89	.063	.565
Technical support available	87	.040	.716
Instructional support available	87	.010	.924
Research literature convincing the use of computers	86	-.012	.910
Administrative support			

Note. **.Correlations are significant at the 0.01 level (2-tailed).
*.Correlations are significant at the 0.05 level (2-tailed).
. 1=not important", "2=little important", "3=somewhat important", "4=important", and "5=very important.

Question 4. - Is there a relationship between faculty demographics and their practice in integrating technology into their course(s)?

The demographic variables were comprised of gender, age, public or private school, prior work in K-12 environment, undergraduate major, doctoral status, and if faculty taught an educational technology course for future administrators.

To answer this question both descriptive and inferential statistics were employed. Two

different tests were run in SPSS; a frequency analysis, and a Chi-Square analysis were computed to determine the relationship between faculty demographics and their association with integrating technology into the curriculum.

Table 3 shows that male participants made up 58.2% (53) of the 91 participants, full-time faculty members equaled 68.1% (62), the age bracket of 56-60+ showed 76.9% (70) of participants, and 60.4% (55) were from private institutions. The demographics also demonstrate that 88 % of the participants held an Ed.D or Ph.D degree, 84.6% held a degree in educational leadership or educational administration, 90.1% (82) did not teach an educational technology course, and 50.5% (46) felt they taught 21st century pedagogy at a substantial level.

Table 16 below shows a Chi-Square analysis which was performed to determine the relationship between "integrating technology into the curriculum" and "gender," "age," "faculty position," if the college or university was "public or private," and if an "education technology course was taught." The Chi-Square crosstab revealed one low, significant relationship for the sub-component, "Do You Teach an Educational Technology Course" (p =.046).

The demographics show that 90.1% (82) of the participants do not teach an educational technology course; however, when looking at the distribution with "integrating technology into the curriculum", we find that 31 participants integrated a fair amount of technology, 14 integrated technology substantially, and 15 integrated technology extensively.

Various studies found a correlation with age and technology use; however, the high percentage of participants in the age bracket of 56-60+ is very high (76.9), which makes the analyses of age significance difficult to determine.

Table 16

Chi Square Analyses for Integrating Technology Into the Curriculum and Demographics as Reported by Faculty

		Never	A Little	Fair Amount	Substan-tially	Exten-sively	Chi-Square	Asymp. Sig. (2-sided)
Gender	Male	1	12	20	9	10	5.739	.219
	Female	3	3	12	8	10		
	Total	4	15	32	17	20		
Age	20-30	0	0	0	0	0	19.598	.719
	31-35	0	0	0	0	1		
	36-40	0	2	0	0	1		
	41-45	0	0	1	0	0		
	46-50	1	0	3	1	1		
	51-55	0	1	4	2	1		
	56-60	0	3	9	4	7		
	60+	3	9	15	10	8		
	Total	4	15	32	17	19		
Faculty Position	Part Time	1	3	8	5	5	6.999	.858
	Full Time	3	10	22	12	12		
	Director/ Dean	0	3	5	3	4		
	Total	4	16	35	20	21		
Public/ Private	Public	2	7	8	7	9	3.516	.475
	Private	2	8	24	10	11		
	Total	4	15	32	17	20		
Do You Teach Ed Tech Course	Yes	0	0	1	3	5	9.696	.046
	No	4	15	31	14	15		
	Total	4	15	32	17	20		

CHAPTER V

Summary of Findings, Conclusions, and Recommendations

The purpose of this study was to explore the extent to which future educational administrators are studying 21st century technological skills in higher education school leadership programs. Higher education faculty, in New York State, were surveyed to determine what educational technologies are being offered and used to prepare pre-service administrators. The instrument used was a 21st century validated survey for digital age leaders that is Web-based and given to professors of educational administration leadership programs in New York State.

The following four research questions were addressed in the study:

1. Is there a relationship between the perceived value of the role of technology in education and the degree to which faculty integrate technology into their curriculum?
2. Is there a relationship between faculty's 21st century technology skills (skills in four groups - basic technology tools, Web-based technology tools, student-centered teaching strategies, and leadership technology tools) and the degree to which they integrate technology into their curriculum?
3. Is there a relationship between the campus program's capacity to enhance technology implementation and faculty's integration of technology into their curriculum?
4. Is there any relationship between faculty demographics and their practice in integrating technology in their course(s)?

Summary of Findings

Perceived Value of the Role of Technology in Education and Technology Integration

Research Question 1 looked at the relationship between the perceived value of the role of technology in education and the degree to which faculty integrate technology into their

curriculum. The descriptive data demonstrated that faculty value technology in education as the mean score ranges from 3.74 to 4.55 in a scale where 1 is strongly disagree and 5 is strongly agree. The highest statement value was "Computers have the Potential to Enhance Teaching and Learning" with a mean of 4.55, and the second highest rating was a mean of 4.23 for the sub-component "Future PK-12 Administrators Need to be Technology Leaders".

The sub-component "I am Comfortable Using Computers" yielded a moderate positive significant correlation of $r = .435$ with integrating technology into the curriculum. This analytic result suggests that the faculty members who are comfortable using computers are more likely associated with integrating technology into the curriculum.

Faculty Technology Skills and Integrating Technology Into the Curriculum

Research Question 2 asks if there is a relationship between faculty's technology skills and the degree to which they integrate technology into the curriculum. The technology tools were divided into four groups: Basic Technology Tools, Web-Based Technology Tools, Student-Centered Teaching Strategies, and Leadership Technology. This section revealed that faculty use technology primarily for basic skills like word processing and Internet searching, while the more 21st century, web-based skills do not show high usage.

Basic Skills. The descriptive data showed a higher use of skills for "Word Processing" with a mean score of 4.72 and for "Internet Searching" with a mean score 4.54, where 1 is never use and 5 is extensive use. A Pearson correlation test found a moderate positive correlation between "Spreadsheet Software $r = .441$ and "Drawing Tools" $r = .448$ with integrating technology.

Web-Based Skills. Web-based skills represent the interactive uses of the Web which promote more of the applied skills and progressive pedagogy. The sub-component "Course

Management Systems" had a mean of 3.46; this was the highest mean under the "Web-based skills" section where 1 is never use and 5 is extensive use. This demonstrates low use by faculty members. The mean scores for the other 11 sub-components ranged from 1.21 to 2.90. The sub-components "Course Management Systems," $r = .642$ and "Web 2.0 tools" $r = .596$ show a strong, positive correlation with integrating technology into the curriculum.

Student-Centered Teaching Strategies. The "Student-Centered Teaching" section asks faculty members for their use of 21st century teaching strategies. The overall mean was high, with the mean ranging from 3.78 to 4.65, based on a five-point scale, where 1 is never and 5 is extensive use. The Pearson correlation analyses for this section yielded a moderate, positive result of $r = .398$ for "Integrating Problem-Based Learning in the Curriculum."

Leadership Technology Skills. The mean scores for this section were very weak ranging from 1.84 to 2.48, where 1 is never, and 5 is extensive use. The two sub-components identified by a correlation analysis were "Data Analysis Software" at a strong correlation of $r = .481$, and "Digital Copyright & Plagiarism Laws" at a moderate correlation for integrating technology into the curriculum of $r = .411$.

Campus Capacity to Enhance Education Technology and Technology Integration

Research Question 3 looked at the capacity for enhancing the integration of technology. The sub-components "Technical Support Available" $M = 4.56$, followed by "Convenient Access to Computers" $M = 4.46$ and "Software and Needed Equipment for Teaching Tasks" $M = 4.26$, in a scale where 5 is very important and 1 is not important demonstrated the most important capacities as reported by faculty.

Of all the questions asked in relation to the importance of campus capacity for integrating technology into the curriculum, only one area showed a weak yet positive significant correlation, "Available Computer Tools for the Course I Teach" $r = 319$.

Relationship Between Demographics and Integrating Technology

Research Question 4 looked at the relationship between demographics and integrating technology into the curriculum. The demographic results showed that 58.2% of the 91 survey participants were male, 68.2% were full-time faculty members, 76.9% were age 56 and above, and 60.4% were from a private college or university.

The demographics also demonstrate that 88 % of the participants held an Ed.D or Ph.D, 84.6% held a degree in educational leadership or educational administration, 90.1% did not teach an educational technology course, and 50.5% felt they taught 21st century pedagogy at a substantial level.

A Chi-Square test was performed in SPSS to determine if there were any significance among gender, age, faculty position, whether an institution was private or public, and if faculty taught an education technology course.

The results showed only one significant relationship: "Teaching an Education Technology Course" of $r = .046$. There were no other significant relationships. This reveals that Education Leadership Program faculty who teach technology courses are more likely to integrate technology into the curriculum than others.

Conclusions

Conclusion 1 - Faculty members strongly perceive the value of technology in education; however, there is a disconnect between the strong perceived value of technology in education and the actual technology tools used as well as the leadership technology courses offered.

One must ask the question that if faculty believe computers have the potential to enhance teaching and learning", what delays higher education educational administration programs to incorporate technology leadership courses? Additional questions arise when looking at the high mean for the sub-component "Future PK-12 Administrators Need to be Technology Leaders," especially since 90.1% of respondents do not teach an educational technology course.

The answer may come when looking at the correlation factor for this question which points to comfort ability with technology as a strong variable in using it. The next question becomes, how do faculty members become comfortable using computers? The first step in promoting comfort using technology by faculty members is to cultivate the vision of why it is important. As noted in the review of literature, exponential technological advances have changed our society and have promoted increased global connectivity. The requirements for student learning and the role of school leaders has changed. Education in the PK-12 arena and higher education have not kept up with the change. As we look at the research we see that we are preparing students for an era that no longer exists and for a job market that no longer offers the same positions (Partnership for 21st Century Skills, 2006). "The future U.S. workforce is here – and it is woefully ill-prepared for the demands of today's (and tomorrow's) workplace" (The Conference Board et al., 2006, p. 9).

Zhou and Xu's (2007) study aligns with the findings above that faculty members who are comfortable using computers are more likely to integrate technology into the curriculum. Zhou and Xu (2007) found that it is the faculty's internal motivators rather than external motivators that play the most important role in integrating technology. They also found that faculty members who use technology learned how to use the technology from their own experiences rather than workshops, trainings, or technical assistance. Zhou and Xu also believe that it is

important to provide faculty members with the reasoning behind the change and that it be articulated clearly (2007).

In his book, "The Heart of Change," Kotter (2002) writes of his eight-step program for effective change. The first step, according to Kotter (2002) is to create a sense of urgency. Kotter states that creating a sense of urgency can alleviate "complacency, fear, or anger, all three of which can undermine change" (p. 3). Articulating a vision or sense of urgency as to why there needs to be change can jump start the internal motivation factor of faculty and increase the desire to change.

In her study, Noce (2000) found that professional development opportunities are directly associated with increasing faculty behavior towards technology integration. The North Central Regional Educational Laboratory (NCREL, n.d.), agrees with Noce (2000) that professional development is essential in promoting faculty use of technology; however, they are specific that, "traditional sit-and-get training sessions or one-time only workshops have not been effective in making teachers comfortable with using technology or adept at integrating it into their lesson plans" (NCREL, n.d.). NCREL believes that the professional development must be ongoing and tied to the goals created by the institution.

Noce (2000) concludes her study with the premise that strong leadership support is necessary to guide the necessary change of the technology integration process. She states that, "college leaders are crucial to the implementation of technology into the curriculum" (p. 176). Leaders must create a vision that incorporates learning for students' benefit that is mandated and communicated (Noce, 2002). As previously stated, "It is no longer possible for administrators to be naïve about technology and be good leaders" (Ertmer, Bai, Dong, Khalill, Park, & Wang, 2002, p. 18). "What's needed is a conceptual knowledge of how technologies can restructure

education and improve instruction and achievement for our nation's students" (Creighton, 2003, p. ix).

Overall, it would be reasonable to conclude, based on the perceived role of technology in education analyses, that educators who feel comfortable using technology are more associated with integrating technology into the curriculum. It is important for leaders to articulate a clear vision as to why technology and 21st century skills are essential for success. Also important, for educators to become comfortable using technology, is the presence of strong leaders who have the vision to plan, coordinate, and promote continual professional development offerings.

Conclusion 2 - Higher education continues to use basic technology tools such as word processing and Internet searching, while web-based and leadership technology tools demonstrate very low usage and offerings.

Basic Skills. The consensus of the data show that faculty use the basic skills of word processing and Internet searching more than web-based technology tools, or leadership technology. This analysis aligns with Zhou and Xu's findings that using technology for basic use was more common in higher education than using technology effectively in promoting higher-order pedagogy (2006). It also aligns with Groves & Zemel's study that found most of the faculty were comfortable using word processing, but were less likely to use newer technologies (2000).

These findings are not surprising since spreadsheet and drawing tools tools require more advanced use of the basic technology skills. "Spreadsheet software" is used for mathematical functions from simple addition to more complicated functions such as statistics, and therefore requires more skill than using word processing software (Pitler, Hubbell, Kuhn, and Malenoski, 2007). "Drawing tools software" also requires more advanced skills to promote photo editing,

which can be used for multimedia and uploading to the Internet.

Web-Based Skills. "Course Management Systems" such as Blackboard or Moodle, represent online learning, which has grown considerably in the higher education arena. According to the Sloan Consortium report, online enrollments have grown faster than higher education enrollments in the past six years and continue to grow at greater rates than higher education, "The 17 percent growth rate for online enrollments far exceeds the 1.2 percent growth of the overall higher education student population" (Allen and Seaman, 2009, p. 1). As faculty begin to create and teach online courses, their technology use increases (Morgan, 2003). In her study, Morgan found that two-thirds of faculty who teach online courses reported increased technology use as time went by. The reason for this increased use was finding more uses for the technology. According to the Sloan Consortium report, there is a need for faculty to become more comfortable with teaching online courses because of the demand (Allen and Seaman, 2009). The Sloan Consortium Report defines online learning as courses "in which 80 percent of the course content is delivered online" (Allen and Seaman, 2009, p. 4). With 80 percent of the course being taught through web-based technology, it would make sense that faculty members who teach online courses would be more associated with integrating technology into their curriculum.

As stated in the literature review, The *Horizon Report: 2009 K-12 Education* finds social networking to be adopted in K-12 classrooms in one year or less. Many of these social networking sites are also referred to as Web 2.0. Web 1.0 users find information, while with Web 2.0 the web becomes interactive; users can now contribute to the Web via wikis or blogs, podcasting, photo sharing, among other devices. People are no longer just searching for information on the Web, but they provide it as well (Solomon & Schrum, 2007). The *Horizon*

Report: 2007 Edition for higher education recommends that higher education adopt Web 2.0 technologies in one year or less. This means that Web 2.0 technologies should have begun being used on college campuses in 2008-2009. It would be difficult for faculty members to teach their students who are future leaders of PK-12 school districts how to use Web 2.0 tools for higher-order pedagogy if they do not use them. The value of Web 2.0 tools in learning 21st century skills is very valuable as discussed in the literature review. Most Web 2.0 tools are free to the user and can be very cost effective for school districts and college campuses. Web 2.0 tools are not only advantageous for student learning, but faculty and administrators can use these valuable tools for collaborative work by using social networking and bookmarking tools. One example of a social bookmarking site is *Delicious*. This site allows users to save their favorites on the Web instead of just to the computer on which they are working. When using *Delicious*, the users can access favorite websites no matter what computer they are working on because they are web-based. Another outstanding feature of *Delicious* is the networking feature. Not only can one access his or her own bookmarks, but bookmarks of others can be accessed as well through networking. This allows collaboration of website resources for users who may have the same interests, or who teach the same courses. There is a veritable plethora of websites for Web 2.0; one that encompasses many of them is found at *Go2Web20* website. This site has many categories, or tags, which makes it easy to search for a Web 2.0 tool of a special interest. Faculty members who are familiar with Web 2.0 tools are more likely to integrate technology into their curriculums. Future school district leaders would benefit by learning the intricacies of using Web 2.0 for Internet safety for student safety, and how they promote a 21st century curriculum.

Student-Centered Teaching Skills. "Problem-based Learning" is a key curriculum strategy that incorporates 21st century skills. It is vital in the PK-12 area according to *Edutopia's*

synopsis on project-based learning research**.** Students in the project-based learning (PBL) programs significantly outperformed the students in the traditional school in math skills and conceptual and applied knowledge and three times as many students passed the national exam. Problem or project based learning is inquiry based and promotes authentic, real-world experiences that form deep learning and critical thinking. The PBL lessons create student-centered learning and the teacher becomes a facilitator instead of being the center of learning (Soloman & Schrum, 2007).

It is impressive that faculty members are using 21st student-centered teaching strategies; however, the question to be answered is, are they teaching future school leaders to encourage their staff to use these strategies? Another question to be answered is, are future school leaders learning the benefits and need for 21st teaching strategies that ensure the willingness to provide on-going professional development to their staff?

Leadership Technology Skills. The fourth section in skills is "Leadership Technology." The nine components that make up this section all relate to necessary technology leadership skills for the PK-12 leaders. They consist of the basic leadership knowledge necessary to be a technology leader in a school district. These are courses that are taught at the Citadel and recommended by Geer (2002). The low mean scores align with the data that 90.1% of faculty participants said they do not teach an educational technology course to pre-service school administrators. This aligns with Ertmer's et al. study that many administrators have a conceptual understanding of the importance of technology use in schools, but the development of technology leadership skills has not been pressed or stressed in educational leadership programs (Ertmer et al., 2002). "Graduate school programs generally are doing a poor job in preparing school principals and superintendents to be technology leaders" (Ertmer et al., 2002, p. 218).

Since the inception of the *No Child Left Behind Act* (NCLB), assessment and accountability have been at the forefront of PK-12 education. The purpose of this act was to "close the achievement gap with accountability, flexibility, and choice, so that no child is left behind" (NCLB, 2001, p. 1). Data-driven decision making is one of the keys of NCLB to open doors of knowledge that lead instruction and strategic district planning. Accountability through the interpretation of data puts the onus on teachers and administrators who have not been trained to read the data accurately (Taylor, 2009). Taylor found that neither teachers nor administrators were trained to interpret data to drive instruction or for strategic district planning (2009). If schools do not meet the accountability standards set by NCLB, they are put on a list of schools that need improvement. If the improvement does not come, school districts can be closed. It is important that teachers and leaders are able to interpret data and are able to drive instruction and school improvement with the results.

With the vast amount of information on the Internet and the ability to add to it as well, "Digital Copyright & Plagiarism Laws," are critical knowledge requirements for school district leaders. The Fair Use doctrine for education adds to the confusion of what is acceptable and what is not when downloading pictures, videos, music, and text (Soloman & Schrum, 2007). Students and teachers need guidance to understand the complex laws that encompass digital copyright and plagiarism laws. Students need to understand what plagiarism is and how to avoid it. School district leaders need to develop policies for following the complex laws in order to avoid lawsuits. Sites like "Creative Commons" allow users to use their images, music, videos, and text under their royalty free license. School district leaders need to know these types of sites to better serve their districts, the students and the teachers.

Overall, it would be reasonable to conclude that it strongly appears that future school

district leaders are not being trained as technology leaders nor are they being trained in the needed 21st century technological tools and skills needed to prepare students for the global, digital, and interconnected world they will be entering. Strong leaders who have the vision to plan, coordinate, articulate, and promote a 21st century technology higher-education curriculum including leadership technology courses are imperative for future school district leaders.

*Conclusion **3** - In order for faculty to integrate technology into the curriculum, it is vital that the college or university, in which they teach, provide technology that is in good working order, supports their class offerings, and provides technical support.*

Hargrove's report showed the motivators that encouraged integrating technology were a working computer, release time for development, and academic support. The barriers to technology integration were release time and the lack of professional development (2000). In Ahadiat's study, she found that the faculty's most significant barrier (56.1 percent) to using technology was lack of time. The next two factors showing significance are the need for relevant software and support (2005).

Faculty participants rated technical support, access to equipment, and available software as the most important capacities for integrating technology. Hargrove (2000) and Ahadiat's (2005) studies both site support, the need for working equipment, the need for time, relevant software, and professional development. However, it is important to mention here Zhou and Xu's study, which revealed that a faculty member's internal motivation plays the greatest role in using technology effectively to promote higher-order pedagogy than workshops or training.

Overall, it would be reasonable to conclude, based on the campus program's capacity to enhance technology implementation and faculty integration of technology into the curriculum, that strong leaders, who have the vision to plan, coordinate, articulate, and promote continual

professional development offerings and 21st century skills and courses, need to make sure the technical needs of the campus are being met as well. Even if faculty members are comfortable using technology and have internal motivation, it is still necessary for the computers to work properly and for support to be available. It is important for the campus to provide technical support, working computers, specific software, and time for preparation.

Conclusion 4 - Demographic backgrounds such as age, gender, faculty position, or whether an institution was private or public had no significant correlation with integrating technology into the curriculum.

It is interesting to note here that, Ahadiat (2005) reported that older faculty were less interested in using technology than the younger faculty (2005). In this study 76.9% of the 91 participants were age 56 and above and showed that although faculty strongly value the role of technology in education, usage of 21st century technology skills is low. It is also interesting to note that faculty of higher education administrative programs are highly qualified as 88% hold a doctorate degree, 84.6% hold a degree in educational leadership or educational administration, and only 5.5% have never worked in a school district before. The data also showed that faculty who teach an education technology course have a significant correlation with integrating technology into the curriculum.

Recommendations

Based on the findings of this study, the following recommendations are provided:

Recommendation 1- Leadership Need to Promote Vision and Professional Development to Increase Faculty Internal Motivation and Comfort Level Using Technology

The data in this study showed that faculty value technology in education; however, there is a disconnect between the value of technology use and the actual use. It is recommended that

leaders of higher educational administrative programs offer ongoing professional development to increase faculty's comfort level using computers. Ongoing is the key word here because "traditional sit-and-get training sessions or one-time only workshops have not been effective in making teachers comfortable with using technology or adept at integrating it into their lesson plans" (NCREL, n.d.). Ongoing professional development sends a message that technology use should be sustainable, and it reinforces skills which can accelerate comfort with technology and 21st century literacy.

It is also recommended that higher educational leaders craft and implement a plan that clearly reflects the technology vision of the 21st century. A clear vision will help to increase internal motivation and self exploratory technology use.

Recommendation 2 – The New York Board of Regents and Higher Education School Leadership Graduate Programs Should Mandate the Development of a 21st Century Technology Leadership Curriculum

It is recommended, upon the findings of this study, that higher education pre-service administrative programs offer a curriculum in leadership technology that is mandated by the New York State Board of Regents. The course or courses should include, foremost, an understanding of the changing world we live in based on exponential technological change and the necessary skills that PK-12 students' need for success, as well as advanced technology tools and pedagogy such as Web 2.0 and social networking. They should also include interpreting and implementing data driven decision making courses, digital copyright and plagiarism law courses, and Internet safety and cyberbullying prevention, as a minimum of course offerings.

As stated by Davis, Darling-Hammond, LaPointe, & Meyerson, "The demands of the job have changed so that traditional methods of preparing administrators are no longer adequate to

meet the leadership challenges posed by public schools" (2005, p. 3). Although graduates of educational leadership college programs become certified to be school administrators, they are not equipped to shift their role from managers to instructional leaders, because programs are deficient in 21st century training (Davis, et al., 2005). Most of our administrators lack the knowledge and skills to foster technology integration in schools. Many administrators have a conceptual understanding of the importance of technology use in schools, but the development of technology leadership skills has not been pressed or stressed in educational leadership programs (Ertmer et al., 2002).

*Recommendation **3** - Higher Education School Leadership Graduate Programs Need to Develop and Offer Ongoing Workshops to School Administrators working in the PK-12 Environment.*

It is recommended that educational administration leadership programs expand their vision to serve, not only those who pass through their leadership programs, but also to school leaders in the districts. To do this they need to have the preparation and capacity for workshop development. This will help to fill the gap of what was missed in their graduate experience concerning educational technology leadership courses.

Recommendations for Future Research

Future Research Recommendation 1 - It is recommended that future researchers interview PK-12 school building and district administrators, higher education faculty members, and the Board of Regents of the State of New York to determine their vision regarding a technology leadership curriculum and to explore barriers and motivators for integrating technology and 21st century literacy.

This study found that faculty highly value the role of technology in education and that

future PK-12 school leaders should be technology leaders. However, basic skills such as word processing and Internet safety are used more than 21st century web-based skills. The data also showed that 90.1 percent of faculty do not teach an education technology course. Therefore, future research should be conducted to determine why there a disconnect exists between faculty's value of the role of technology and the little to no use of 21st century technology curricula.

Future Research Recommendation 2 - Questions addressing internal and external motivators should be explored to determine what factors play a role in their development.

Zhou and Xu (2007) found, in their ten-year study, that it is the faculty's internal motivators rather than external motivators that play the most important role in integrating technology. The correlation data, in this study, point to faculty who are comfortable using computers as the value most associated with integrating technology into the curriculum. Therefore, future research would prove advantageous to determine how internal and external motivators are developed and explore what factors play a role in their development.

Future Research Recommendation 3 - It is recommended that the future researcher consider whether age is a factor in determining why the more Web-based 21st century skills are used little to no extent?

This study revealed that although 76.9 percent of the faculty are age 56 and above, the value of the role of education in technology is high. However, the use of 21st century Web-based skills and Leadership Technology courses is low. Future research should determine if age plays a factor in using the more advanced technology tools.

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APPENDIX A

Survey

1. Consent

Dear Participant,

Please note that your participation in this survey is voluntary. The survey will be completed anonymously. No personal names, college names or identifying information will be collected or associated with the collected data.

You are giving your consent to participate in this survey by clicking on the 'Next' button below which will take you to the survey.

You are being asked to participate in a research project entitled: "Technology and The Changing Face of Education in the 21st Century: Are Educational Leadership Programs Preparing Future Leaders for This Change"?

This research is being conducted by: Darlene Westinghouse and Daniel Alemu, Ph.D of The Sage Graduate School, Albany, New York.

The purpose of the study is to explore the extent to which future administrators in higher education are being equipped with 21st century technological skills in school leadership.

It should take approximately ten minutes. Thank you so much for your time and consideration.

Darlene Westinghouse

2. Higher Education Leadership Training Survey

1. What is your position? (You can choose more than one answer)

- [ ] part-time adjunct faculty member
- [ ] full-time faculty member
- [ ] director/dean

Other (please specify)

2. What is your gender?

- ◯ Male
- ◯ Female

3. What is your age?

- ◯ 20-30
- ◯ 31-35
- ◯ 36-40
- ◯ 41-45
- ◯ 46-50
- ◯ 51-55
- ◯ 56-60
- ◯ 60+

4. Is the university or college you teach at public or private?

- ◯ Public
- ◯ Private

5. Did you ever work in a K-12 school district as teacher, administrator, or both? (You can choose multiple answers)

- [ ] Teacher
- [ ] Building Administrator
- [ ] District Administrator
- [ ] School Business Administrator
- [ ] Chief Information Officer (CIO)
- [ ] Other

Other (please specify)

*** 6. What is your undergraduate major?**

- ◯ Elementary Education
- ◯ Secondary Education
- ◯ Special Education
- ◯ Other

Other (please specify)

*** 7. Do you hold an Ed.D or Ph.D?**

- ◯ No
- ◯ I'm working on it.
- ◯ Ed.D
- ◯ Ph.D

*** 8. Do you hold a graduate degree in educational leadership or educational administration?**

- ◯ yes
- ◯ no

*** 9. Do you teach an educational technology course for pre-service educational administrators?**

- ◯ Yes
- ◯ No

10. Do you teach pre-service educational administrators how to integrate 21st century skills to enhance higher-order pedagogy for PK-12 students in your courses? (such as: innovation, communication, collaboration, critical thinking, problem solving)

- ◯ No
- ◯ A little
- ◯ Substantial
- ◯ Extensive

*** 11. To what extent do you value technology in education. 1=strongly disagree, 2=disagree, 3= undecided, 4=agree, and 5=strongly agree.**

	strongly disagree	disagree	undecided	agree	strongly agree
Computers have the potential to enhance teaching and learning	☐	☐	☐	☐	☐
I enjoy figuring out how to use computers in teaching	☐	☐	☐	☐	☐
Computers enable me to make a subject more interesting	☐	☐	☐	☐	☐
Students expect instructors to use computers in teaching	☐	☐	☐	☐	☐
Computers provide an environment appealing to different learning styles	☐	☐	☐	☐	☐
Computers enable students to collaborate in learning	☐	☐	☐	☐	☐
I am comfortable using computers in teaching	☐	☐	☐	☐	☐
Students can learn the material more easily or thoroughly using technology	☐	☐	☐	☐	☐
Faculty are better able to present more complex material to students when using technology	☐	☐	☐	☐	☐
Future PK-12 administrators need to be technology leaders	☐	☐	☐	☐	☐
Using technology increases student interest	☐	☐	☐	☐	☐
Technology integration offers clear advantages over traditional learning	☐	☐	☐	☐	☐

12. BASIC TECHNOLOGY TOOLS

Please rate how often you use the following for your personal use and also rate the following for how often you teach your students how to use these tools and skills. 1=never, 2=a little, 3=fair amount, 4=substantial, 5=extensively

	Personal Use	Teach to Students
Word Processing	▼	▼
Presentation Tools (e.g.MS Power Point)	▼	▼
Spreadsheet Software (e.g. MS Excel)	▼	▼
Database Software (e.g. MS Access)	▼	▼
Drawing Tools (e.g. Photoshop)	▼	▼
Internet searching	▼	▼

13. WEB-BASED TECHNOLOGY TOOLS

Please rate how often you use the following Web-based tools in the courses you teach and if you teach pre-service educational administrators how to use these tools in their future school curriculums as leaders. 1=never, 2=a little, 3=fair amount, 4=substantial, 5=extensively

	Use in your courses	Teach pre-service educational administrators how to use in their districts
Course Management Systems (e.g. Blackboard, Moodle)		
Podcasting Software		
Blog Creation		
Wikis		
Social Networking		
Web 2.0 tools		
Video Editing		
Student Information Systems (e.g.School Tools)		
ePortfolio Development		
Internet searching via the deep Web		
Gaming		
Multi User Virtual Reality (MUVE's, e.g. Second Life)		

14. STUDENT-CENTERED TEACHING STRATEGIES

Please rate how often you use the following for your personal use and also rate the following for how often you teach your students how to use these tools and skills. 1=never, 2=a little, 3=fair amount, 4=substantial, 5=extensively

	Use in your courses	Teach pre-service educational administrators how to use in their districts
Integrating technology in the curriculum		
Integrating problem-based learning in the curriculum		
Encourage students to share ideas with classmates		
Engage students in small group discussion		
Question student ideas before introducing new concepts		
Engage students in small group work		
Use hands-on activities		
Use real-world activities in the curriculum		
Facilitate intellectual development		
Relate subject matter to social issues		
Develop student's critical thinking skills		

15. LEADERSHIP TECHNOLOGY

Do you teach the following to pre-service educational administrators? Please choose: 1=never, 2=a little, 3=fair amount, 4=substantial, 5=extensively

	Never	A little	Fair amount	Substantially	Extensively
Data Analysis Software	◯	◯	◯	◯	◯
School Finance Software	◯	◯	◯	◯	◯
Design a Technology Plan	◯	◯	◯	◯	◯
Internet Safety	◯	◯	◯	◯	◯
Cyberbullying	◯	◯	◯	◯	◯
Digital Copyright and Plagiarism Laws	◯	◯	◯	◯	◯
Creative Budgeting for Technology Infrastructure and Tools	◯	◯	◯	◯	◯
Internet filtering and blocks	◯	◯	◯	◯	◯
Prepare an Acceptable Use Policy	◯	◯	◯	◯	◯

APPENDIX B

ISTE National Technology Standards for Administrators (2009)

The ISTE National Educational Technology Standards (NETS•A) and Performance Indicators for Administrators

1. Visionary Leadership.

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

Educational Administrators:

a. inspire and facilitate among all stakeholders a shared vision of purposeful change that maximizes use of digital-age resources to meet and exceed learning goals, support effective instructional practice, and maximize performance of district and school leaders

b. engage in an ongoing process to develop, implement, and communicate technology-infused strategic plans aligned with a shared vision

c. advocate on local, state, and national levels for policies, programs, and funding to support implementation of a technology-infused vision and strategic plan

2. Digital-Age Learning Culture.

Educational Administrators create, promote, and sustain a dynamic, digital-age learning culture that provides a rigorous, relevant, and engaging education for all students. Educational Administrators:

a. ensure instructional innovation focused on continuous improvement of digital-age learning

b. model and promote the frequent and effective use of technology for learning

c. provide learner-centered environments equipped with technology and learning resources to meet the individual, diverse needs of all learners

d. ensure effective practice in the study of technology and its infusion across the curriculum

e. promote and participate in local, national, and global learning communities that stimulate innovation, creativity, and digital-age collaboration

3. Excellence in Professional Practice.

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

Educational Administrators:

a. allocate time, resources, and access to ensure ongoing professional growth in technology fluency and integration

b. facilitate and participate in learning communities that stimulate, nurture, and support administrators, faculty, and staff in the study and use of technology

c. promote and model effective communication and collaboration among stakeholders using digital-age tools

d. stay abreast of educational research and emerging trends regarding effective use of technology and encourage evaluation of new technologies for their potential to improve student learning

4. Systemic Improvement.

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

a. lead purposeful change to maximize the achievement of learning goals through the appropriate use of technology and media-rich resources

b. collaborate to establish metrics, collect and analyze data, interpret results, and share findings to improve staff performance and student learning

c. recruit and retain highly competent personnel who use technology creatively and proficiently to advance academic and operational goals

d. establish and leverage strategic partnerships to support systemic improvement

e. establish and maintain a robust infrastructure for technology including integrated, interoperable technology systems to support management, operations, teaching, and learning

5. Digital Citizenship.

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

a. ensure equitable access to appropriate digital tools and resources to meet the needs of all learners

b. promote, model, and establish policies for safe, legal, and ethical use of digital information and technology

c. promote and model responsible social interactions related to the use of technology and information

d. model and facilitate the development of a shared cultural understanding and involvement in global issues through the use of contemporary communication and collaboration tools