

**INFLUENCE OF TECHNOLOGY ON THE LEADERSHIP OF 21st-CENTURY
CAREER AND TECHNICAL EDUCATION ADMINISTRATORS**

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DEDICATION

I dedicate my dissertation to my family, friends, and colleagues who have supported me and provided me with the love and care needed to keep me emotionally strong through this challenging academic endeavor.

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ABSTRACT

**INFLUENCE OF TECHNOLOGY ON THE LEADERSHIP
OF 21st-CENTURY CAREER AND TECHNICAL
EDUCATION ADMINISTRATORS**

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The purpose of this qualitative study was to examine how the technology beliefs of New York State Career and Technical Education Board of Cooperative Education Services administrators influenced their leadership behaviors. The participants were from a purposive selection from five suburban and rural Boards of Cooperative Education Services in New York State. All of the career and technical education (CTE) administrators participated in in-depth interviews and provided data related to the transition process of antiquated CTE programs into 21st-century technology-supported CTE learning environments. To assist in triangulation, the participants completed a self-reflective survey developed by the International Society for Technology in Education to identify their perceived technology competencies. And a document review was conducted that examined classroom observations, administrator evaluations budget expenditures for technology hardware, software, and teacher professional development. Analysis of data determined the 21st-century CTE administrator is a self-taught *technology immigrant*, whose technology beliefs and perceptions have little influence on the transition process of CTE programs. The study results revealed a dichotomy between the technology beliefs and perceptions of the CTE administrators and the actual frequency and efficacy of classroom technology. Recommendations for future research and practice included exploring the

relationship between student achievement and a CTE technology-supported environment as well as the implications and value of bring-your-own-device (BYOD) technology policies.

CHAPTER I

THE PROBLEM

Introduction to the Problem

Futurist Toffler (1970) predicted, “The illiterate of the 21st century will not be those who cannot read and write, but those who cannot learn, unlearn, and relearn” (p. 271). Toffler’s statement frames the new educational paradigm emerging as schools transition from a traditional bricks-and-mortar teaching classroom environment to a 21st-century learning environment supported by technology. The Interactive Educational Systems Design *National Survey Report* (2011) on schools reported, “76% of the districts reported about 25% of the teachers or more use teacher generated online content,” an increase from the “64% reported in 2009” (p. 5).

The new paradigm for the 21st-century school demands higher order learning skills for students and teachers alike, and school leaders are expected to facilitate these changes. “Students, whose teachers emphasized higher order thinking skills, small-group instruction, and hands-on learning activities, out-performed their peers” (Wenglinsky, 2000, as cited in McCaslin & Parker, 2003, p. 1). Freedman (2009) stated, “Top performing schools are making great headway individualizing education by using real-time data to change and modify education in the classroom” (p. 6). “The role of educational leaders, especially in schools, has changed considerably as many countries have transformed their education systems and schools to better prepare young people for today’s world of economic globalization and increased mobility of people” (Pont, Nusche, & Moorman, 2008, p. 1).

“The number of elementary and secondary students who are enrolled in online courses; increased tenfold between 2001 and 2007, from about 200,000 to almost 2 million” (Association for Career and Technical Education, 2010, p. 2). This increase in course-imbedded technology

for secondary students can be seen throughout the United States. A study conducted by the Institute of Education Sciences (2008) reported an estimated 100% of public schools had one or more instructional computers with Internet access, and the ratio of students to instructional computers with Internet access was 3.1 to 1. All of these reports demonstrated the growing trend in education as yielding to technology-supported instruction and curricula to prepare students for the 21st-century workforce.

The mastering of complex thinking skills by means of internet technology in a real-world environment has been a crucial need in a Career and Technical Education (CTE) classroom, and a shift from traditional teaching that produces low (level) thinking to the development of complex thinking must be made. (Jakovljevic, 2006, p. 2)

What gives these thinking skills a 21st-century twist are the powerful technologies available today for accessing, searching, analyzing, storing, managing, creating, and communicating information to support critical thinking and problem solving (Trilling & Fadel, 2009). Nowhere is this trend more prevalent than in CTE programs.

Career and technical education (CTE), formerly known as vocational education programs or shop class, are being revamped and enhanced to provide students with the opportunity to learn academic content while acquiring relevant job-related skills. In 2006, the passage of the Carl D. Perkins CTE Improvement Act addressed the need to “strengthen the focus on responsiveness to the economy, while tightening up the accountability statement in regards to the integration of academics and technical standards” (Threeton, 2007, p. 66). Harkins (2002) reasoned,

The potential role of CTE leadership in developing and testing a human capital paradigm that leaves repetitious performance and information storage to machines, even as it

provides new and saved resources for the growth of creative, inventive, and innovative human beings. (p. 1)

As of 2007, approximately 220,695 high school students participated in CTE programs across New York State (Camp & Camp-Heath, 2007). CTE programs have begun to transition from a traditional “shop” classroom setting into a CTE 21st-century learning environment supported by new and emerging technologies. Many of the CTE curricula have links to postsecondary institutions’ syllabi, and the courses provide a seamless articulation process from secondary to postsecondary education. The New York State Education Department (NYSED; 2011a) implemented the College and Career Readiness initiative. This initiative was in response to the national education movement, which sought to improve post-secondary student achievement rates and prepare students for a 21st-century workplace. Harkins (2002) stated, America is already moving toward rapid-cycle organizational deconstruction and continuous innovation based on distributed software. In such a society, workers must change rapidly. They must be assisted by appropriate technology, such as computers and hand-helds, together with the software and net ware required to make these connectively useful. (p. 2)

Background of the Study

CTE programs were introduced into the American school system as a means to provide skilled labor for industry. Presently, “Of 147 million jobs in the United States in 2005, only 32 million (21%) will require a college degree” (Hoyle, English, & Steffy, 2005, p. 188). In the past, the CTE classroom (shop class) was a place where students were trained to complete a job through rote learning applications, with the understanding that, with enough time on task and practice, a student would become proficient enough for employment.

However, times have changed, and McCaslin and Parker (2003) stated, “CTE is facing a rapidly changing external and internal environment” (p. 1). Juxtaposed to the objectives of the CTE classroom of the past; “A greater emphasis will be placed on educating students for high-skill/high wage jobs rather than merely providing four-year college degrees” (Hoyle et al., 2005, p. 188). CTE programs have different pedagogical and classroom support needs from traditional academic programs. Paradoxically, in New York State, CTE teachers typically enter the field of education by an alternative pathway that does not require traditional teacher preparation.

In New York, most CTE teachers are hired with minimal higher education credits requirements. The prospective CTE teachers must demonstrate only trade skill proficiencies through industry certification and provide evidence of five years of employment in the related trade area. CTE teachers have six years to pursue the New York State Education Department (NYSED) mandated 60 college credits (NYSED, 2011d). As a result, CTE administrators must continuously monitor and assess CTE instruction and provide appropriate ongoing professional development for the CTE teacher to support the pedagogical growth to promote positive student achievement. Both Firestone and Shipps (2005) and Honig and Hatch (2004) stated administrators are expected to,

Balance many obligations; negotiate the competing political demands of constituents; meet legal and bureaucratic obligations; manage employees; provide a professional structure for educational decisions; compete for employees; provide a professional structure for education decisions; compete for employees, grants and clients; and make pedagogical choices in light of equity and other community values. (Cooper, Cibulka, & Fusarelli, 2008, p. 99)

In 2010, New York State signed on as one of 14 governing states and one of 12 participating states to the nationally funded Race to the Top and the Partnership for the Assessment of Readiness for College and Careers (PARCC) consortia. These two consortia share one goal, which involves the “building of their collective capacity to dramatically increase the rates at which students graduate from high school prepared for success in college and the workplace” (PARCC, 2010). As a result of the new education reform, a new annual professional performance review (NYSED, 2011c) was implemented in 2011 to evaluate all New York State teachers. As the national education reforms move from concepts to practical applications,

School reform will continue to fail, until we recognize there aren't any quick fixes or perfect education theories. School reform is a slow, steady, labor-intensive process that depends on harnessing the talent of individuals instead of punishing them for noncompliance with bureaucratic mandates and destroying their initiative. (Cohn, as cited in Ravitch, 2010, p. 66)

The influence of the CTE administrator will greatly affect the progression of the practical application process of CTE program transformation. Bryk and Schneider (2004) reasoned, “Trust, not coercion, is a necessary precondition for school reform” (p. 87). The objective of the current study was to examine the nature of the supervision of CTE high school programs. Career and Technical Education students learn in line with the new 21st-century learning standards. The CTE administrators need to provide the appropriate leadership that can inspire faculty to transform their traditional “chalk-and-talk” lessons into technology supported student learning activities to meet 21st-century learning goals.

Statement of the Problem

In 2008, Wagner asked, “Why is it, the longer our kids are in school, the less curious they seem?” (p. 41). The way in which students learn has changed. Technology supported instructional methods and practices require CTE administrators to review their programs for industry relevancy and CTE pedagogical appropriateness. The MAGI Education Services (n.d.) conducted a two-year follow up study and reported:

Rote learning appeared to be the prominent level of student performance. The lessons provided were very traditional: A problem is presented and solved, and then similar problems are presented for students to solve, with little opportunity for true exploration of concepts. More abstract and higher-level algebra topics were missing. (p. 7)

CTE administrators supervise and evaluate how 21st-century technology-supported curricula and instruction are implemented in CTE programs. The continuous introduction of newer technology perpetuates changes in the methodology of instruction, thus influencing pedagogy and the role of the administrator. Prensky (2001) believed the emerging education paradigm is driven by students who he identified as *digital natives*. Prensky reported the new generation gap is the difference between *digital natives* and *digital immigrants*, who are the adults and teachers in their lives. Present day students are,

No longer the people the educational system was designed to teach; they have changed not just incrementally from those of the past, but a big discontinuity has taken place.

They represent the first generation to grow up with the new technology-and have spent their lives around it and using it; they think and process information fundamentally differently from their predecessors. (Prensky, 2001, as cited in Berger and Trexler, 2010, p. 104)

Values and attitudes define the different generations. According to Howe and Strauss, who have conducted extensive research in generation studies, “Every generation attempts to reverse what it perceives as the worst characteristics of older generations and to fill the roles being vacated by the dying generation”(as cited in Daggett, 2008, p. 26). The generation characteristics of the baby boomer educators, Generation X, or Gen-Xer’s parents, and present-day millennial students’ characteristics present varying values and beliefs reinforced by experiences, era, and age. The current study represented an attempt to understand the relationship, if any, between the CTE administrators’ technology beliefs and perceptions and their support for the use of imbedded technology in the classrooms they supervise.

Purpose of the Study

The purpose of this qualitative study was to examine how the technology beliefs of New York State Career and Technical Education Board of Cooperative Education Services administrators influenced their leadership behaviors. The goal of the study was to explore the technology perceptions and beliefs of CTE administrators as related to the organization, to teaching and learning, and to the professional development of CTE teachers. Additional topics explored included school leadership and the identification of new and emerging 21st-century administrator skills and support needs. Pink suggested, “Mastery is a mindset: It requires the capacity to see your abilities not as finite, but as infinitely improvable. Mastery is a pain: It demands effort, grit, and deliberate practice” (2009, pp. 222-223). The underlying values and beliefs of CTE administrators were studied to identify trends as they facilitated the development of new programs and upgraded older CTE programs. The CTE administrator’s perceptions and beliefs about technology supported student learning activities, and possible emerging 21st-century CTE leadership skills were topics explored to determine the commonalities of

experiences and expectations of CTE administrators employed by Board of Cooperative Education Services (BOCES) in New York State. The focus of this study was on the complexities of supervising CTE programs in an era of change, not only in education, but also in the globalization of the workforce.

Theoretical Rationale

The theoretical framework of this study was derived from the four frames of leadership developed by Bolman and Deal (2008). The four-frame model provided an appropriate lens through which to examine CTE administrators' managerial practices as they navigated the transformation process of revamping outdated shop classrooms to a newer, more relevant 21st-century CTE learning environment. The construct of reframing assisted in analyzing how CTE administrators designed, planned, and implemented new 21st-century school organization initiatives. The four frames of leadership also provided a lens through which to evaluate how school leaders' styles and approaches to school organization issues and initiatives to allow classification and comparison to assess best practices and school organization trends.

Symbolic leadership is the inspirational characteristics of leadership and the ability of the school leader to view an organization as a stage or theater on which certain roles and impressions are exhibited (Bolman & Deal, 2008). Human resources leadership identifies the leader as a supportive advocate for his/her employees. Structural leadership requires analysis and a design focus on structure, strategy, environment, implementation, experimentation, and adaptation. Political leadership addresses how organization leaders facilitate coalition building (Bolman & Deal, 2008).

CTE programs are an integral component of secondary education. "When academic and CTE content is presented in an integrated model, students are able to identify the real-world

applicability of academic concepts” (Meeder & Hebert-Giffen, 2009, p. 2). New school reform policies require administrators to implement these learning paradigms for students.

Successfully transforming CTE programs requires CTE administrators to understand the change process and the complexities of organization, leadership, and social change. Fullan (2001) believed effective leaders, “must cultivate their knowledge, understanding, and skills of what has to come to be known as complexity science” (p. 45). CTE administrators must demonstrate the capacity to navigate the political, structural, human resource, and symbolic relationships that are particular to their own school organizations. “When managers and consultants fail, government frequently responds with legislation, policies, and regulations, and all stakeholders are badgered to do something” (Bolman & Deal, 2008, p. 9). Utilizing a frame-structured theory for the current study provided the ability to “register and assemble key bits of perceptual data into a coherent pattern;-a picture of what’s happening” (Bolman & Deal, 2008, p. 11). The frame-structured theory served as a filter to disaggregate the process by which CTE administrators experienced or perceived their experiences in the transition process of CTE programs.

Today’s advanced technology drives organizations to become more open in their operations. A leader in an open organization “is still required to set goals, the strategy, and the agenda,-but with greater information sharing and distributed decision making” (Li, 2010, p. 197). To better understand the process by which the CTE administrator goes about setting goals and assessing strategies to facilitate the creation of 21st-century CTE learning environments in a new and emerging open organizational setting, a traditional organizational theoretic framing was used to provide clear and distinct categories by which to identify trends, commonalities in practice, and specific differences. As 21st-century trends emerged, Gladwell (2002) stated, “We are

required to reframe the way we think about the world and the idiosyncrasies of the way we relate to new information and to each other” (p. 257).

Research Questions

The following research questions guided the current study:

1. What relationships exist among the CTE administrators’ technology comfort levels and proficiencies and the degree to which 21st-century instruction is implemented?
2. How do CTE administrators’ perceptions about their frequency of use and knowledge of specific technologies correlate with CTE 21st-century technology-supported instruction?
3. How do the CTE administrators’ beliefs and perceptions about the frequency with which specific technologies are used influence the role of a CTE administrator?
4. To what degree do differences exist between the CTE administrators’ beliefs and perceptions about technology and the actual efficacy (value) of technology in CTE programs?
5. How do the technology beliefs and perceptions of the CTE administrator influence the degree to which technology influences school organization methods and structure?

Limitations of the Study

No research instruments are devoid of assumptions. However, the nuances of the CTE administrators who are employed by a BOCES, and each of whom is the director of a BOCES career and technical education center, were purposefully selected as units of analysis for this study because of the similarity of the structures of their organizations. All the CTE centers were

located in New York State. All selected directors shared the commonalities of the supervisory role and responsibility of a NYS BOCES CTE administrator. Excluded from this study were the city CTE comprehensive high schools (Buffalo, Rochester, Yonkers, New York City, Mount Vernon), because of the complexity of their CTE programming and CTE supervision assignments, descriptions, roles and responsibilities.

Significance of the Study

As technology drives industry to reconsider old norms of doing business, education is compelled to address the new learning needs of the 21st-century student who will compete for jobs in a global economy. Daggett (2008) believed, “The world in general—and America in particular—is being pushed by fundamental changes caused by both globalization and technology. The implication for what students need to know, and be able to do is increasingly dramatic” (p. 1). School organizations are composed of human resources that provide a service to the public. The determining factors for the relevancy of service are industry and societal needs. The 21st-century technological advances continue to forever change the landscape of the United States economy, industry trends, and education. Wagner (2008) stated,

It’s hard for people in the U.S. to work globally because they are used to being in control. It’s hard for many to let go and trust people to do the work, to truly empower people to achieve results, not just complete tasks; to let people in more junior organizations have power—and the resources they need to get a job done. (p. 25)

In this time of change in education, “The actions of the school leader will determine the fate of public education in the 21st century, and maintaining the status quo is not an option” (Daggett, 2010, p. 61). Countries such as India, Brazil, and China have responded to the global market by implementing targeted 21st-century education initiatives to educate and prepare their

citizenry for the global workforce. According to the Trends in International Mathematics and Science 2007 score report, the U. S. held eighth place, behind Chinese Taipei, Korea, Singapore, Hong Kong, Japan, Hungary, England, and the Russian Federation on eighth grade math and science scores Baldi, Jin, Skemer, Green, Herget, & Xie (2008). Presently, America, “at the politico-military level, remains a single-superpower, but in every other dimension-industrial, financial, educational, social, and cultural-the distribution of power is shifting away from American dominance” (Zakaria, 2008, p. 4). Freidman (2006) cautioned, “It is clear the U.S. and other rich nations will have to transform their educational systems so as to produce workers for the jobs that will actually exist in their societies” (p. 302).

The goal in this study was to examine the technology beliefs of the selected CTE administrators to better understand how their personal values and beliefs influenced the integration of technology and technology-supported curriculum into CTE programs. As technology transforms traditional (mastery) classroom activities of teaching, “We may need to re-calibrate our value system around helping students develop the 21st-century skills needed to meet the demands of their future workplace” (Project Tomorrow, 2011, p. 9). Results of the 2010 Speak Up research survey conducted for Project Tomorrow indicated,

Given the increase in online learning, there is an increased interest in ensuring today’s students have a solid foundation in key information and media literacy skills. However, teachers and students are not on the same page when it comes to evaluating the relative importance of particular skills. (Project Tomorrow, 2011, p. 9)

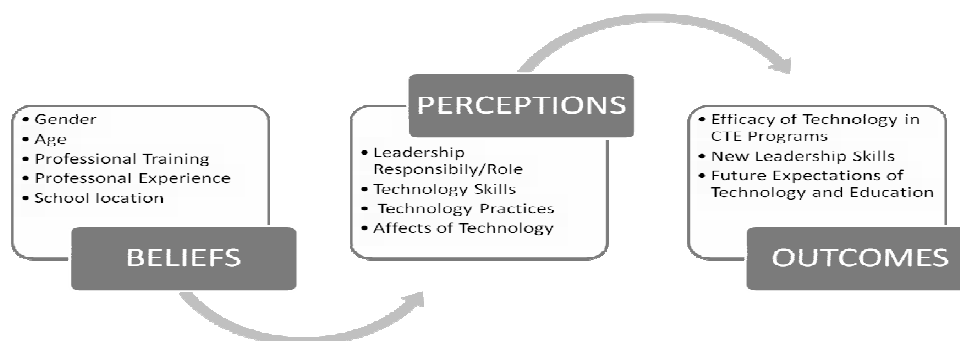
Questions in the Speak Up 2010 survey were limited to the technology values and beliefs of students and teachers. Results provide evidence of how technology is not only changing the way in which students learn, but also how it is changing the values of the type of work

performed in the classroom. The significance of this qualitative study was limited to examining the New York State CTE administrators' technology values and beliefs as they supported their faculties and as they addressed the perceived disparities in New York State CTE secondary education programs.

Conceptual Framework of the Study

The purpose of this qualitative study was to examine how the technology beliefs of New York State Career and Technical Education BOCES administrators influenced their leadership behaviors. This study was an exploration of the relationship between the CTE administrators' technology perceptions and beliefs and their leadership behaviors in the process of transitioning a CTE traditional "chalk-and-talk" instructional environment to a 21st-century learning environment. "Today's older folks were socialized differently from their kids, and they are now in the process of learning a new language. And a language learned later in life, scientists tell us, goes into a different part of the brain" (Prensky, 2001, p. 2). Friedman and Mandelbaum (2011) believed, "Today's hyper-connected world poses yet another new educational challenge: To prosper, America has to educate its young people up to and beyond the new levels of technology" (p. 102). The technology ideology of CTE administrators who are expected to lead this education initiative was the subject explored in this study (See Figure 1).

Figure 1.

Conceptual Design of Research Study**Definition of Terms**

21st-century learning environment. This term refers to an aligned and synergistic system of learning practices that support teaching and learning.

21st-century skills. These skills are the digital age proficiencies necessary for students to thrive in a digital, global economy.

Approved career and technical education programs. This refers to certified New York State Department of Education career and technical (CTE) programs for high school students that prepare them college and career.

Endorsed CTE diploma. This is a New York State Department of Education distinction awarded to students who earn a minimum of 22 units of high school commencement level credit, of which 8 are CTE.

Integrated academic programs. These programs are the New York State Department of Education -CTE program curricula that yield academic and CTE credit concurrently.

Chalk and talk-traditional teaching environment. This refers to teacher-directed classroom instruction.

CHAPTER II

REVIEW OF RELATED LITERATURE

Introduction

In 1997, Hirschbuhl and Bishop predicted, “In the very near future, we will have the needed links to bring the community, home, school, and business together in a lifelong interactive education experience” (as cited in Hoyle et al., 2005, p. 78). The 21st-century CTE classroom is in transition to a learning environment supported with technology including e-books such as Kindles and Nooks, cellular laptops, smart phones, laptops, iPads, SMART boards, wikis, cloud computing, and podcasting. This trend is aligned with the Project Tomorrow (2011) national survey findings, which indicated, “One third of all 6th grade students have a smart phone, 73 percent own a MP3 player, half of all 6th graders take online tests, and 25 percent of 6th graders are already using an e-textbook” (p. 1).

The digitization of the CTE classroom compels CTE leaders to examine the new and emerging relationships between teachers and administrators. “Most importantly, what can we learn today about the students aspirations, adoption, and adaption of emerging technologies for learning that can help us plan for the future?” (Project Tomorrow, 2011, p. 1). The International Society for Technology in Education (ISTE) is an association supporting PK-12 learning and teaching by advocating for and advancing the effectiveness of technology in schools. In 2009, ISTE presented the following five revised National Educational Technology Standards for Administrators: (a) Inspire excellence through transformational leadership, (b) Establish a robust digital age learning culture, (c) Advance excellence in digital age practice, (d)-Ensure systemic transformation of the educational enterprise, and (e) Model and advance digital citizenship” (ISTE, 2009).

Schrum and Levin (2009) purported, “It appears a school leader must do many things simultaneously to lead and support educators to function in a 21st-century school and to employ technology when appropriate” (p. 103). The 21st-century CTE curricula are mostly in a blended theory/practicum model that requires CTE administrators to evaluate student learning and teacher instruction differently from how they have in the past. “The separation of technical/vocational education from liberal or general education will greatly diminish, and career education will shift to career creation and career cycling” (Harkins, 2002, p. 2).

Education leaders hold varying opinions about how to design appropriate 21st-century curricula. The two opposing sides support either a skill-based or a content-based curriculum initiative. Harkins (2002) argued:

K-12 and higher education should emulate the worker software movement by bringing it into the common experience of students. Software-based preparation of students for success in a continuous innovation society will be driven by performance-based learning, in which the skills of (1) software and device management, and (2) developing and working within fast cultures will become the new CTE basics. (p. 2)

In agreement with Harkins, Darling-Hammond (2010) asserted:

Knowledge and skill can be taught well together. There is living proof that strong interdisciplinary (and interdisciplinary) learning is not at odds with the new so-called 21st-century skills, such as problem solving, critical and creative thinking, the capacity for independent learning, reflection, and communication. (p. 235)

Willingham stated, “Teaching of a skill is inseparable from of core content, but also it’s the content itself that allows individuals to recognize problems and to determine which critical-thinking skills to apply to solve them” (2009, p. 14). CTE administrators in New York State are

redesigning stagnant CTE programs into 21st-century CTE learning environments that will have support from the national school reform movement in the guise of the Common Core Learning Standards (NYSED, 2011d). Today's education leaders have to be "credible, capable human beings as well as capable professional educators" (Duignan, 2010, p. 116). Kelly (2000) asserted, "It is not a matter of knowing something, but becoming someone; not just a matter of knowing relevant things, but of becoming a relevant person" (p. 19).

The motivation of school leaders will influence the speed of restructuring these programs to reflect the needs of the 21st-century workforce. Pink (2009) advanced, "Within organizations, a new 'purpose motive' is expressing itself in three ways: in goals that use profit to reach purpose; in words that emphasize more than self-interest; and in policies that allow people to pursue on their own terms" (p. 223). In a 21st-century educational and learning environment, this drive or motivation of self-interest and ability to pursue the goal on one's own terms is a construct relating to the student, teacher, and administrator as a direct result of technology blurring the relationships within a classroom or school organization. Bolger presented evidence from his study that indicated, "Empowering teachers and giving them decision-making opportunities improved their professional commitment" (Bolger, 2005, as cited in Schrum & Levin, p. 103).

The present study was an exploration of the technology perceptions and beliefs of CTE administrators as they related to the organization of CTE programs, school leadership, and the identification of any new and emerging 21st-century administrator skills and support needs. To support the study, Chapter II is a review the pertinent literature under the headings of theories of education leadership, education leadership and 21st-century classroom instruction, and globalization and 21st-century leadership skills.

Theories of Education Leadership

“The hierarchical model simply doesn't work anymore. The craftsman apprentice model has been replaced by learning organizations; filled with knowledge workers who don't respond to ‘top down’ leadership” (George, 2010). When examining the relationships between school leadership and teachers, use of a school organizational theory model to evaluate efficacy and relevancy is typical. However, due to the prevalence of content virtualization in the present study, the researcher examined data pertaining to teacher/administrator perceptions, beliefs, and instructional methodologies related to the virtualization of CTE instruction to provide an opportunity to understand how technology has impacted the relationships.

Watson reported, “Relatively little was known about how the K-12 programs conducted online learning” (Watson, as cited in Berge & Clarke, 2005, p. 10). “The job of all educational leaders, whether their primary responsibility is to a single school or school district, is to create highly reliable organizations in which all children can be successful” (Hoyle et al., 2005, p. 53). Petersen and Fusarelli (2005), editors of *The Politics of Leadership*, contended, “The American public has persistently demanded that schools align their work with changing demographics, social, economic, political, and technological realities of society” (p. 4).

Successful school leaders understand the discrete needs of their organizations and provide appropriate leadership to influence and make the needed changes. As Young stated, “Indeed, professional standards should be used as a foundation for the learning of professionals, around which faculty members have a responsibility to build programs based upon the students they serve, their conceptual framework, and the expertise of their faculty” (2005, p. 169). Identifying the nuances of the processes by which these successful school leaders navigate the social architecture of their school organizations in a transitional era of school change was

valuable when grappling with ways to individualize and implement new school reforms that are, by design, standardized. In the four frames of leadership, the structural frame “explores the key role social architecture plays in the functioning of organizations” (Bolman & Deal, 2008, p. 78).

Graen and Uhl-bien (1995) proposed members accomplish their work through roles. The Graen and Uhl-bien research findings expressed the importance of evaluating the nature of roles in organizations, as well as the processes used to identify and to classify individual behaviors into one of three domains: the physical domain, the interpersonal-social domain, or the personal domain. These particular domain indicators are crucial in understanding teacher/administrator interactions.

Because of the anonymity of virtual learning, online classrooms are devoid of the physical domain in many respects. The interpersonal-social domain takes on new perceptions when viewed through the lens of a virtual synchronous and asynchronous virtual instructional learning environment. The personal domain becomes a less dominant focal point as related to teacher-administrator roles in the expanding virtual education learning environments. Picciano & Seaman (2007) purported: “Approximately 50 percent of the total distance education course enrollment of 328,000 or 164,000 is internet-based or online” (p. 4). Based on predictions, the United States Department of Education (USDOE) expected K-12 enrollment to exceed 600,000 by 2005. The upward enrollment trending 21st-century learning environments are supported by technology that has influenced the leadership-subordinate pedagogical relationship.

The autonomous nature of virtualization of instruction can be either a synchronized or unsynchronized online learning course, or an in-class blended course of instruction that requires students to meet face to face with a teacher, with most of the course content online and or in a fully digitized classroom. Such virtualization of instruction has diminished the need for

administrators to micro-manage day-to-day instruction and classroom activities such as lesson planning, assessment development, and student information management, as many of these activities are now managed by web-based software. Teachers and administrators are expected to focus on a “21st-century teacher model that includes practice in designing and implementing inquiry, design, and collaborative learning projects” (Trilling & Fadel, 2009, p. 125). Northouse (2007) stated:

It is common for transformational leaders to create a vision. The vision emerges from the collective interest of various individuals and units in an organization. The vision is a focal point for transformational leadership. It gives the leader and the organization a conceptual map for where the organization is headed; it gives meaning and clarifies the organization’s identity. (p. 190)

Graen and Cashman (1975) introduced the concept of vertical dyad linkage. Their research was one of the first studies to evaluate the exchange theory that focused on the vertical dyadic relationship of the leader to the subordinate. The construct examined the ways in which personality and personal traits define the relationship between the subordinate and the leader: “Within an organizational work unit, subordinates become a part of the in-group or the out-group, based on how well they work with the leader” (Northouse, 2007, p. 152). Graen and Cashman documented the ways by which these two groups responded to job responsibilities, job satisfaction, and additional participation in job-related activities.

Leaders must be consummate relationship builders with diverse people and groups, especially with people different than themselves. Effective leaders constantly foster purposeful interaction and problem solving, and are wary of easy consensus. (Fullan, 2001, p. 5)

Administrators in the 21st century grapple with the question of how to effectively evaluate and implement classroom technologies as well as how to set appropriate goals for teachers and the school organization digitalization. According to Bolman and Deal (2008), an organization's characteristics can be evaluated through four discrete elements: complex, surprise, deception, and ambiguity. These elements are "the complexity of human behavior, the surprise of unanticipated outcomes, deception from undefined roles and responsibilities, and the ambiguity of organizational day to day confusion" (pp. 31–32). Such traditional thinking yields to Harkins' (2002) concepts of convergent thinking, which Harkins said, "Thrives on the qualities of the educational bureaucrat and visionless legislature," as opposed to divergent thinking that supports "reliably continuous innovation" (p. 11). Harkins believed, "American education appeared to operate on the presumption of continuity, resisting calls for substantial change [that] were synonymous with chaos, and therefore was, by definition, unmanageable" (p. 11). Fayol's 1916 principle of management stated the belief:

Division of work permits reduction in the number of objects to which attention and effort must be directed and has been recognized as the best means of making use of individuals and of groups of people. It is not merely applicable to technical work, but without exception, to all work involving a more or less considerable number of people and demanding abilities of various types, and it results in specialization of functions and separation of powers. (Fayol, 1916, as cited in Shafritz, Ott, & Jang, 2005, p. 49)

Today's schools require technology reorganization initiatives that augment the need for administrators to learn how to manage the growing teacher autonomy within a school organization without undermining the positive characteristics of a self-directed work environment, while simultaneously attempting to meet the demands of school reforms, parents,

and students. Leithwood, Louis, and Anderson (2004) wrote, “Most definitions of leadership included two factors, providing direction and exercising influence. Each of these can be carried out in different ways, and such differences distinguish many models of leadership from one another” (as cited in Degehardt & Duignan p. 130).

In many aspects, all teachers need to take a leadership role as they implement technologies such as virtual instruction activities into their daily lessons. Like industry, education leaders have to cope with the ever-changing, technology-driven, work environment. Kotter (1996) stated, “Without sufficient empowerment, critical information about quality sits unused in workers’ minds and energy to implement changes lies dormant” (pp. 166-167).

The complexities of managing organizations are the results of the difficulty in predicting human behavior. Bolman and Deal (2008) believed trying to obtain the validity of “people doing work” and determining how such work impacts results could be clouded by biased perceptions and ineffective evaluation skills. They identified the underpinnings of an organization’s ambiguity:

We are not sure what the problem is. We are not sure what is really happening. We are not sure what we want. We do not have the resources we need. We are not sure what we are supposed to do. We are not sure how to get what we want. We are not sure how to determine if we have succeeded. (Bolman & Deal, 2008, p. 33)

These statements of ambiguity are points of discussion when attempting to understand the thoughts and perceptions of CTE administrators who are responsible for realigning their curriculum, instruction delivery, and program designs to meet the needs of the 21st-century learner. To better understand how leaders make sense of their organizations, the concept provided by Bolman and Deal (2008) seemed applicable: “A frame is a coherent set of ideas

forming a prism or lens that enables the researcher to see and understand more clearly what goes on from day to day” (p. 43). Bolman and Deal outlined the six assumptions underlying the construct:

Organizations exist to achieve established goals and objectives. Organizations increase efficiency and enhance performance through specialization and appropriate division of labor. Suitable forms of coordination and control ensure diverse efforts of individuals and units mesh. Organizations work best when rationality prevails over personal agendas and extraneous pressures. Structures must be designed to fit an organization’s current circumstances (including its goals, technology, workforce, and environment). Problems arise and performance suffers from structural deficiencies, which can be remedied through analysis and restructuring. (Bolman & Deal, 2008, p. 47)

The assumptions support the structural frame and have their origins in Taylor’s (1911) research of time and motion, which he branded *scientific management*, as well as Fayol’s model outlining the following indicators as a *monochromic bureaucracy*. These indicators are a fixed division of labor, a hierarchy of offices, a set of rules governing performance, a separation of personal from official property and rights, the use of technical qualifications rather than family ties or friendship for selecting personnel, and employment as a primary occupation and long-term career. Conventional organizational models were challenged in this research by the nuances of the 21st-century work environments, where bricks and mortar workspaces (e.g., classrooms/schools) are eroding and virtual work environments (online, webinars etc.) are increasing. Hill purported:

Today’s public school system tolerates new ideas only on a small scale and it does so largely to reduce pressures for broader change. The current system is intended to

advance individual, community, and national goals, but is, in fact, engineered for stability. That is normally a good thing. We want schools to open on time, teachers to count on having jobs from one day to the next, and parents to feel secure knowing their children will have a place to go to school. Stability alone, however, is the wrong goal in a complex, fast-changing, modern economy. (Hill, as cited in Darling-Hammond, 2010, p. 266)

The current educational reforms represent an attempt to bring education and learning into the 21st-century. Traditional education has followed in the footsteps of traditional business and industry whereby

Two things have happened to put pressure on this traditional mode. First, the parameters of success have changed from process control to innovation. You simply can't "Six Sigma" your way into new markets. Instead, organizations need to develop the organizational flexibility to adapt to fast-changing situations. Second, businesses are now more likely to be delivering services than manufacturing objects. (Li, 2010, p. 13)

"The modern official always strives and usually enjoys a distinct social esteem as compared with the governed" (Weber, 1964, as cited in Shafritz et al., 2005, p. 75). The new paradigm requires administrators to evaluate teacher performance through a different lens. It also compels them to examine themselves to ascertain how they will perceive their new roles and or positions in the hierarchy of the teaching and learning environment. Weber expanded, saying,

The actual social position of the official is normally highest where, as in old civilized countries, the following conditions prevail: a strong demand for administration by trained experts; a strong and stable social differentiation, where the official predominantly derives from socially and economically privileged strata because of the social distribution

of power; or where the costliness of the required training and status conventions are binding upon him. (Weber, 1964, as cited in Shafritz et al., 2005, p. 75)

The focus of the present research was to examine the ways in which the beliefs and perceptions of CTE administrators influenced the general school organization protocols and methodologies of the administrators when they developed learning environments during a period demonstrating a sharp decrease in hierarchal delineations. In the leader-member exchange (LMX) theory defined by Dansereau, Graen, and Haga (1975), the leader was the most important figure, due to his or her ability to impose sanctions and grant privileges to subordinates. As the construct was refined, a less authoritative view of the leader was implemented as a variable and was replaced with the idea that the leader communicates a set of expectations regarding the appropriate role behavior of the member (Katz & Kahn, 1966). Elmore (2000) stated,

The job of administrative leaders is primarily about enhancing the skills and knowledge of people in the organization, creating a common culture of expectations around the use of those skills and knowledge, holding the various pieces of the organization together in a productive relationship with each other, and holding individuals accountable for their contributions to the collective result. (p. 15)

Today many CTE administrators could view this as a time of uncertainty, because what was previously known and understood to be sound leadership qualities are now in question, due to the new and emerging needs of the 21st-century CTE classroom. Zmuda, Kuklis, and Kline (2004) suggested the world of the 21st-century demands creative coping mechanisms.

Sociologists Bryk and Schneider proposed, “Trust foments a moral imperative to take on the hard work of school improvement” (as cited in Ravitch, 2010, p. 66). The uncertainty for many administrators and industry leaders centers on the concept of “leading by influence” (Wagner,

2008, p. 28). A leader in the 21st-century workplace is required to manage a complicated system of people. Kotter (1996) maintained,

Management is a set of processes that can keep a complicated system of people and technology running smoothly. The most important aspects of management include planning, budgeting, organizing, staffing, controlling, and problem solving. And leadership is a set of processes that creates organizations in the first place or adapts them to significantly changing circumstances. Leaders define what the future should look like, align people with vision, and inspire them to make it happen, despite the obstacles. (p. 25)

In the 21st century, CTE school organization instructional environment, CTE administrators supervise programs that allow more autonomy for teachers and students. “Having the confidence and humility to give up the need to control but to inspire commitment from people to accomplish goals” (Li, 2010, p. 18) is an emerging supervisory standard.

Administrators need to explore the advantages of having less control in this technologically driven environment in order to lead successfully. Supporting education leaders with technology is an emerging concept. “Whereas the division of labor up to this point has been between the operators themselves, the introduction of a manager introduces a first administrative division of labor in the structure—between those who do the work and those who supervise it” (Mintzberg, as cited in Shafritz et al., 2005, p. 219). Pink (2009) believed, “Our default setting is to be autonomous and self-directed; unfortunately, circumstances, including outdated notions of management, often conspire to change this default setting” (p. 222). Similarly, Pfeffer (1994) pointed out, “A focus on individual self-actualization is useful, but a focus on sheer self-reliance

is not likely to encourage one to try to get things done with and through other people—to be a manager or a leader” (p. 8).

To date, most education leaders have focused on student learning, curriculum, and student achievement, and on acquiring the needed supporting technology. However, the day-to-day duties and responsibilities of the 21st-century school leader are not defined as clearly as in the past. “Command and control hierarchical leadership, is increasingly becoming a relic of the past” (Neal, as cited in Wagner, 2009, p. 25). As technology increases in education, administrators’ skills need to adapt to the new demands of the 21st-century school organization model.

Duignan (2010) declared, “The challenge to lead in a time of change is a difficult one, because it often requires a shift in a hierarchical world model to an inclusive, transformational leadership model” (p. 33). Administrators are expected to organize and monitor school/classroom portals, thus blurring the lines between administrator and teachers. Gladwell (2002) stated, “We are powerfully influenced by our surroundings, our immediate context, and the personalities of those around us” (p. 259). Li (2010) cautioned, “Open leaders will have to be very comfortable with using social technologies when implementing an open strategy” (p. 195).

In the study conducted by Project Tomorrow, parents were surveyed concerning the features they desired in an online school or classroom. The study results indicated, Seventy-four percent favored access to curriculum materials and online textbooks that can be used at home. Sixty-two percent favored information updated daily on their child’s homework assignments, projects, and upcoming tests. Fifty-three percent favored the updated daily information on their child’s progress. Fifty-one percent favored the

special alerts for missing assignments, low grades and failing of a class. (Project Tomorrow, 2011, p. 13)

An open enterprise suggests a system can spontaneously restructure, move into a larger heterogeneity, and still maintain a steady state, and employees can still perform with minimal interruption or disruption to doing work. Through the open process, enterprises are robust and self-sustaining by demonstrating their ability to conduct regular commerce in products or services with other enterprises, institutions, and persons in their external social environment (Trist, 1993). The belief is that an open enterprise will always yield to the joint action of its core and to material or human resources as well as the broader social environment. The present research included a close look at leadership motivation and at how technology-driven instruction could increase or decrease personal and professional satisfaction. Among the concepts examined were leadership motivation and technology-driven instruction in relationship to the efficacy of faculty pedagogy.

Trist and Bamforth (1951) disaggregated the two terms of “socio-technical system” and “technological system” from each other, based on the social structure of the occupation roles that had been institutionalized. This new construct went against the traditional belief that researchers should treat systemic work issues as a whole. Two different perspectives from two different disciplines, social science and engineering, can combine to offer new and unique constructs as related to today’s workplace.

The new construct is by nature similar to the educational phenomenon of merging academic disciplines such as science, technology, engineering, and math (STEM). Harkin prophesized; “The separation of technical/vocational education from liberal or general education will greatly diminish” (p. 5). As the 21st-century CTE learning model advocates, the new CTE

classroom is a transition into a technology-supported learning and training environment in which students are enrolled to gain 21st-century skills, meet industry standards, and earn academic graduate level credit simultaneously. This model aligns with the beliefs of Friedman (2006) who maintained, “The United States still excels at teaching science and engineering at the graduate level, but the Chinese get more feeder stock coming up through their improving high schools and universities” (p. 347). In New York State, all New York State Education Department (NYSED) approved BOCES CTE programs provide the successful CTE student with the opportunity to earn college and CTE graduate level credit concurrently, thus providing a financial and educational value added component (NYSED, 2011a).

Administrators of CTE programs must introduce new CTE programs and upgrade old programs to meet the new 21st-century industry needs. When the restructuring of an organization occurs, time and resources are expended. According to Bolman and Deal (2008), a successful outcome is never assured, due to environment shifts, technology changes, organization growth, and leadership changes.

Transitioning from a traditional organization model to a 21st-century school organization model has a less defined work-learning environment that mandates education leaders to understand the contextual variables of employee motivation as they promote 21st-century workplace teamwork and collaboration. Employee motivation and perceptions can influence organizational transformations, and Pink (2009) believed, “Unfortunately, despite sweet-smelling words like ‘empowerment’ that waft through corporate corridors, the modern workplaces’ most notable feature may be its lack of engagement and its disregard for mastery” (p. 109). Pink elaborated, “Only engagement can produce mastery, an important but often dormant part of our drive and that become essential in making one’s way in today’s economy”

(p. 109). Bolman and Deal (2008) outlined the following ten questions that administrators should consider when attempting to vet the behaviors that can distort anticipated outcomes when reconfiguring organizational teams:

1. What are your goals?
2. What needs to be done?
3. Who should do what?
4. How should we make decisions?
5. Who is in charge?
6. How do we coordinate efforts?
7. What do individual members care about most: time, quality, participation?
8. What are the special skills and talents of each group member?
9. What is the relationship between this group and other?
10. How will we determine success? (Bolman & Deal, 2008, pp. 102-103)

These questions examine goal setting, the specific objectives and responsibilities of each member, the decision-making structure and coordination, and the question of leadership. In addition, the questions examine individual organization members' concerns, skills, relationships, and their definitions of success. Pink stated, "One reason for anxiety and depression in the 'high attainers' is they are not having good relationships" (2009, p. 143). The fore-mentioned questions Bolman and Deal (2008) presented provide a lens to evaluate possible responses that would impede or bolster the success of an organization's transformation because they relate to relationships and motivation.

Use of both the four frames of leadership (Bolman & Deal, 2008) and the social theory proposed by Trist and Bamforth (1951) that addressed the relationship between man and

machine provided a foundation for the findings of the present research to provide some insight into the effects of technology on CTE school organization. Fullan (2001) advocated, “It is essential for leaders to understand the change process; moral purpose without an understanding of change will lead to moral martyrdom” (p. 5). The Race to the Top is one of three major American school reforms that have shaped the nation’s school programs within the last 30 years. In 1981, government leaders commissioned a study on the state of the nation’s school systems. The findings from the study *A Nation at Risk* (USDOE, 1983) reported, “Our nation is at risk. Our once unchallenged preeminence in commerce, industry, science, and technological innovation is being overtaken by competitors throughout the world,” and recommended,

State and local high school graduation requirements are strengthened and, at a minimum, all students seeking a diploma are required to lay the foundations in the Five New Basics by taking the following curriculum during their 4 years of high school.... For the college-bound, 2 years of foreign language in high school are strongly recommended in addition to those taken earlier. (USDOE, 1983, “Recommendation A: Content”)

The *Nation at Risk* report further recommended, “Citizens across the Nation hold educators and elected officials responsible for providing the leadership necessary to achieve these reforms, and, citizens provide the fiscal support and stability required to bring about the reforms we propose” (USDOE, 1983, “Recommendation E: Leadership and Fiscal Support” section).

In 2001, the No Child Left Behind (NCLB) school reform mandated, “A 100 percent proficiency in reading and mathematics by 2013-2014 by all U.S. public and private schools that receive public funding” (Ravitch, 2010, p. 97). In 2009, Race To The Top (RTTT), a 21st-century school reform, was introduced. Its purpose was to

Adopt standards and assessments that prepare students to succeed in college and the workplace; Build data systems that measure student growth and success and inform teachers and principals how to improve instruction; Recruit, develop, reward, and retain effective teachers and principals, especially where they are needed most; and Turn around the lowest-performing schools. (Race to the Top Fund, 2009, “Purpose”)

These mandates are supported by standardized, high-stakes testing conducted, for the most part, online. “For the first time, state assessments will make widespread use of smart technology. They will provide students with realistic, complex performance tasks, immediate feedback, computer adaptive testing, and incorporate accommodations for a range of students” (USDOE, 2010a, para. 11). The new assessment mandates restrict administrators from individualizing instruction and, some argue, limit creativity.

School reform will continue to fail, until we recognize there are no quick fixes or perfect educational theories. School reform is a slow, steady, labor-intensive process that depends on harnessing the talent of individuals instead of punishing them for noncompliance with bureaucratic mandates and destroying their initiative. (Cohn, as cited in Ravitch, 2010, p. 66)

Biases or personal preferences can be covertly or overtly observed. Independent of one stating his/her preferences/bias, research must find alternate avenues to explore the complexities of motivation. Gladwell (2009) stated, “We like to think of ourselves as autonomous and inner-directed: who we are and how we act is something permanently set by our genes and our temperament” (p. 258). Juxtaposed with Gladwell’s belief that we are not so autonomous or inner-directed, Starratt (2003) proposed an ethical person is autonomous:

The ethical people are independent agents who act of an intuition of what is right or appropriate in a given situation. Their autonomy is in contrast to those who act of a mindless routine, or simply because others tell them to act that way, or who act of a feeling of obligation to or fear of those in authority. (Starratt, 2003, p. 30)

Starratt's belief was, "Autonomy implied a sense of personal choice, of taking personal responsibility for one's actions, of claiming ownership of one's actions" (p. 30). Understanding how to transform stagnant, compliance-driven CTE programs to a more open and autonomous student-driven learning environment requires CTE leaders to straddle the distance between organizational compliance and autonomy initiatives. Pink (2009) reasoned, "The opposite of autonomy is control. And since they sit at difference poles of the behavioral compass, they point us toward different destinations. Control leads to compliance; autonomy leads us to engagement" (p. 108). Career and Technical Education administrators who understand self- and employee motivation will assist all to identify the ways they should implement change, with or without any challenges to their personal moral code of ethical beliefs. Starratt (2003) stated:

Schools tend to reduce rationality to skills, to the processing of and the repackaging of information, but always to satisfy some external criteria of achievement defined by some impersonal other: an organization, a government agency, a commercial enterprise. The more these students accept this practical definition of intelligence, the less they feel any responsibility for what they know. (p. 21)

Understanding the CTE leader's stated perceptions and beliefs about pedagogical autonomy, observing the implications of contrary ideology in leadership behaviors, and documenting the ways in which they conducted the evaluation of their subordinates also served as core components of the present research. Career and Technical Education administrators need

to transition their CTE programs from a closed-door, teacher-in-charge classroom to a more open learning environment, where boundaries are no longer defined by a physical classroom wall, by rigid student programming and curriculum, or by teacher capacity. According to Li (2010), an open organization model, “still requires a leader to set goals, strategy, and the agenda, but with greater information sharing and distributed decision making, the leader’s role in the organization changes in subtle but significant ways” (p. 197).

The obstacles of a smooth transition rely on a leader who understands this premise. Li (2010) indicated, “You are asking a group of individuals to do things differently from what they have done in the past” (p. 197). Present day school “architecture, technology, enrollments, and employment patterns” (Degenhardt & Duignan, 2009, p. 122) all support the need for appropriate change in the ways in which administrators design CTE programs. The perceptions and beliefs of the CTE administrators who design the new programs will define the ease with which they grapple with the technology-driven open leadership practices of authenticity and transparency, and will also define their comfort level as they function in an open forum. This new forum is where “radical new pedagogy–student focused, highly relational, and based on authentic curriculum and authentic assessment–will be developed” (Degenhardt & Duignan, 2009, p. 40).

Making the needed changes without bias can be difficult. Bolman and Deal (2008) expressed that organizational goal setting success involves “the manager as the politician” and defined the constructs of a politician as someone who is able to “diagnose political realities, set agendas, build networks, negotiate, and make ethical and effective choices” (2009, p. xi).

Secretary of Education Arne Duncan’s “Pathway to Prosperity” (2011a) report clearly stated:

The mission of CTE has to change. It can no longer be about earning a diploma and landing a job after high school. The goal of CTE 2.0 should be that students earn a

postsecondary degree or an industry-recognized certification--and land a job that leads to a successful career. (p. 3)

Secretary Duncan's message also broadened the breadth and depth of the challenge presented to current CTE administrators by stating; "To be fair, the uneven quality of career and technical education is one reason CTE fails to receive the attention it deserves. The shortcomings of the old vocational educational system are well-known, and unfortunately, many of them persist today" (2011a, p. 3). The CTE administrator is clearly called upon to change the face of this nation's career and technical education programs. On the local level, the CTE administrator must attempt to upgrade while maintaining quality CTE programs that meet the new 21st-century political agenda. On the local level, New York State's Career and Technical Education Policy of 2001 was established as a means to improve the design and quality of CTE programs and to offer students a flexible pathway to graduation (MAJI Education Services, 2006, p. 1). Although Duncan's (2011b) message addressed the need to improve and promote CTE programs, NYSED does not mandate CTE programs.

Easton determined, "A political system is considered to be an open system; that is, one draws resources from its environment, processes them in some fashion, and returns the process resources to the environment" (Easton, 1965, as cited in King, Swanson, & Sweetland, 2003, p. 14). As school budgets face stress due to the downturn in the local economies and struggle to find ways to appropriate tax levy monies that provide for student education programs, King et al. (2003) further explained:

The crisis is not so much a function of the deterioration of the quality of public education in its traditional format as it is the result of global, social, and economic changes making much of what a system was designed to do in and for another era irrelevant. The solution

requires realignment or redesign of the system in order to enable educators to prepare graduates to live and work successfully under new conditions. (pp. 4-5)

Administrators for BOCES CTE programs must develop annual operating budgets, negotiate within their own organizations for funding and support, and promote the added value of CTE programs to the component district school to ensure that a robust student enrollment will generate sufficient tuition revenues to cover operating annual operating costs. The purpose of interviewing BOCES CTE administrators in this research was to determine how, if at all, the political realities are different in the new CTE paradigm. Bjork observed, “During the last few decades, the American public has persistently demanded that schools align their work with changing demographics, social, economic, and technological realities of society” (2005, p. 4).

In the current era of school change, CTE administrators need to prepare CTE teachers to teach in new and upgraded CTE programs. Many teachers hired more than 10-15 years ago find themselves feeling technologically challenged. “The workforce in education is ageing, and in many of the Western countries, the average of age of teachers is in excess of 45 years” (Santiago, 2001, as cited in Duignan, 2010, p. 38).

Paradoxically, the Dawley, Rice, and Hincks (2010) study results showed teachers with five years or less of teaching experience exhibited the greatest need in instructional design, design tools, and syllabi design. Teachers with six or more years of teaching experience reported fewer training needs than their peers reported. However, the more experienced teachers required support in areas such as psychology of online learning, promoting student autonomy, and student readiness. Duignan (2010) stated, “As the average age of educators continues to rise, education systems and schools need to devote more resources and generate creative solutions to ensure that teachers and other educational leaders continue to be professionally challenged” (p. 39)

The CTE administrator has to manage both the widely divergent perceptions between technological pedagogy skill ability and fact when determining program assignments and program relevancy. Bandura (1997) contended, “The role of self-efficacy beliefs in human functioning is people’s level of motivation, affective states, and actions are based more on what they believe than on what is objectively true” (p. 2). Duignan (2010) explained, saying, “Education leaders in the 21st-century need to devise new and creative ways of ensuring that teachers and other educators with many years of experience are continuously challenged and actively engaged in their own personal and professional development” (p. 41). Ongoing teacher professional development is an option employed by CTE administrators to assist in mitigating this growing problem, but resources and funding are limited and the CTE administrator has to determine where best to allocate funds.

Perceptions and data-supported facts are the two divergent underpinnings of a school organization. A CTE administrator who attempts to foster an open organization has to learn how to politically integrate “passion for the vision, focus on relationships, and have a hacker mentality” (Li, 2010, p. 202). Focusing on relationships requires an astute administrator who has the ability to identify the people who are open and available to advocate for the organization in a less structured environment. “Social structure can be designed to produce specific social goods, including knowledge, trust, formal rules, and commitment or loyalty” (Zucker & Darby, 2005, p. 562). Redesigning CTE programs will compel CTE administrators to facilitate learning environments where the status-quo is shunned and is looked upon as a good reason for change. Daggett (2008) believed:

Schools must do more to keep pace with the rapid technology, research, and societal changes. They must embrace new designs for learning based on emerging research about

how people learn, how to use technology effectively, and what skills are needed in the 21st-century. (p. 93)

Leadership and 21st-Century Classroom Instruction

Wagner believed schools must prepare to address,

The rapid evolution of the new global knowledge economy, with profound effects on the world of work—all work; the sudden and dramatic shift from information that is limited in terms of amount of information characterized by flux and glut; and the increasing impact of media and technology on how young people learn and relate to the world and to each other. (Wagner 2008, p. xxvi)

The educational leader who is responsible for facilitating change will influence how schools prepare students for the 21st-century workplace. Daggett (2008) asserted, “While all educators must play key roles in changing schools, those in leadership positions bear an even greater burden. They must respond to change appropriately, and they must show others the way” (p. 61). Chen (2010) suggested, “We need to put the edge into education and create a sense that teaching and learning are exciting, contemporary, and cool; as its most important enterprise, education should be on the cutting edge of society, technology, and culture, rather than trailing other sectors” (p. 3). Chen cited the Time, Learning, and Afterschool Task Force (2007), which suggested, “The structure of the day for American children and youth is more than timeworn. It is obsolete; in a new day for learning, there is no final bell” (Chen, 2010, p. 139). The North American Council for Online Learning (NACOL), which conducted a study in 2006 on the efficacy of virtual learning in the American classroom, declared:

Online learning through virtual schools is one of the most important advancements in attempting to rethink the effectiveness of education in the United States. Education

leaders are re-thinking how the national educational system will address the learning needs of today's learners and prepare our nation's students for the world of work. From national defense to environmental defense, from national security to economic security, every major issue of our day depends on our capacity to educate our citizenry. (NACOL, 2006, p. 2)

In an attempt to meet these new demands, today's education leaders are challenged with deficiencies in funding, technology, and visionary leadership. Duignan (2010) suggested, "Management issues such as strategic planning, resource allocation, or organizing and scheduling educational processes and tasks demand the application of sound management processes, at the core is the relationship issues between and among the people involved" (p. 43). The New Commission on the Skills of the American Workforce (2007) stated, "Our core problem is that our education training systems were built for another era, an era in which most workers needed only a rudimentary education" (p. 7). The present and future competitive, global economy will require American students to demonstrate strong creativity, problem-solving, communication, and analytical thinking skills.

On January 10, 2011, the New York State Board of Regents approved the recommended additions to the Common Core Learning Standards for English Language Arts and Literacy and Common Core Learning Standards for Mathematics, plus a new set of Pre-kindergarten Standards (NYSESED, 2011b). However, Darling-Hammond speculated:

The best employers the world over will be looking for the most competent, most creative, and most innovative people on the face of the earth. Beyond strong skills in English, mathematics, technology, and science, candidates will have to be comfortable with ideas

and abstractions, good at both analysis and synthesis, creative and innovative, self-disciplined, and well organized. (2010, p. 1)

Dawley, Rice, and Hinck (2010) presented a case for virtual education as an option to meet the goals that will prepare students for college and career. Dawley et al. showed online delivery through teaching and learning management systems could improve data-driven decisions and strengthen the school-to-parent connection. Such learning management systems provide rich data-driven environments that can inform instructional and administrative decision-making and thus improve student achievement. McNulty (2011) suggested, “Technology can be an optimal learning tool, allowing students to work with graphic and interactive displays, and organizational and problem solving skills can be developed through the use of technology and honed for the use in the world of work”(p. 6). Both fully online and blended courses are beginning to make major inroads in our schools today. A Sloan Consortium follow-up study found:

Of the three quarters of the responding public schools, 75 percent had one or more students enrolled in a fully online or blended course, 70 percent had one or more students enrolled in a fully online course, and 41 percent had one or more students enrolled in a blended course, and these percentages presented a 10 percent increase since the 2005-2006 report. (Picciano & Seaman, 2008, p. 1)

CTE administrators who transform their programs will have to evaluate the appropriateness of various technologies as they relate to curriculum content, delivery of instruction, and their effect on CTE teaching and learning. Daggert (2008) contended, as educators, “[We] must embrace new designs for learning based on emerging research about how people learn, how to use technology effectively, and what skills are needed in the 21st century”

(p. 93). The supporting concept of technology and its implications for CTE are dependent upon how successful it is at incorporating 21st-century skills related to design, delivery, and instructional methodology. Daggert explained,

Most teaching of document, technological, and quantitative (DTQ) literacy takes place in career and technical education programs . . . educators need to understand what level of skill their students are demonstrating DTQ literacy [and teachers] need specific strategies to help teach the skills needed for DTQ literacy. (2008, pp. 94-95)

The influence of technology in the classroom may produce a variety of outcomes.

However, the NACOL *Virtual Schools and 21st-Century Skills* White Paper (2006) reported:

- The 21st framework should be integrated, wherever possible, into all aspects of virtual school curriculum, instruction, and assessment.
- Online students should be expected to demonstrate mastery of 21st-century skills as a distinct outcome of their education experiences.
- Virtual school teachers should be provided with appropriate opportunities to learn effective techniques and best practices for teaching 21st-century skills in online environments. (p. 8)

The theory of socio-technical systems discovered by Trist and Bamforth (1951) can assist in framing the relationship between technology and 21st-century classroom pedagogy (teacher tasks and or roles). Related studies conducted by Oeser and Emery (1954) suggested,

The child's relation to the learning material is given little opportunity to develop into a spontaneous interest relation because it is overshadowed by the teacher-child relationship. The teacher generally decides what material should be worked on, the relative importance of the different aspects, how it should be worked on, the standards of

achievement, and when work should cease. It is only rarely that the child's behavior is spontaneously oriented towards problems posed by the material itself or guided by the demands implicit in the structure of the material. (p. 132)

This construct speaks to how technology individualizes learning and teaching tasks.

“The whole individual raises new problems for the organization, partly because of the needs of his own personality and partly because he brings with him a set of established habits” (Selznick, 1948, p. 26). Bruner stated, “There is a tremendous difference between learning about physics and learning to be a physicist. Isolated facts and formulae do not take on meaning and relevance until learners discover what tools can do for them” (as cited in Lombardi, 2007, p. 2). Authentic learning is “comprised of three factors: first, learned material must be significant; second, it must demand intellectual quality; and third, it must be delivered within a quality learning environment” (Gore, 2005, as cited in Degenhardt and Duignan, 2010, p. 97).

Students have more options with an online learning experience because of its flexibility in scheduling, customization of personalizing and individualizing instruction to meet individual needs, and interest in the subject and delivery mode. Project Tomorrow (2011) asserted, “Some students rely on their teachers or schools to facilitate these enhanced digital learning opportunities, while other students, those who are identified as ‘free agent learners’, seek out such online learning resources on their own” (p. 2). These findings align with the identified needs of the 21st-century workforce. Christy Pedra, CEO of Siemens, stated,

The concept of teamwork today is very different from what it had been twenty years ago.

Technology has allowed for virtual teams. The way some engineering projects in our company are set up is that you are part of a virtual team. We have teams working on major infrastructure projects that are all over the U.S. On other projects, you're working

with people all around the world on solving a software problem. They don't work in the same room, they don't come to the same office, but every week they're on a variety of conference calls; they're doing web casts; they're doing net meetings. (Pedra, as cited in Wagner, 2008, p. 23)

Today's CTE administrators attempt to make sense of the dynamics of supervising a blended virtual learning environment and managing student and school organization information digitally, a complex task (Gladwell, 2009). This ability to stay current is paramount for teachers and administrators to maintain relevant lessons and curriculum. Wurman stated, "A weekly edition of *The New York Times* contains more information than the average person was likely to come across in a lifetime in 17th-century England" (Wurman, as cited in Berger & Trexler, 2010, p. 32). Wagner (2008) contended, "The use of the Internet and other digital technology has transformed both what young people learn today and how they learn" (p. 178).

Wagner (2008) speculated that students today need to acquire what he termed the seven basic survival skills: critical thinking and problem solving, collaboration across networks and leading by influence, agility and adaptability, initiative and entrepreneurialism, effective oral and written communication, assessing and analyzing information, and curiosity and imagination. The CTE administrators need to upgrade antiquated classrooms to address 21st-century employment, college, and career expectations, as well as to reevaluate CTE curricula, instruction delivery, and teacher evaluation. As Wagner (2008) stated, "The portrait of the new world of work is emerging as a complex one; the shifts from hierarchal authority telling you what to do to a team-based environment have been both rare and profound" (p. 30). Technology has influenced the role of the leader. Karen Bruett, manager of strategic development in K-12 education at the Dell Computer Corporation, reported,

Corporations have changed dramatically in the last 20 years in terms of the ways work is organized. Most companies used to have big hierarchies, and were very top-down in their management styles, and employees were very specialized in their functions. (as cited in Wagner, 2008, p. 15).

According to Manz (1992), “Self management is often associated with creative and non-routine work, dynamic environments; and custom or, continuous process technologies” (p. 277). The CTE administrator must provide leadership for the three core domains of a 21st-century CTE program, including curriculum, student engagement, and teacher performance.

Curriculum and Instruction

Research has demonstrated CTE teachers, like academic teachers; “have the most direct impact on instruction” (Silverberg, Warner, Fong, & Goodwin, 2004, p. 10). Bernhardt, Hedley, Cattaro, and Svolopoulous (1998) advocated, “Teaching needs to be organized around individual students’ work or subgroups within a class” (p. 194). Traditional beliefs regarding curriculum and instruction asserted that, by nature, both were designed to be teacher and textbook dominated. Venezky (1992) stated, “A textbook exists both as a cultural artifact and as a surrogate curriculum” (pp. 436-461). However, by design, technology-supported CTE courses provide an opportunity for teachers to prepare lessons that can be implemented as individualized learning activities.

Schlechty (1990) contended; “Students are active participants in the knowledge-work process; their job is to take the knowledge embedded in the curriculum and process it in a way that makes it their own” (p. 43). Teachers also need to demonstrate “judgment to distinguish reliable from unreliable information, patience to follow longer arguments, synthetic ability to recognize relevant patterns in unfamiliar contexts, flexibility to work across disciplinary and

cultural boundaries to generate innovative solutions” (Lombardi, 2007, p. 3). “Setting forth a clear understanding once and for all about what students should know, and which teaching methods best help students engage content in depth, will be crucial to putting such debates to rest” (Darling-Hammond, as cited in Hersh, 2009, p. 28).

Threton (2007) conducted a study of the Carl D. Perkins Career and Technical Education (CTE) Act of 2006, and the Roles and Responsibilities of CTE Teachers and Faculty Members. The purpose of the study was to evaluate the effectiveness of integrating academics into CTE programs. Threton (2007) reported, “All teachers need to integrate in their classrooms a range of activities, tasks, and projects, including case studies, relevant to what they teach, aimed at targeting mind growth” (p. 74). Results in the Brown, Collins, and Duguid (1989) study indicated, “Student learning is enhanced when structured in a real environment situation, and one of the most effective ways of teaching skills is in context, (i.e. academics)” (as cited in Threton, 2007, p. 76). Harkins’ (2002) conceptual essay posed, “It is about synchronizing CTE with a knowledge-driven continuous innovation society” (p. 1).

In a research study developed by Teachers College, Columbia University, and Rutgers University (2010), the Blackboard Institute investigated the implications of dual enrollment for the students who traditionally are underrepresented in higher education. These dual enrollment college courses could be taken in a CTE secondary program, which 17 of the 50 states offered online. The study concluded dual enrollment could “Enhance the academic rigor of high school curricula, provide students with a broader range of academic-oriented courses, and make education more relevant, to the extent students can take courses related to their interest or career goals” (Barnett & Stamm, 2010, p. 8). The report “Closing the Expectations Gap” related:

Clear and compelling evidence shows the level of the courses students take in high school is one of the best predictors of their success in college and the workplace. This is particularly true in mathematics: Data show a strong correlation between taking higher-level mathematics courses in high school and achieving success in college and employment in high-growth, high-performance jobs. (Achieve, 2008, p. 8)

Cuyamaca College (2004) research identified characteristics of online course academic rigor as those that:

Meet classroom-based class standards; offer students sufficient weekly work; include alternate, hands-on assignments and regular quizzes and exams to monitor student progress; incorporate ways to keep students on track; provide an outlined syllabus, regular and weekly updates, and meaningful assessments based on multiple measures; and maintain the same grading standards as a regular classroom based course. (p. 6)

Student Engagement

Green stated, “Education remains the most important crucible for remedying disparities, enhancing life opportunities, developing citizens, and promoting a genuine democracy” (as cited in Cooper et al., 2008, p. 406). Chen (2010) reported the following United States school statistics:

Of 50 students behind in reading in the first grade, 44 will still be behind in the fourth grade. An American student drops out of high school every 26 seconds, a total of 6,000 a day. Thirty years ago, the United States ranked 1st in the quality of its high school graduates. Today, it is 18th among twenty-three industrialized nations. (p. 2)

The American school systems have not come under such direct scrutiny since 1981, when then-President Ronald Reagan commissioned the Excellence in Education Committee to address

the issue of failing schools. Highlights of the 2006 Programme for International Scores and Assessment (PISA) scores compiled by the National Center for Education Statistics (NCES) identified deficiencies in American student skills when they competed globally in science, mathematics and literacy (Baldi et al., 2008). The 2006 PISA report stated American 15-year-old students had an average score of 489 on the combined science literacy scale, lower than the Organization for Economic Cooperation and Development average score of 500.

American students scored lower on science literacy than students in 16 of the 29 OECD areas and in six of the 27 non-OECD areas. Only 22 jurisdictions (five OECD jurisdictions and 17 non-OECD areas) scored lower than the Americans in science literacy (Baldi et al., 2008) American students ranked in tenth place, behind students from Hong Kong, Singapore, Chinese Taipei, Japan, Kazakhstan, Russian Federation, England, Latvia, Netherlands, and Lithuania on fourth grade mathematics and science (Baldi et al., 2008). Hersh identified China's students as having, "science curriculum that was far more rigorous than the United States, and Chinese students are programmed for physics every semester in grades 8-12, with a final exam in the 12th grade" (2009, p. 28).

The Partnership for 21st-century Skills purported, "Within the context of core knowledge instruction, students must also learn the essential skills for success in today's world, such as critical thinking, problem solving, communication and collaboration" (2009, p. 1). The National Association of State Directors of Career and Technical Education Consortium (NASDCTEC), established in 1920 to represent secondary, postsecondary, and adult career technical education, revealed:

The average high school graduation rate for students concentrating in CTE programs is 90.18 percent, compared to an average national freshman graduation rate of 74.9 percent.

Seventy percent of students concentrating in CTE areas stayed in postsecondary education or transferred to a four-year degree program, compared to an average state target of 58 percent. Experts project 47 million job openings in the decade ending 2018. About one-third will require an associate's degree or certificate, and nearly all will require real-world skills that can be mastered through CTE. (NASDCTEC, 2011, p. 1)

The Center for Occupation and Development (CORD) also maintained that most students' interest and achievement in math, science, and language improve dramatically when they are helped to make connections between new information (knowledge) and experiences they have had. The report stated, "Students' involvement in their schoolwork increases significantly when they are taught why they are learning concepts and how those concepts can be used outside the classroom" (CORD, 2010).

The National Survey of Student Engagement (NSSE) reported, "Courses delivered primarily online seem to stimulate students' levels of intellectual challenge and educational gains" (NSSE, 2008, p. 11). Reynard's (2007) case study supported the NSSE findings and confirmed the blended or hybrid model of online learning increased learner autonomy. Reynard emphasized, "In a hybrid model that maximizes student self-direction, content choice, and organization, and heightens interaction, students become central to their own learning processes" (2007, p. 4). *Learning in the 21st-century: A National Report of Online Learning* (2006) reported; "Eighty-eight percent of 9-12 graders and 80% of 6-8 graders use technology at school for online research" (p. 10). An in-depth review of 51 online studies supported by the U.S. Department of Education determined, "Online learners in the online condition spent more time on task than students in the face-to-face condition and found greater benefit for online learning" (Patrick & Powell, 2009, as cited in Chen, 2010, p. 117).

Teacher Performance

McCaslin and Parker (2003) commented on the findings from the 2003 National Career and Technical Teacher Education Institute Final Report:

First, little is known about what makes a good career and technical education teacher and how that teacher contributes to academic and technical achievement. Second, an inadequate knowledge base is available regarding what the career and technical education teacher does in the classroom. Finally, there is little in the literature regarding what constitutes an effective career and technical teacher education program. (p. 2)

The Carl D. Perkins Vocational-Technical Education Act Amendments of 1998 authorized the National Center for Career and Technical Education to research and evaluate activities such as

- Integration of vocational and technical instruction, and academic, secondary, and postsecondary instruction;
- Education technology and distance learning approaches and strategies that are effective with respect to vocational and technical education;
- State-adjusted levels of performance and state levels of performance that serve to improve vocational and technical education programs and student achievement; and
- Academic knowledge and vocational and technical skills required for employment or participation in postsecondary education. (Threeton, 2007, p. 3)

CTE teachers are mandated to meet specific New York State teaching certification requirements (NYSED, 2011d). As of 2011, NYSED Law 3012-c required implementation of a

new annual professional performance review evaluation for all New York State school districts and BOCES. This evaluation:

Is designed to measure teacher and principal effectiveness based on performance, including measures of student achievement and evidence of educator effectiveness in meeting NYS teacher or school leader standards, and the results of the evaluations shall be a significant factor in employment decisions, including but not limited to promotion, retention, tenure determinations, termination, and supplemental compensation, as well as teacher and principal professional development, including coaching, induction support, and differentiated professional development. (NYSESED 2011d)

This newly designed annual professional performance review will address the principal's (and the CTE administrator's) responsibility to contribute to improving teacher effectiveness by mandating that goals be established to

Improve retention of high performing teachers, correlate student growth scores of teachers granted tenure vs. those denied tenure, improve quality of feedback provided by teachers throughout the year, and increase facilitation of teacher participation in professional development and the quality and effectiveness of teacher evaluations. (NYSESED, 2011c)

Hoyle et al. (2005) believed, "In the end, teachers control the curriculum. They each make the final determination about what to teach, in what order, for how long, using what materials and instructional strategies, and how to assess what students have learned" (p. 77). However, Gladwell believed, "Teachers are not solely responsible for how much is learned in a classroom, and not everything of value a teacher imparts to his or her students can be captured on a standardized test" (as cited in Ravitch, 2010, p. 187). Ravitch (2010) agreed with Gladwell and

stated, “Being an effective teacher is not necessarily a permanent, unchanging quality. Some teachers are outstanding year after year, when judged by increases in their students’ test scores; others are effective one year, but not the next, by the same measures” (p. 186).

Klagholz (2000) reported, “The length of time CTE teachers stay in the education field is longer than that of the academic teacher” (p. 16). With a longer retention period in the education field, CTE teachers risk becoming disconnected from new and emerging industry trends. There is a constant balancing act between developing and maintaining industry skills as well as strengthening academic pedagogy for the CTE teacher. There has been an 11% decline over the past 10 years in CTE teacher education programs (Bruening et al., 2001).

Targeted, industry-specific professional development is as important to a CTE teacher as is traditional educational professional development. Sawchuk (2009, p. 73) stated, “Training for teachers still tends to take place outside of schools.” The dilemma is unique because “Teaching in CTE is a rigorous yet frequently underrated challenge” (Cushall, 2002, p. 20). Researchers cited extensive research literature on professional development and reported, “Synthesis found training programs of a certain duration—30 to 100 hours of time over six months to a year—positively influenced student achievement, while those with fewer than 14 hours had little effect” (Wei, Darling-Hammond, Andree, Richardson, & Orphonos, 2009, p. 6).

Globalization and 21st-Century Leadership Skills

Homer-Dixon (2000) believed, “As we are careening into the future is the very time we need leadership” (as cited in Fullan, 2001, p. 134). Fullan himself (2001) asserted, “One of the main conclusions I have drawn is the requirements of knowledge societies to bring education and business leadership closer than they have ever been before. Corporations need souls and schools need minds” (p. 136).

Global competitors are widening the achievement gap because of the newfound desires and economic opportunities of their rising middle classes. Paradoxically, in the United States, income inequality is widening at an accelerated rate. According to a study by the Brookings Institution, “Middle-income neighborhoods, where families earn 80 to 120 percent of the local median income, have plunged by more than 20 percent as a share of all neighborhoods in Baltimore, Chicago, Los Angeles, and Philadelphia” (Harden, 2006). Both economically depressed and wealthy neighborhoods are on the rise, and cities and suburbs are becoming more segregated by income. Berube (2006) reported, “No city in America has gotten more integrated by income in the last 30 years” (p. 21).

Education can be considered a direct derivative of the middle class. This observation is validated through data providing evidence that India’s growing middle class correlated highly with its burgeoning educational opportunities for its citizens (Freidman, 2006). India’s middle class is growing at an average of 5.3 percent annually and, according to the McKinsey Global Institute (MGI), India’s middle class households are estimated at fifty million. MGI predicted this number will grow to 583 million by 2025 (Farrell & Beinhocker, 2007).

Globalization of industry has “flattened” the traditional corporate organizational structure. Friedman (2006) explained the need for U.S. schools to teach and to train students with “the right stuff” to meet these new industry organizational trends. Determining what the “right stuff” is and how to obtain it is perplexing, and a primary challenge of CTE school leaders.

The argument of how to appropriate value to a nation’s human resources and its relationship to the economic structure produces diverse rhetoric. Levin, Belfield, Muennig, and Rouse (2007) focused on the impact of the profit and loss of failing students on the U.S.

economy, in support of Schultz (1961), who conducted a research study based in humanistic and philosophical ideals. Schultz stated:

In principle there is an alternative method for estimating human investment, namely by its yield rather than by its cost. While any capability produced by human investment becomes a part of the human agent and hence cannot be sold; it is nevertheless in touch with the market place by affecting the wages and salaries the human agent can earn. The resulting increase in earnings is the yield on the investment. (1961, p. 1)

Blinder aligned with Schultz and stated:

It is clear the U.S. and other rich nations will have to transform their educational systems so as to produce workers for the jobs that will actually exist in their societies. Simply providing more education is probably a good thing in balance, especially if a more educated labor force is a more flexible labor force that can cope more readily with non-routine tasks and occupational change. But it is far from a panacea. In the future, how we educate our children may prove to be more important than how much we educate them. (Blinder, 2008, p. 302)

CTE leadership is responsible for transforming antiquated vocational programs into 21st-century CTE programs to provide students with the skills needed to be globally competitive. Starratt (2003) contended, “The school’s curriculum tends to be self-justifying and self-explaining. That is, it is not related to the larger social and political world of public policy, commercial enterprise, political struggle, and human tragedy” (p. 23). Gargan and Guare (1998) reasoned, “Today’s schools are caught in a whirlwind of social and political change, shifting paradigms and promises, and intense public debate about the nature of schooling” (p. 32).

Twenty-first-century education leaders will be working within in a new framework as they reinvent schools.

We are certain of one thing. We will never move within the bureaucratic structure to new schools, to free schools. That structure was invented to assure domination and control. It will never produce freedom and self-actualization. We cannot get there from here. This risk of movement from here to there is not great. The bureaucratic structure is failing in a manner that critical adaptations will not forestall its collapse. It is impractical. (Clark & Meloy, 1990, as cited in Bernhardt et al., 1998, p. 22)

Zmuda et al. (2004) believed profound and systemic change is required to meet the needs of these times. Fullan (2001) declared, “Pervasive leadership has a greater likelihood of occurring if leaders work on mastering the five core capacities: moral purpose, understanding of the change process, building relationships, knowledge building, and coherence making” (p. 137). Hoyle et al. (2005) affirmed 21st-century education leaders need to be able to demonstrate their ability to

- Gather, analyze, and use data to inform decision making,
- Ensure adherence to legal concepts, regulations, and codes for school operations,
- Use technology to enhance administration,
- Engage in financial planning and cash flow management,
- Establish procedures for budget planning,
- Administer auxiliary programs,
- Develop a plan for maintaining the school plant, equipment, and support systems,
- Apply appropriate components of quality management, and

- Implement a systems approach to monitoring all components (subsystems) of the school system for efficiency. (p. 53)

Darling-Hammond (2010) reasoned, “Today’s expectation that school will enable all students, rather than just a small minority, to learn challenging skills to high levels creates an entirely new mission for schools” (p. 237). CTE school leaders need to rethink how to simultaneously realign their programs to meet these expectations within the constraints of a bureaucratic system. Fullan (2001) stated the goal is to

Enhance the skills and knowledge of people in the organization, creating a common culture of expectations around the use of those skills and knowledge, holding the various pieces of the organization together in a productive relationship with each other, and holding individuals accountable for their contributions to the collective result. (p. 65)

Skilled leadership is needed to transition our schools into the 21st-century training mode. Friedman (2006) stated, “It is hard to have an American national strategy for dealing with ‘flatism’ if people won’t even acknowledge there is an education gap emerging; and there is an ambition gap emerging and we are in a quiet crisis” (p. 365). Understanding the CTE leaders’ thoughts and perceptions about the influence of technology on student achievement supported Friedman’s global belief:

The wealth in the age of flatness will increasingly gravitate to those countries who get three basic things right: the infrastructure to connect as efficiently, knowledge skills to empower more of their people to innovate and do value-added work on platform, and finally, the right governance; that is, the right tax policies, the right investment and trade laws, the right support for research, the right intellectual property laws, and most of all,

the right inspirational leadership to enhance and manage the flow with the flat world.
(2006, p. 329)

The extent to which CTE leadership is prepared to meet the needs and challenges of the 21st century is fast becoming one of the focal points in education today. Kowalski (2005) explained, “Not only have demands for reform persisted for an unusually long period, the nature of the change proposals have become progressively focused, and at least for the last 10 years, they have concentrated heavily on local school district governance” (p. ix). Kotter (1996) predicted,

Powerful macroeconomic forces are at work here, and these forces may grow even stronger over the next few decades. As a result, more and more organizations will be pushed to reduce costs, improve the quality of products and services, locate new opportunities for growth, and increase productivity. (p. 3)

The leadership skills and the environments in which these changes occur could be examined through Burns and Stalker’s *Mechanistic and Organic Systems*, which functioned as an “outline of the two management systems which represents the two polar extremities of the forms which such systems can take on when they are adapted to specific rates of technical and commercial change” (Burns & Stalker, as cited in Shafritz et al., 2005, p. 198). The mechanistic management system could be viewed as traditional organizational functionality, whereby “The specialized differentiation of functional tasks into which the problems and tasks facing the concern as a whole are broken down” and there is a “tendency for interaction between members of the concern to be vertical; i.e., between superior and subordinate” (p. 198). The organic management system could be considered more conducive to a 21st-century organizational functionality that is “appropriate to changing conditions, which give rise constantly to fresh

problems and unforeseen requirements for action which cannot be broken down or distributed automatically arising from the functional roles defined within a hierarchic structure” (Burns & Stalker, as cited in Shafritz et al., 2005, p. 199). Leading organizations to exhibit lateral communication rather than vertical communication, where communication between people is more of a consultant than directive model, is essential.

Summary

As CTE transforms to meet the emerging needs of today’s (and tomorrow’s) industry, CTE administrators will be compelled to understand the nuances of preparing today’s students for the anticipated workplace. In 2006, Friedman prophesized there would be a great number of “new middle jobs involving personalized, high-touch interactions with other human beings, because it is precisely those personalized high-touch interactions that can never be outsourced or automated, and are almost always necessary at some point in the value chain” (2006, p. 302). In 2011, Friedman and Mandelbaum stated, “We also have a new structural challenge in the labor market can only be addressed by more education and more innovations” (2011, p. 74).

The literature suggested this new trend could promote CTE as a crucial, educational education component necessary to develop work-ready skills for tomorrow’s workforce. The literature also contended the extent to which CTE teachers and administrators know and embrace the changing technologies and the subsequent nature of the workplace is the extent to which CTE students will achieve success. The authors quoted in this study were all of the belief that education must shift to meet the new emerging needs of the global economy. U.S. students will be expected to compete globally for jobs due to the increase in education and CTE training throughout the world. As Zacharia (2009) noted, “It’s not that the U.S. is falling behind and

attempting to regain superpower status as it relates to economy, education, and politically; but in fact, it must learn to compete with the rise of the rest of the global community” (p. 1).

CHAPTER III

RESEARCH DESIGN AND METHODOLOGY

Introduction

The purpose of this qualitative study was to examine how the technology beliefs of New York State Career and Technical Education Board of Cooperative Education Services administrators influenced their leadership behaviors. The objective was to assist CTE administrators in understanding how their personal technology beliefs and perceptions influence the transformation process of CTE programs, and the extent to which the transformation process produces new and revised leadership values and beliefs consistent with 21st-century educational, technology-supported learning environments. Exploration of the emerging roles of the CTE administrators as they encountered the complexities of transitioning daily CTE instruction from a chalk-and-talk teaching environment to a technology-supported learning environment was the focus of the study. The results of this research yielded best instructional practices to support positive student achievement and teacher pedagogy. Twenty-first-century CTE theory; teacher and administrator professional development; blended, virtual classroom instruction; and the application of innovative, instructional methodologies were topics explored. The research questions guiding this study follow:

1. What relationships exist among the CTE administrators' technology comfort levels and proficiencies and the degree to which 21st-century instruction is implemented?
2. How do CTE administrators' perceptions about their frequency of use and knowledge of specific technologies correlate with CTE 21st-century technology-supported instruction?

3. How do the CTE administrators' beliefs and perceptions about the frequency with which specific technologies are used influence the role of CTE administrators?
4. To what degree do differences exist between the CTE administrators' beliefs and perceptions about technology and the actual efficacy (value) of technology in CTE programs?
5. How do the technology beliefs and perceptions of the CTE administrator influence the degree to which technology influences school organization methods and structure?

Methodology of the Study

A qualitative method, the case study, was used to evaluate and examine the beliefs and authentic work experiences of CTE administrators. As Yin (2009) stated, "A case study is an empirical inquiry: It investigates a contemporary phenomenon within its real-life context; when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used" (p. 23).

This case study was designed to gather CTE administrators' perceptions and beliefs about the frequency of use and specific technologies related to CTE classroom instruction, school organization, and personal utilization, through a series of in-depth interviews. Through site visits, interviews, and document review, the researcher observed the ways in which these leaders attempted to make sense of the new supervision and administration paradigm. The selected interview questions encouraged open-ended responses and were flexible enough for the researcher to note and collect data on any unexpected dimensions of the topic under discussion (Bogden & Biklen, 2007). A descriptive, holistic, and comprehensive lens was used in this study to examine data, observations, and interviews. The qualitative methodology offered the

opportunity to explore each CTE administrator's satisfaction, professional development engagement, and his or her ability to define CTE administration and supervision pedagogical responsibilities clearly. Merriam (2009) stated:

Qualitative researchers are interested in how people interpret their experiences, how they construct their worlds, and what meaning they attribute to their experiences. The overall purposes of qualitative research are to achieve an understanding of how people delineate the process of meaning making and to describe how people interpret what they experience. (p. 14)

The research processes chosen allowed discovering the ideas, beliefs, and personal feelings of the CTE administrators pertaining to their use of technology in CTE program development, school organization, and CTE curriculum and instruction, as well as the implications for the emerging role of the CTE administrator in a 21st-century learning environment. The research was designed for uncovering the similarities and differences of a homogeneous group of CTE administrators who were purposefully selected from among New York State BOCES CTE administrators, thus eliminating content area specific idiosyncrasies.

Unit of Analysis

The Board of Cooperative Educational Services (BOCES) was created through legislation in 1948 to provide shared educational services to school districts throughout New York State, excluding the "Big 5" city school districts of Buffalo, Syracuse, New York City, Yonkers, and Rochester. Presently, 37 BOCES are charged with the mission to provide cost-effective school services, prepare diverse populations of students for a global workforce, and collaborate with district schools to close the student achievement gaps. Five units of analysis were purposefully selected for this study: two rural and three suburban/rural BOCES. All of the selected BOCES

had a Center for Career Services programs that provided CTE training for their participating district schools.

In a purposive sampling, the researcher chose particular subjects because they were “believed to facilitate the expansion of the developing theory” (Bogden & Biklen, 2007, p. 73). As Berg (2009) stated, “When developing a purposive sample, researchers use their special knowledge or expertise about some group to select subjects who represent this population” (pp. 50-51). A total of five BOCES CTE directors and five BOCES CTE supervisors were preselected and agreed to participate in the study. The cohort members were all of similar age and had comparable education and professional experiences. These similarities assisted in providing an equitable baseline to frame interviews, surveys, and field observations.

All the CTE administrators who completed interviews and surveys for this research were employed in a BOCES, and all of the CTE principals or supervisors reported directly to the CTE director. Each individual interview was conducted on the BOCES campus where the administrator was employed. Interviews were augmented by telephone calls and e-mail for the purpose of follow-up to survey data and interview questions and for document review.

BOCES-A was located in suburban and rural communities of New York. BOCES-A serviced approximately 1,200 students from 18 school districts, and according to the 2011-2012 New York State Education Department Career and Technical Education Data (CTED; NYSED, 2012) report, had 321 students who successfully completed a CTE program in June 2011. Of the 321 students, 239 were White, 28 were Black, 45 were Hispanic, and six were Asian. The 2010 to 2011 cohort consisted of 143 females and 178 males. A total of 392 students graduated from this cohort, and of the 392, 80 students earned an endorsed New York State High School/CTE-endorsed diploma of distinction.

BOCES-B was located in rural area of New York. BOCES-B serviced approximately 1100 students from eight school districts. The 2011-2012 CTEDs (NYSED, 2012) reported 101 students successfully completed a CTE program. Of the 101 students who completed the CTE program, 82 were White, 12 were Hispanic, and one student was listed as bi-racial. This cohort consisted of 57 females and 44 males. Reports indicated 120 (19 students returned to home school) students received a high school diploma. However, this BOCES did not report any students receiving a CTE-endorsed diploma.

BOCES-C was located in a rural area of New York. BOCES-C serviced approximately 525 CTE students from eight district schools. The CTED (NYSED, 2012) reported this BOCES had 89 students who successfully completed a two-year CTE program. Of the 89 students, 51 were males and 38 were female. The CTED reported the 2010 to 2011 cohort consisted of 62 White students, 16 Hispanic students, and 11 Black students. Fifty-three students earned a CTE-endorsed diploma of distinction.

BOCES-D was located in a suburban area of New York. BOCES-D serviced approximately 530 CTE students from eight district schools. The CTED (NYSED, 2012) reported this BOCES had 136 CTE students who successfully completed a CTE program, including 64 males and 72 females. The report indicated 51 students received a high school CTE-endorsed diploma of distinction.

BOCES-E was located in a rural area of New York State and serviced approximately 1925 CTE students from 17 district schools. The 2010-2011 CTED (NYSED, 2012) reported 458 students successfully completed a CTE program. This cohort consisted of 228 males and 230 females, of which 29 were Black, 57 were Hispanic, and 370 were White students.

The CTE Director of BOCES-A, Ava, was a 54-year-old White female who had been a CTE Director for the past two years. She had obtained a Bachelor of Science in Physical Education and a Master of Science in Special Education as well as a NYSED Certification of School District Administration (SDA). In addition to her two years as CTE Director, she had 10 years as an administrator. Ava was responsible for the supervision of approximately 40 secondary level CTE programs, an LPN (licensed practical nurse) adult education program, and an adult literacy program that serviced the residents of the district. This BOCES employed 80 CTE and academic teachers and provided CTE services for approximately 1,200 students.

The CTE Director of BOCES-B, Ben, was a 59-year-old White male who had been a CTE Director for 18 years. He had obtained a BS in Special Education and a NYSED Certificate of Administration and Supervision (CAS). He had additional professional experience as a principal and a special education director. Ben was responsible for the supervision of 25 CTE programs as well as for the adult literacy and career training programs. This BOCES employed 75 secondary day CTE teachers, provided CTE services for approximately 1,200 students, and had multiple career services sites as well as satellite industry training locations.

The CTE Director of BOCES-C, Colleen, was a White 50-year-old female who had been a CTE Director for seven years. She had obtained a BA in Special Education, a master's degree in education, a NYSED CAS, and a NYSED School District Administrator (SDA) certification. Her additional professional experience included special education teacher, special education transition coordinator, and principal of an alternative high school. Colleen was responsible for the supervision of 16 CTE programs. This BOCES employed 35 CTE teachers, provided CTE programs for approximately 500 students, and had multiple career services sites, as well as satellite industry training locations.

The CTE Director of BOCES-D, Dennis, was a 59-year-old White male who had been a CTE Director for three years. He had obtained an Associate of Science (AOS) in Culinary Arts, a BS in hotel management, a Master of Education degree in Administration and Supervision, and a NYSED School District Administration certification. He had additional professional experience as a culinary teacher and a CTE principal (supervisor). Dennis was responsible for the supervision of nine secondary day CTE programs, six adult education LPN programs, 11 adult career training programs, and a regional secondary day summer school program. This BOCES employed 45 CTE teachers, provided CTE services for 530 students, and had multiple career services sites as well as satellite industry training locations.

The CTE Director of BOCES-E, Ellen, was a 54-year-old White female who had held the position of CTE Director for eight years. She had obtained an Associate of Applied of Science, a Bachelor of Science in Education, a Master of Education, and a NYSED SDA. Ellen had a total of 12 years as an administrator, with professional experiences as an elementary principal as well as a special education principal. Ellen was responsible for the supervision of 36 secondary day CTE programs and adult education LPN and literacy programs, and the school employed 115 secondary CTE and academic teachers who provided instruction for approximately 1,200 students. This BOCES also had multiple career services instructional sites as well as satellite industry training locations.

The New York State CTE comprehensive high schools (The Big Five) were not considered for this study, due to the overwhelming difficulty in obtaining permission from the bureaucratic district offices to interview and survey their school personnel and the dissimilarities in their CTE program structures. CTE programs are integrated into the comprehensive high

school setting, while BOCES CTE programs are separate by design, allowing area district high schools to send their students who are interested in career training.

Design of the Study

The researcher collected demographic, professional, experiential, and job-site descriptions and information from all participating subjects prior to interviews, document review, and survey analysis. To triangulate this study, the researcher conducted face-to-face interviews with the selected CTE directors and supervisors and collected and analyzed the results of a CTE technology survey from the CTE principals, who were direct reports to the selected directors, and the CTE directors. The researcher examined documents such as the Perkins grant major effort initiatives for annual technology allocations. The researcher also reviewed each BOCES CTE program annual operating budget, technology strategic plans, and teacher and supervisor/principal observations that supported interviews, as well as a self-reflective survey that required the participants to rate their own perceived technology skill level using the International Society for Technology in Education (ISTE) rubric.

The researcher was able to gather an abundance of relevant information that provided a complete and comprehensive CTE program analysis to determine the degree and frequency to which technology was integrated into the CTE curriculum, school organization, and technology professional development. The researcher collected information through in-depth interviews and discovered the ways in which, and to what degree, the CTE administrators' technology beliefs and perceptions either limited or increased the use of technology in their CTE programs. Interviews were limited to 45-60 minutes in structured sessions. The interview structure and techniques were influenced by the neo-positivist concept proposed by Alvesson, which provided the opportunity reveal the subjects' "inner or authentic self, not necessarily publicly visible,

which may be revealed through careful questioning by an attentive and sensitive interviewer who contributes minimally to the talk” (Alvesson, 2003, as cited in Roulston, 2010, p. 52).

A self-reflective analysis survey developed by ISTE (see Appendix A) was administered to the participating administrators to establish their perceived technology skill levels, competency, and frequency of use in their school. The survey also gathered information as to how administrators utilized technology in the day-to-day organization tasks and classroom instruction and their ability to appropriately determine and assess technology professional development teacher needs. The self-analysis survey, the ISTE rubric, assisted in “triangulating, or corroborating, one’s own record, or comparing one’ own perception of events with participants” (Dressman, 2008, p. 106).

Bogdan and Biklen (2003) believed documents, “Serve as sources of rich descriptions of how people who produced the materials think about their world” (p. 124). To that end, a document review of CTE program annual budgets took place, including the expenditures for items such as technology software and hardware purchases; NYS Perkins grants expenditures; curriculum hardware, software, and instructional materials; teachers’ and administrators’ professional development activities; and teacher observations.

The researcher elicited information regarding four CTE programs or career cluster (auto-technology, cosmetology, culinary, and construction trade) technology protocols during the interview to establish a common baseline by which to examine technology protocols and technology integration. Each interviewee completed the self-reflective survey that listed commonly used technology-assisted cues to provide a visual prompt. Each participant circled the appropriate number as it related to his/her technology comfort level, skill ability, and understanding of the particular technology. The survey also provided a rating scale (1–3) for

CTE administrators to identify with and relate their technology understanding and usage in their organizations, classrooms, and professional development planning.

A qualitative methodology was optimal for this research because it “captured problematic interactions and difficult data that can provide rich materials for examination and further development of one’s own interview practice through asking questions concerning how data are collaboratively generated by the speaker” (Roulston, 2010, p. 16). All of the primary subjects (CTE directors and supervisors) who were solicited and selected were active participants in the research. The use of ethnographic field strategies helped to obtain a better understanding of the interview responses, and each subject was observed in his/her work environment. The strategy of analytical ethnography encompasses,

Research processes and products in which, to a greater or lesser degree, an investigator (a) attempts to provide generic propositional answers to questions about social life and organization; (b) strives to pursue such an attempt in a spirit of unfettered or naturalistic inquiry; (c) utilizes data based on deep familiarity with a social setting or situation gained by personal participation or an approximation of it; (d) develops the generic propositional analysis over the course of doing research; (e) strives to present data and analyses that are true; (f) seeks to provide data and /or analyses that are new; and (g) presents an analysis that is developed in the senses of being conceptually elaborated, descriptively detailed, and concept-data interpenetrated. (Lofland, 1996, as cited in Berg, 2009, p. 191)

Using this process provided rich anecdotal information pertaining to each specific school culture and each respondent’s relationship to culture. All of the participating subjects were employed by a BOCES located in the New York area for the duration of the study. All the BOCES selected for this study had similar CTE programs and school organization designs. Each

BOCES contained one CTE director and a CTE program supervisor (principal) who was responsible for the day-to-day supervision of CTE classes and teachers.

All five selected BOCES directors were scheduled for on-site interviews, which were limited to an hour for each interview session. Anecdotal information was collected via e-mails and telephone. All of the participating subjects completed a 10-item self-reflective survey that served as a prerequisite to the questions and probes and that assisted in framing needed research information. The self-reflective survey was tested for validity prior to the start of this study by the ISTE organization, and the researcher requested and was granted permission to use the rubric as an instrument of measure (see Appendix B).

Questions and probes for this study were designed for relevancy by the researcher to prompt accurate and valuable information needed to complete this research. The in-depth interview questions focused on the CTE administrator's technology use, attitudes, outcomes, concerns, and influence in planning a 21st-century learning environment. These questions were codified in the areas of school organization, teaching and learning environment, and professional development (See Appendix C).

Document Study

Berg (2009) believed the primary venue for data gathering in a case study is the use of interviews and observations. However, he also felt value added was facilitated by the researcher investigating various document sources and supplementing the research with official documents relevant to a case study. A qualitative researcher's goal "is to better understand human behavior and experiences" (Bogdan & Biklen, 2007, p. 43). To make sense of the CTE administrator's behaviors, the researcher triangulated this study with in-depth CTE administrators' interviews and correlated the CTE directors' technology beliefs and self-reflective survey responses to

identify how frequently technology was used. The survey was completed by all CTE administrators who participated in the study. A document review took place to examine the BOCES CTE program annual operation budget, curriculum, teacher observations, professional development activities, technology purchases, and BOCES-wide strategic technology plans.

The identified documents assisted the researcher in providing data to validate or repudiate the perceptions and beliefs of the CTE administrators. In addition, the researcher found the examination of official documents helped to reduce any potential researcher bias in the evaluation of data process. The intent of the study was to examine traditional supervision and administration theory using Bolman and Deal's (2008) four frames of leadership in an attempt to identify any new and or emerging theories developed due to virtual instruction technology management. Use of this tested framework to evaluate administration and supervision organization theory in conjunction with integrated technology instruction yielded information that fosters the need to conduct additional research as schools move towards a more technologically dominated CTE learning environment.

The researcher utilized an overarching social theory to examine the research findings and to provide a complex view of human behaviors in a virtual learning environment. The theory was an important component of the research because it offered a broad base to examine, observe, and formulate emerging trends among CTE administrators. The socio-technical system theory (STS) framed the human behaviors observed in the implications of automation and provided a frame to show how CTE administrators managed those behaviors as the virtual learning trend expanded into the CTE learning environment. Recording the ways the administrators internalized and processed such experiences to provide a road map for future school organizational and instructional planning practices was an essential element of the study.

Evaluating these personal observations and recording the stated feelings and beliefs of the administrators provided additional insight. This procedure was an attempt to provide a mirror by which the subjects of this research and other interested parties could reflect upon behaviors, actions, and emerging skill sets as CTE program instruction was increasingly supported by technology software and hardware.

The research process began with a focus group of interested CTE administrators who attended regular Area Zone 4 meetings for the purpose of discussing and disseminating NYSED information. The focus group included some of the subjects who participated in the study. The purpose of the focus group was to garner information about the pressing issues and concerns surrounding the CTE programs as they transitioned to a 21st-century learning environment. The participants were asked to complete a questionnaire of 10 questions relating to CTE supervision of instruction, curriculum, faculty, budgets, technology, and NYSED compliance (See Appendix D). The questionnaire was used to fact-find and to acquire a baseline of information to support the framework of the research. The questionnaire was designed to capture authentic data related to the research topic and to frame the face-to-face interview questions to “capture the subjects’ own words and let the analysis emerge” (Bogdan & Biklen, 2007, p. 79).

A concept map was designed to plot the research progression plan visually. Having a continuum of processed information was important to “better understand the relationships between ideas, concepts, plans of action, and the like by creating a pictorial representation of these ideas, or plans, and their connections” (Berg, 2009, p. 43). To better understand the collected research information, data and interview responses were organized methodically. The process of visual plotting provided the opportunity to learn and understand how the information garnered could be used to formulate empirical data.

To ensure no harm was caused by this study, confidentiality was reinforced using an invitation letter (see Appendix E) and confidentiality agreement (see Appendix F) secured between the researcher and the subjects. No data collection took place until the Fordham University Internal Review Board (IRB) had approved the study (see Appendix G). The names of the participants were changed to pseudonyms to assure anonymity and were recorded as follows:

1. BOCES-A = “Ava” (director), “Adam” (supervisor),
2. BOCES-B = “Ben” (director), “Barbara” (supervisor),
3. BOCES-C = “Colleen” (director), “Cora” (supervisor),
4. BOCES-D = “Dennis” (director), “Donna” (supervisor), and
5. BOCES-E= “Ellen” (director), “Eileen” (supervisor).

CHAPTER IV

FINDINGS: SCHOOL ORGANIZATION AND TECHNOLOGY

School Organization

The process of educating the American student has evolved through three significant eras: agrarian, industrial, and the present day information era. The information era requires the American education system to address the digital learning needs of the 21st-century student, in order to provide America's students with the opportunity to compete globally in a digitized workplace.

The goal of this study was to examine the technology beliefs and perceptions of CTE administrators to determine if their beliefs and perceptions hindered or enhanced the process of transitioning CTE programs in New York from the antiquated shop-class vocational programs into 21st-century technology-supported CTE learning environments. The influence of technology in the school and workplace is an integral component in all reorganization and restructuring processes. Bolman and Deal's initial research in 1984 was an attempt to make sense of the changing needs of organizations going through a metamorphosis due to downsizing or to antiquated and obsolete services or products. Understanding how reorganization and restructuring—change—occurs in a career and technical education setting was revealed through a comprehensive qualitative study.

All of the CTE administrators interviewed for this study faced the task of transitioning antiquated shop classrooms into 21st-century learning environments. The study methods and procedures required dividing the transition process into three levels focused on three discrete areas of education. (See Analysis of Research Findings, Appendix H.) The study research questions and responses were codified into three sub-topics: school organization, teaching and

learning, and pedagogical professional development. Findings were analyzed through the lenses of Bolman and Deal's four frames of leadership organization theory (structural, political, human resources and symbolic), which assisted in understanding the process of system change.

Leadership Technology Beliefs and Practices

Traditional beliefs held that technical, interpersonal, and leadership skills were the required underpinnings of responsive, organizational leadership characteristics. Due to shrinking school budgets and continuous advances in technology, traditional top-down management leadership skills may require the acquisition of more transformational leadership characteristics that permit transformational leaders and followers to advance to a higher level of morale and motivation (Burns, 1978). Burns's beliefs support the emerging needs of a 21st-century school system that is, by nature, less structured and autonomous, due to the integration of technology into the day-to-day activities of a school administrator.

The researcher investigated how the technology beliefs and perceptions of the CTE administrators influenced the degree to which technology affected school organization methods and structure. Additionally investigated were the levels of use of the various technologies such as Smart boards, iPads, netbooks, school information software systems, and office support software systems and hardware (Wincap, Google-docs, iPads, smart phones, Skype), and the degree to which they were integrated into the daily activities of a CTE administrator. The researcher aligned the research questions with the in-depth interview questions for the individual BOCES directors and supervisors. The study yielded key findings in four areas: influence of technology on leadership, efficacy of technology, technology process and planning, and schism within technology professional development.

Finding 1: Influence of Technology on Leadership

CTE administrators believe technology had influenced and transformed their roles as CTE administrators from those of traditional CTE administrators who spend the majority of the day delegating clerical tasks and physically monitoring hallways and shop classes that provide rudimentary hands-on training to students. The new role is a CTE administrator who has acquired self-taught technology skills to complete the required daily tasks of an administrator of a 21st-century CTE learning environment. Such an administrator is responsible for providing higher order thinking skills and skill-based career and technical education training.

The CTE administrators used technology to accomplish daily traditional administrative tasks; however, some seemed to lack fundamental understanding of ways to utilize technology software for more efficient and cohesive processes. Only 2 of the 10 administrators interviewed, Ava and Ellen, believed technology had improved or streamlined their tasks and daily responsibilities. Both Ava and Ellen reported technology had facilitated a systemic change in methods and practices. Ava said, “Technology changed my role in that we use personal communication devices like Blackberries and iPads; we use E-Chalk software to communicate with the teachers and students and it has 24/7 access capabilities. It [technology] has definitely made communication and crisis management easier.” Ellen stated:

How I did my job has certainly changed in the past eight years. Now I have Skype set up in the office for my teachers to communicate with me from the classroom. This makes it easier to resolve whatever issue the teacher is having, because it is real-time communication. It can also make things weird sometimes: I can be meeting with someone in the office and the Skype pops on in the middle of the discussion. We are also

expanding our SIS to provide additional teacher accountability data that the new NYSED Annual Professional Performance Review (APPR) mandates, such as teacher of record and accountability data teacher-to-student instructional time. Our teacher mentor program is now supported by Skype. No longer do the two people have to be in the same room. This is cost effective and certainly changes how we no longer have to schedule for substitutes to cover the classes.

The overall consensus among the administrators was that technology had influenced and transformed their roles. Dennis stated, “As a CTE administrator, I need to be up on technology. I have to stay ahead of the curve.” The other eight administrators agreed and cited the different types of software and technology hardware that had influenced and changed the way they completed tasks. They all similarly responded by references to specific technology, such as software systems and hardware, without any correlation to the organizational system daily functions and the technology influence on their tasks.

The interview data indicated programming, purchasing, and student and employee data were managed with software, and the administrator’s time was still mostly consumed with compiling data and preparing reports. It was evident that technology was being used to facilitate the administrators’ traditional tasks, such as fiscal and student management, but none of the administrators indicated they had analyzed the relevance of technology with regard to the teaching methods and practices in their organizations. The interview responses supported the stated beliefs of the CTE administrators that their organizations used various types of technology and software. It appeared that software had simply been put in place to facilitate the needs of completing a traditional isolated task, in lieu of implementing interfacing software to streamline and change the operational methods and practices of the BOCES organization.

Research Question 5, “How do the technology beliefs and perceptions of the CTE administrator influence the degree to which technology influences school organization methods and structure?” helped to understand this finding. The BOCES administrators were asked, “What is the current level of use of various technologies (school information systems, Smart Boards, scanners) at your site?”

Leadership Organizational Methods and Technology Practices

Among the many daily tasks performed by CTE administrators, maintaining and accessing accurate student data was cited most frequently. Administrators noted it was imperative for the CTE administrator to acquire and maintain an effective student information system (SIS) to provide accurate and time-sensitive reports for the administrators and real time student achievement data retrieval capabilities for the CTE administrators as well as for the classroom teachers. All but two of the CTE administrators’ interviews indicated they had to contract software companies through their Regional Information Centers in order to develop and maintain a responsive SIS. Ben stated:

All of our purchases, technical support for our hardware and software and website upkeep, are managed by our Instructional Services division. This design has been in place for many years [over 10 years] and we had someone there design our SIS. The Regional Information Center only handles the telephones, Internet connectivity, and technology infrastructure.

Ellen also utilized an in-house created SIS, and reported:

We have a great system; it was designed just for our CTE program. It has great capabilities. It has the ability to provide psychometric analytic data to the classroom teachers, so you know that helps with instruction, and it works for the organizational side

because it delivers data needed for our [NYSED] reports. We are working with the software technician to expand its [data software] capabilities to collect more data from two additional CTE programs. So it has the ability to be expanded as needed.

All of the CTE administrators interviewed believed their work responsibility landscape had changed, and they spent an inordinate amount of time coordinating and monitoring data for the mandated quarterly NYSED reports. Barbara reported:

The annual Carl Perkins Vocational and Technical Education Act (VATEA) grant funding applications and the new New York State CTE accountability reports are integral components of the new accountability of the student achievement initiatives for our CTE programs. We use grant [Perkins] to upgrade and create new CTE programs. Also, the new Common Core Learning Standards (CCLS) are now required to be integrated into our CTE program curriculum. And the College and Career Readiness initiatives are going to require a lot of data collection.

Cora agreed and stated, “All of these new accountability initiatives have added additional data collection duties and classroom instruction relevancy evaluations for the CTE administrators.” Ava believed their organization was prepared to meet the challenges of the new initiatives and stated:

I think we’re pretty cutting-edge in terms of the use of technologies. I know we have an agency-wide technology committee that has sub-committees that are focused on instruction. We also have an internal CTE technology committee. We are again very much focused on instruction. The sub-committees develop and provide monthly training for staff on the latest technology, such as how to create a wiki-space and how to better utilize the Smart Board. All of the classrooms have Smart Boards. We have laptop carts

available as well as a computer laboratory in each classroom; in addition, we have a state-of-the-art computer laboratory furnished with 15-20 computers with the latest software.

Ellen also used the term “cutting-edge” and “exciting” to describe her CTE program, and reported:

We have over 680 computers on-site: about 100 laptops and the rest are stationary computers. Our students also have access to tablets, iPads, and our newest piece of classroom technology is a virtual simulator for heavy equipment. We supplied all of our teachers and administrators who wanted and knew how to use them a Smartphone, iPad, tablet, or laptop.

Ben believed his school was well supported by current technologies and that technology was well integrated into the daily school organizational as well as instructional functions. He stated, “We receive our primary technology support from our Instructional Services Division, not the Regional Information Center. Our Regional Information Center services the district schools, so this gives us an advantage of having in-house technology development.” Ben explained there was a benefit to having dedicated technology support services in-house, stating,

All of our classrooms have a Smart Board, and approximately eight laptop carts are assigned to a classroom or can be reserved for instruction. We also utilize software for grading, attendance management. Our in-house technician designed our student information system that is uploaded as an Excel spreadsheet for the development of report cards. Our students have access to electronic readers/e-books, and their use, like, other technology, is dependent upon the teacher’s skill level.

Barbara reported her administrative duties were all supported with technology and she reported:

I use Wincap for purchasing, budgeting, and human resources management tasks. All of my student data collection is electronically managed; it gives me information quickly and in real time. The new NYS student data mandates require our student information systems be aligned with their data collection process, so that is going to force us to upgrade our student information system from School DESX to, I think, Classmates software.

Donna stated their organization would soon switch from School DESX to Classmates, a web-based student information system software that manages student data. When probed as to the reason for the switch, “It works better for the way our CTE programs are set up” was her response. Regarding the relevancy of School DESX, Dennis stated, “We have now bought into Classmates and are transitioning from School DESX because we found Classmates was much easier for our clerical staff to get the data of, since it was so well organized and developed for CTE.” Dennis believed, “It [School DESX] is antiquated at this point.”

Colleen also confirmed her BOCES used Classmates because of the advantages of its ability to interface with IEP Direct (software coordinates the Individual Education Plans for students with special needs) and Class Link (software is typically used by classroom teachers to store and manage student achievement data). But when asked if this system had the ability to do various other types of data collection and reporting, Colleen reported, “We pull reports all the time. We do the CTED [NYSED annual mandated Career and Technical Education Data report] where the data are uploaded by a tech specialist off-site who then sends it [electronically] to us to prepare the reports.”

The researcher queried the respondents as to how dependent they were on software to complete their tasks. Colleen believed she was very dependent upon technology to accomplish her daily tasks. She cited one example of software (School Dude) she used daily:

It's a service request that can be managed from afar. You put in the School Dude ticket and that can be either a request for something to be fixed or other technology request, like professional training or equipment, and it is then routed to me and I have the ability to approve or deny and track the request. All of the parties along this chain of action have to write notes, and I'm able to access these notes and monitor the progress of a request. All of the technology purchases are requested through School Dude. It makes it very easy to coordinate purchase order codes and obtain prices of requested technology.

Barbara also reported their organization used School Dude and MyLearningPlan, a professional development tracking system. Barbara stated; "School Dude was implemented last year, and the big ticket item, MyLearningPlan, was a big investment that is charged at a group rate." Unlike Colleen's organization, where School Dude was used to manage acquisition of equipment, maintenance, and training, Barbara stated, "We use MyLearningPlan only for professional development and School Dude only for maintenance reporting."

Cora concurred with her director and stated, "I use the student management system Classmates daily, and all of the teachers manage their student classroom data through Classmates. IEP Direct is only used in the special education programs, and I use Wincap for all my purchasing."

Although Dennis believed his programs were on track with current technology, he expressed concern regarding the physical structure of the campus buildings and its effect on his campus technology upgrade initiatives. He believed,

It's a little more challenging for us here, because our buildings are spread out across the campus. Our whole infrastructure here is made of cement, and it has made it difficult to install the drops for the computers. But we were able to upgrade, and get—not sure of the terminology—let's say, T-5 lines [increased broadband].

Colleen expressed similar concerns regarding technology infrastructure. She stated, "Our buildings are not all on one campus. We have a few satellite programs and we need to stay connected, and we can only do that using similar software and hardware. One of our previous network administrators made technology decisions five or six years ago that we are still trying to overcome in terms of technology. For example, we are still using Novell when everyone else is using Microsoft now, and as result, things start to fall behind, such as the capacity of the hardware. I want a computer lab, or three or four computers in a classroom, but the switches are at capacity and we are reaching critical mass."

Dennis reported, "We try to keep our technology up to date, as well as our technology infrastructure. We just finished putting in a complete phone system throughout the whole campus that allows certain key people, such as myself, to put in a code, and I can now announce an emergency from anywhere on the campus." Colleen stated newly acquired telephone technology was in place at her site. She reported,

Technology is being used to maintain contact with the parents and community. We have the digital auto-dialer that is used by both the staff and administration to notify students and parents of snow days, and teachers use it to send home daily updates regarding student behavior, achievement, and school events.

Colleen cited her organization's daily functions were also well supported by technology: "Most of my administrative daily tasks are conducted by using web-based software, Classmates [student information system], IEP Direct [individual education plan], Wincap [financial and human resources management system], and School Dude [a facilities maintenance manager]."

Colleen reported an internal administrative wiki-space website was in place and explained,

We just got it up and running last spring because we [BOCES administrators] were working on the NYS mandated annual professional performance review, and now we have multiple pages in there, and just today we were talking about creating another one. I'm not sure I'm even describing it right, but I know we use it and it is very helpful in collaborative activities.

When asked if the BOCES administrators utilized their secretaries as electronic support in lieu of performing the tasks themselves where applicable, Ben stated; "Yes, I do, but I do write the content for the memos and letters." Barbara responded, "I do all my own evaluations and manage other documents myself online." When asked if they were familiar with the various types of software their secretaries were using, Ben responded, "Word," and asked his secretary to come in to the interview area to provide the names of the other software she was using. The secretary responded with Google Docs, Publisher, and Wincap. Barbara was able report, "Google Docs, Wincap, Publisher, and School Tools" were "some of the software" both she and her secretary used daily. Contrary to Ben's utilization of his secretarial services, Colleen stated,

For me, technology has allowed me to work smarter, and with the changing needs of the organization, I need to try to keep up with the latest technology. I don't remember the last time I've hand-written something for my secretary to type up. I have a secretary who still knows stenography and still wants to use it. So every now and then, I will dictate

something to her. But it's a real struggle dictating something now. I am constantly saying "No, change," because I'm used to being able to edit as I go along when I am composing something on my own.

Colleen went on to explain the perceived ramifications of change due to technology, and said,

We now type everything ourselves. With that said, you know, we needed someone to monitor everything in the data management system. We hired a school district technical data specialist [this was an agency CSEA created position], and that is the way the organization is moving now, no longer hiring typists and senior typists anymore. These new technician specialists manage and manipulate Excel; they have higher technology skills. However, in the past our 20- and 25-year senior typists were unable to make data entries into our student information system when we had delayed school openings, attendance adjustments, and other student management edits. Now we have a technician who has the capacity to manipulate data.

Ava explained her use of the secretary had indeed changed with the implementation of technology in her workplace. She stated:

In the past, if I needed a Power Point, I'd give it [the task] to my secretary or write it out, sometimes in longhand first, and then give it to my secretary. But with all the conversations about posting to a wiki-space, I'm now finding, I better get on board here and kind of immerse myself in all this, because this is something I can't delegate to somebody. This is something that I myself have to get involved with.

It was evident all of the BOCES administrators used Wincap software for budget management. Although Wincap has several functions that include staff data management,

purchasing, facilities supplies, material and inventory capabilities, none of the BOCES were using this system as a means to interface data management tasks. Ben supported this finding as he explained the process for purchasing supplies and materials. He reported, “We use Wincap; the website is supported by the RIC. All the teachers have to do now is order supplies electronically.” Asked if the teachers have access to the Wincap system to place orders directly, Ben responded, “Yes—well, not directly into Wincap. They have to send it electronically first.”

Within the scope of the CTE administrator’s perceived technology knowledge, participants had consensus that the frequency and use of technology was transforming the CTE classrooms into 21st learning environments due to their ability to update their classroom technology hardware and software. When examining the evidence to support this finding, one has to first concede simply acquiring technology software and hardware for the classrooms does not negate the need for a fundamental change in instructional methods and practices. Integrating technology into an organization’s school culture requires a shift in the paradigm of doing business, so as not to use technology ineffectively or inefficiently. An example of an ineffective and inefficient use of software and technology was observed in the use of the classroom Smart Board. Without a shift in the teaching paradigm, teachers simply transfer the activities of a chalk-and-talk blackboard lesson to an electronic Smart Board. Dennis stated, “I see teachers more engaged in the lesson when they are using the Smart Board correctly. Otherwise they are just using it like a blackboard or a movie screen to show videos to the students.”

An efficient and effective use of the classroom Smart Board would be to utilize the Smart Board as a computer that enables the teacher to link to learning opportunities globally, and to connect to other online professional learning communities, alternative curricula, research resources, and other web-based activities. This shift in paradigm will require alteration of

classroom methods and practices, thus making the learning process less about teacher-directed activities and more about student exploration. Although all of the BOCES administrators indicated they were able to outfit their CTE classrooms with Smart Boards, few administrators noted the importance of how this acquisition could change the process or delivery of instruction. Dennis perceived his organization's technology usage could be rated as "very high." He stated:

As far as the classrooms are concerned, they all have Smart Boards. This was a big shift in classroom upgrades. When I first became the CTE principal [supervisor] here seven years ago, we had shops that didn't even have classrooms. Within two years, we had constructed within-the-shop classrooms, desks, Smart Boards, Internet-connected computers, and "stand-alone" computers [not connected to the Internet or school server] for the students to complete individual shop activities and assignments.

Dennis believed:

Equipment-wise we are pretty much up-to-date on the technology of each individual CTE program. So if there is a new piece of technology or software out there, we need to try to keep current, and obviously, it is difficult now, due to limited funding, but prior to these current funding constraints, I probably spent the last five years spending a great deal—every penny I could get—on technology for the shops.

Eileen concurred and reported,

Right now, we are on the cutting edge of technology, but the fiscal aspect of trying to provide cutting-edge technology is becoming challenging and we have to look at new ways to fund technology initiatives to stay current.

Asked if these purchases were limited to only technology equipment, Dennis responded,

Software was purchased if needed, as well. As the director of the Career and Technical Education secondary program, the director of adult education, and the director of the LPN program, I also run summer school for the county, making me responsible to teach everyone. So I made sure we have Smart Boards in all of our adult education classes as well as our secondary CTE programs. Until recently, these adult sites didn't have any supporting technology. Our LPN program now has a computerized clinical lab. Students are able to complete their mandated 20 clinical hours sitting at a computer.

Supporting the consensus, Ava described their CTE shops as State-of-the-art classrooms that have current industry equipment; in addition to a large computer lab, we have a state-of-the-art graphic design lab that is outfitted with 15 Mac [Macintosh Apple] computers and four Alienware computers; and 13 Mac computers in the TV/video production studio.

The researcher asked the BOCES administrators, "To what extent is technology being used effectively and efficiently for instruction?" Adam believed their organization was technologically "highly evolved," and the technology organization behavior would perpetuate itself as newer staff come on. As he explained:

New teachers pick up the organizational habits and culture and ask administrators how to get technology training, except in the case of a staff member who is adverse to technology, but those folks are few and very quiet. We are always quick to respond to any technology request, to encourage continuous learning opportunities for our staff. We get many requests after we have staff complete a technology survey in the first days of school opening up in September.

Adam concurred with his director, Ava, and stated,

All of our monthly technology training sessions are open to all staff and we have a dedicated technology technician who functions as a technology scout to provide the technology committee with the latest technology news. This technician also provides on-site tech support for our programs and is considered a “minute-man” of sorts to assure all our computers and software are functioning appropriately. His daily primary function is to maintain student online accounts [student IP numbers], CTE website software, and loading and updating CTE training videos.

Ellen reported,

I see many of the teachers here are self-motivated to get the newest technology, and that is good. However, I use caution when purchasing new technology. I have to first understand what they are going to use it for, can it be used in other programs so as to be cost-effective. We work with our in-house technician to make sure it makes sense to purchase the requested technology.

Ben revealed technology was proving to be cost-effective for his organization and explained:

For the past six years, our CTE teachers have been using My Access software to improve student writing as part of their daily instruction, and it is site licensed and the students’ writing assignments are evaluated and graded by the software company. This is a positive impact on the budget by allowing us to eliminate the need for additional academic support in the CTE classroom.

Barbara believed technology training was expensive, but understood it was important to provide the training so employees could use technology equipment correctly. Barbara stated,

Teacher technology skill levels are monitored at my site through a voluntary teacher observation initiative that gives the teacher [only teachers who have earned tenure after 3 years] the opportunity to develop their own technology goals and get technology professional development. They first have to complete an annual professional growth plan (PGP).

Ben supported his supervisor's declaration and said, "For the past three years, we have provided technology training that was aligned with the PGP plans submitted." Dennis conceded that although technology hardware and software were in place in the CTE classrooms,

Technology-supported classroom activities are growing. Last year we implemented electronic testing for our Licensed Practical Nursing program's Test of Adult Basic Education assessments and for our Computer Information System Company (CISCO) assessments. As of right now, both assessments are given electronically by request.

Ellen reported, "We now use virtual trainers/simulators in our CTE classrooms. We will continue to explore more options with virtual software."

Leadership and Technology-Supported Instructional Methods

The researcher explored Research Question 2: "How do the CTE administrators' beliefs and perceptions about their frequency of use and knowledge of specific technologies correlate with CTE 21st-century technology-supported instruction?" Two interview questions collected that information: "What have you observed during daily walk-through observations?" and "How has integrated technology influenced classroom management?"

Barbara reported that during her daily walk-through observations, she observed more evidence of engagement. She explained,

We have a lot of good resources in terms of teacher industry knowledge. I see a lot of engagement, almost a 100% increase in terms of just the use of technology, probably because of the professional development trends. We have several teachers who have used the PGP to get the needed technology training. I would have to say, even some our most reluctant teachers use some form of technology in their classrooms now.

Barbara's director, Ben, concurred:

I do at least three informal observations a week. What I see is varying levels of technology usage for the teachers. I see a lot of student engagement, where there is a teacher who is using technology not as a babysitting tool. I see a lot of students using the laptops, but these are usually seen in the integrated academic classes. We need to get more engagement like this in our CTE [practicum] session.

When asked to describe active student engagement, Barbara explained,

I see a lot of student engagement when it comes to using a technology piece for the lesson. YouTube clips and assessment clickers: the kids enjoy and participate.

Sometimes I don't know what is going on from just looking into the classroom. I went into the classroom one time and had to ask a student, "What are you doing?" He told me, he was taking a test, and I didn't see any paper or anything, and he said, 'I'm taking it with this thing'" [clicker assessment remote].

Eileen reflected:

CTE student engagement is typically more kinetic in nature, but with technology integrated into the classrooms, lecture time is less and there is more time for the student to spend on the task of learning a new skill, so the students spend a longer time on task activities.

Ellen agreed with her supervisor and stated,

First of all, we have a very low referral [discipline] rate, and I think is because we are a CTE program where students get to use a lot of their pent-up energy on hands-on tasks. But I will say, since we have integrated more and more technology into the classrooms, the students are really excited and motivated to stay in class.

Ben offered a negative technology observation. He reported,

Sometimes we have a computer or Internet connection problem. Our teachers who are so reliant on the technology to teach a class get stuck. I'm "old school." I want to see notes up there or else the students are just going to be sitting there idling. Teachers have to remember how to give an auditory lesson.

Dennis stated that on his daily walk-through, he observed bell-to-bell instruction. He went on to explain he also witnessed, "Actively engaged students who can't wait to get started." He attributed this to "Our state-of-the-art CTE technology equipment aligned with industry. We work with our craft committee members to make sure we get the newest information about the industry technology." Dennis also reported:

I observe CTE students actively engaged in completing their integrated academic assignments with classroom laptops or in the computer lab. This is great, because most of our students prefer to come here to work on hands-on projects, so technology is keeping them engaged.

Donna concurred with her director and said,

When I conduct my daily walk-through, I see teachers using the Smart Board regularly, mostly to show Power Point presentations. I see students using the classroom computers.

All of our shops are equipped with state-of-the-art technology equipment they [teachers and students] use regularly.

Finding 1 Summary

In Finding 1, the influence of technology on leadership, evidence indicated that technology had influenced and changed the CTE administrator-completed day-to-day tasks. Upon closer examination, these tasks were not streamlined or simplified with technology, due to new software or technology applications. Instead, with the advent of new office technology software and applications, the CTE administrators had failed to utilize technology comprehensively, such as assessing and implementing technology as a systemic process by which to do work, but instead had used it as a method to digitize a single, isolated, traditional task at a time. This finding implied that such failure to implement a systems approach to technology integration limited the ability of the software interfacing capabilities, thus creating additional time on task work for the administrator.

All of the CTE administrators cited the software selection of a student information system (SIS) as a priority. Currently, all of the CTE administrators were evaluating what SIS was optimum for use in their organization or they had purchased a new system to meet the NYSED data needs. Each of the BOCES sites had unique organizational needs that differed greatly from a district secondary high school. Appropriate selection of software demands a systems approach if the transition is to be effective and efficient.

By implementing a systems approach when selecting software, the CTE administrators would have the ability to analyze what type of data is needed. CTE leaders will have to determine when and how frequently these data need to be accessed and need to have a firm understanding of the purpose these data serve. The administrators also need to ascertain whether

the data can be used in other areas of the school, such as in classroom instruction, in the financial and budgeting office, or in teacher observations. A systems approach to selecting software could include how to ensure appropriate, needed training for all stakeholders and how to assess the influence of the technology on the ways in which people conducted their tasks and professional duties.

Finding 2: The Efficacy of Technology

All of the CTE administrators were of similar age and had acquired varied professional experiences and education. The beliefs and perceptions of all of the CTE administrators regarding the value of technology in CTE programs were similar in nature, aligning with the administrators' perceived technology capacity. All of the administrators were committed to transitioning their CTE programs from a traditional chalk-and-talk teaching environment to a 21st-century CTE learning environment. The BOCES administrators believed the transitioning process was promoted by their executive decisions to acquire the accepted conventional technology supports such as lap top carts, electronic readers, iPads, and Smart Boards for the classrooms, and to provide online assessment opportunities for students.

Juxtaposed to the administrator's actions, which were driven by their beliefs and perceptions of technology, using interviews and document reviews of current technology plans, lesson plans observations, and technology purchases for CTE programs such as cosmetology, construction trades, auto technician and culinary arts revealed that most administrators were aware of the more sophisticated classroom Web 2.0 technologies. Such technologies included smart phones, "bring your own devices (BYOD)," interactive social websites such as YouTube and Moodle, Pod-casting, webinars, and online professional learning communities. Although all believed their CTE programs could be considered cutting-edge, all but one administrator failed to

indicate the intention to upgrade to more sophisticated (Web 2.0) technologies in the classroom or the influence of such technologies on classroom instruction.

Some resistance surfaced to the implementation of some of the Web 2.0 technologies in the classroom setting. All of the administrators cited reasons for resistance as the technology policies presently in place or the administrator's lack of confidence in the benefits of these more sophisticated technologies, as well as in the capacity to manage the more sophisticated technologies that bring additional autonomy to the students and teachers.

Leadership Demographic Analysis

Making sense of this finding required examination of all of the contributing indicators that might influence the CTE administrators' technology beliefs and perceptions regarding the implementation of not just the type of technology, but whether the administrators recognized the Web 2.0 technologies as value added to the CTE classroom. Examination of the BOCES' administrators' personal demographics, including professional experience and educational background, was the first step. A researcher-created online demographic survey using Survey Monkey was e-mailed to all of the participants. The following anecdotal information was gathered and analyzed for similarities and discrepancies in the identified demographic categories.

Ava was a 55-year-old White female who had been employed as the CTE Director for the past two and a half years. Ava had been employed at the same BOCES for 10 years as the CTE principal, with a total of 28 years of experience in CTE. Ava had earned a Bachelor of Science in Education, a Master of Science in Special Education, and a New York State School District Administrator certification.

Adam was a 44-year-old White male who had been supervising the CTE Career Academy for approximately a year and half. He had a total of five and a half years of experience

as an administrator, had four years of previous professional experience as a principal in an alternative high school at this same BOCES, and had 15 years of experience as a secondary math and science teacher at another BOCES. His professional experience included three years as an engineering officer in the U.S. Army Corps of Engineers. Adam had earned a Bachelor of Science in Physics, a Master of Science in Science Education, and an Advanced Master of Education Administration School and District Level Administration.

Ben was a 59-year-old White male who had been employed as the CTE director at this BOCES for 18 years, and he had a total of 30 years of professional experience as an administrator, including building principal, special education director, and CTE director. He had earned a Bachelor of Science in Special Education and held a NYS School District Administrator certification.

Barbara was a 56-year-old White female who had a total of 16 years as a CTE administrator, all acquired at her present BOCES site. Barbara's educational and professional experiences included nine years as a New York City teacher of Aviation Trades. In addition, Barbara had 18 years of extensive industry experience as an aircraft mechanic. She had earned a Bachelor of Science in Education and Master of Education in Administration and held a NYS CTE Teacher Certification and School District Administrator certification.

Colleen was a 51-year-old White female who had been employed as the CTE Director for the past seven years. Colleen had acquired nine years of professional experience as an administrator, including three years as a building principal of an alternate high school and 13 years as a special education transition coordinator. Colleen had earned a Bachelor of Science in Special Education, a Master of Science in Special Education, and a Certificate of Advanced Studies in Education Leadership.

Cora was a 53-year-old White female who had been employed in her current position for the past four years. Prior to becoming an administrator at this site, Cora was a health occupations coordinator and health occupations teacher for 10 years, and she also held the position of a registered nurse for 15 years prior to coming to work at BOCES. Cora had earned a Bachelor of Science in Nursing, a Master of Science in Education, the New York State School Administrator and New York State Supervision certification, and School District Administrator certification.

Dennis was a 59-year-old White male and had been employed as the secondary CTE and Adult Education Director for the past three years. Dennis had a total of 10 years of administrative experience, four of which were as a CTE administrator. Dennis had earned an Associate of Occupational Studies (Culinary), Bachelor of Science in Hotel Administration, and a Master of Education in Administration.

Donna was a 50-year-old White female. She had been in the position of CTE supervisor for the past three years and had a total of eight years as an administrator. She had earned a Bachelor of Science in Nursing and held a New York State School District Administrator certification.

Ellen was a 54-year-old White female and had held the position of CTE Director for the past nine years. Ellen had 11 years of administrative leadership experience. She had earned an Associate of Applied Science in Nursing, a Bachelor of Science in Education, a Master of Science in Education, and a Certificate of Advanced Studies in Education Leadership.

Eileen was a 53-year-old White female who had earned an Associate of Science in Correctional Administration, a Bachelor of Science in Psychology, and a Master of Social Work. She had worked as an administrator for a total of six years and had been in her present position

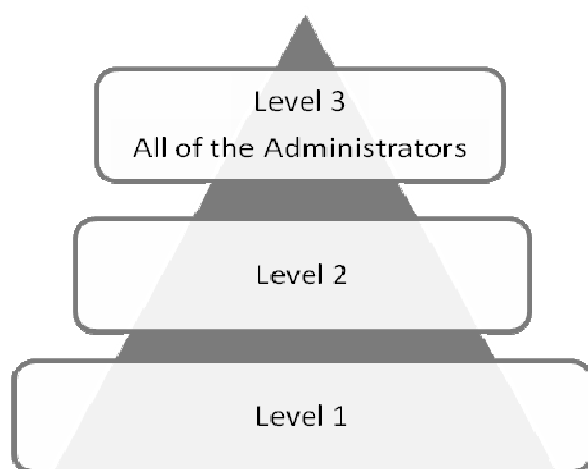
as a CTE supervisor for a year. She had obtained a New York State School District Administrator. All of the administrators' ages clustered between 45 and 60, an age group that fell comfortably into Prensky's (2001) model of the digital immigrant.

The Influence of Technology Perceptions on Leadership and Policy

Looking at the findings from the perspective that all of the administrators were digital immigrants required understanding the perceived limitations of technology understanding by the administrators. To assist in classifying the perceived technology levels of the administrators, the administrators completed an ISTE self-reflective survey. The survey is composed of three levels in ascending order, from 1–3. The survey classifies the technology capacity of administrators and implementation of identified technology into the organization methods and practices of the school administrator. The resulting findings of the survey placed all of the administrators on the third level of the rubric (See Figure 2).

Figure 2.

ISTE Rubric Results



The third level of the ISTE rubric is very rudimentary. It fails to identify any Web 2.0 technologies in its characteristics, so the results are not in conflict with the self-acknowledged “basic” and “self-taught” descriptions of the administrators’ assessments of their own technology skills. Recall that each of the administrators was asked in the interview session what they believed their technology levels were on a 1-10 scale, with 1 as the lowest and 10 as the highest.

The administrators’ responses included a highest self-rating of 8 and low of 5. The average perceived technology number was 7. The self-ratings were interesting because during the course of the interviews, the administrators had made conflicting self-evaluation statements relating to their technology skill levels. Three administrators stated they were “self-taught,” while two other administrators reported they were “behind the eight ball when it comes to technology,” and were “trying to keep up.” One administrator stated during the interview process, “This is making me feel like an old man.” Another administrator stated, “I have to refer a lot of the technology discussion to my director, because I need to learn more.” Another administrator believed she was “under-rating” herself” and “wasn’t really sure where she was at on the technology scale.”

With the understanding of conflicts between the administrators’ technology perceptions and a self-imposed analysis or a prescribed ISTE rubric, the researcher attempted to align the perception classifications with the frequencies in which the administrators hindered or influenced the advancement of technology integration into their CTE programs. The administrators replied to a question about their policies concerning students using their personal technology of “bring your own devices” (BYOD). Adam, who described himself as a “solid 7” stated:

We have a “no phone policy” presently in place. But I am familiar with research, which advises us to turn the iPhone into an ally as opposed to a foe in the classroom. There are some

classrooms, where the teachers who are working to meet our literacy initiative goals, gave them a choice, and they can choose a book, a magazine, or a newspaper. Some of the kids asked if they could use their phones and so when I went past the room, I saw some kids using Kindles or their phones. I was ok with it; it was a good use of the iPhone. Reading off their iPhone in a qualitative way, I think their achievement is going up. Can I translate to regent math scores or biology regent scores? That would take more time to study.

Ben, who rated himself a 5 and rated a 3 on the ISTE rubric, stated:

We have a “bag and tag” policy regarding phones. We have a new zero tolerance policy that was started last year here. And naturally, the students complain, they argue, they don’t want to give it up; but we are bagging and tagging and call home and notify the parent we are keeping the phone for 24 hours. If the parent insists they want their child to get their phone back, they [parents] have to come up and pick it up after school. If it is more than one occurrence, then there is a one day of school suspension, given. Most times, the parent opts to come pick it up.

When the researcher asked if he had considered implementing a BYOD policy, Ben stated firmly:

My philosophy is when the student learns how to use it correctly, okay, then they can use it, but students haven’t mastered that, because if they don’t, we have to deal with the issue of texting their friends during class and other inappropriate uses. We did talk about it: we would love to be able to create a responsible policy, but if you talk to many educators, they tell the same story: the kids don’t use it right. In fact, even though we have a strict Internet policy in place here, the students still go to sites they know they aren’t suppose to be accessing. We are looking at possibly purchasing software that

would give the teachers the ability to block and unblock some of the filtered sites on our server. We are looking into that because we have had complaints from even the teachers that they want access to some sites, like YouTube.

However, Ben's supervisor, who rated herself an 8 and was classified on the third level of the ISTE rubric, reported:

Smart phones and BYOD policy will have to be addressed when we revise our five-year technology. We will, I believe, integrate the use of Smart phones and other personal technology into our technology plan. Our present policy was written with the old education implications and values. So I think our five-year plan will look towards how to address the new classroom trends.

Ben responded to his supervisor's remarks, stating:

You know, I find it interesting that we on the secondary level are supposed to be preparing our students to go to college, and yet, not one college has ever had the conversation with us about increasing technology into the classrooms as a means to get kids better prepared for college. But that said, we're going to have to consider using technology the kids bring in, but right now it is what it is, no cell phones allowed. And in terms of integration, I have to say integrating technology; it's one piece in the process of education. It doesn't change behavior: a good teacher changes behavior. That's the bottom line: organized, structured, and well planned. Yes, you can use technology, and the best teacher uses technology effectively, but it is only one tool in their toolbox.

Dennis, who regarded himself as "self-taught," who rated himself as a strong 8 on the self-analysis, and who was classified as Level 3 on the ISTE rubric, reported,

I am someone who has to get involved and find the right technology and learn how to use it. I mean, we have some professional development, but I find myself a little ahead of the curve at those workshops. I am pretty much up on technology. I ask what's out there. I feel like I'm up on technology a little more than the traditional administrator. I use a LiveScribe pen, I use an iPad, and I'm always researching new technologies. I believe a CTE director, you have to know about technology in shops you know nothing about, and you have to really be able to make technology decisions, like whether or not it is worth spending the money on or whether it's poor technology. And since I'm not really an expert, I have to really talk to the salesman and manufacturers and industry people to figure out what type of technology is best for the classroom.

When questioned about the possibility of BYOD on his campus, Dennis responded, "I think the biggest technology struggles we have are cell phones and their use in education, and how they can be beneficial, and how to control them." Dennis also believed addressing a student's college preparation needs and technology integration into CTE classrooms were two separate issues. He stated:

It hasn't been a big issue that we need to use more technology as the key to improve college and career readiness. I have decided to take a step back a little bit because we are not using more technology for students to learn. Believe it or not, we're looking at what college and career readiness means and it means you leave your program [CTE] and enter College 101 English and not have to take remediation courses in college. We are presently networking with a community college to implement a new literacy program that will help bring up the student English and writing levels, and that means we are not going

to be using computers to do that. It means the student will start his/her day out with a reading assignment and a writing assignment and they will handwrite it.

Dennis was asked to explain the transition away from technology at his site, and he responded,

We are going the traditional way of doing things because technology is great, but the skills you need to have aren't there, so we have to develop the skills for them to be able to read the technology on a computer and be able to type and know what you're typing the right way. So we're admittedly a little backwards, and we're going in a direction our students have experienced in maybe 10 years.

Colleen, who rated herself an 8 felt she was "self-taught," and was classified on Level 3 of the ISTE rubric, stated,

Technology is like a hobby to me and I enjoy it. In the beginning, I was a bit resistant to learning the new technologies, but now I love it. I use all kinds of apps. I find myself waiting anxiously for the next new app I can use. Especially if it is free. I would like to become more proficient in using wikis and Google-docs. If there was a scale, I'd say, I move up the scale all the time.

When Colleen was asked about the campus BYOD cell phone policy, Colleen responded, Right now, our policy says, "Put away the cell phone, so we [teachers] don't see them." But they are allowed to use it in a controlled classroom setting, if the teacher knows what they are doing, as far as integrating them into the lesson.

Colleen believed how the teachers integrates technology is as important as the technology itself, and said,

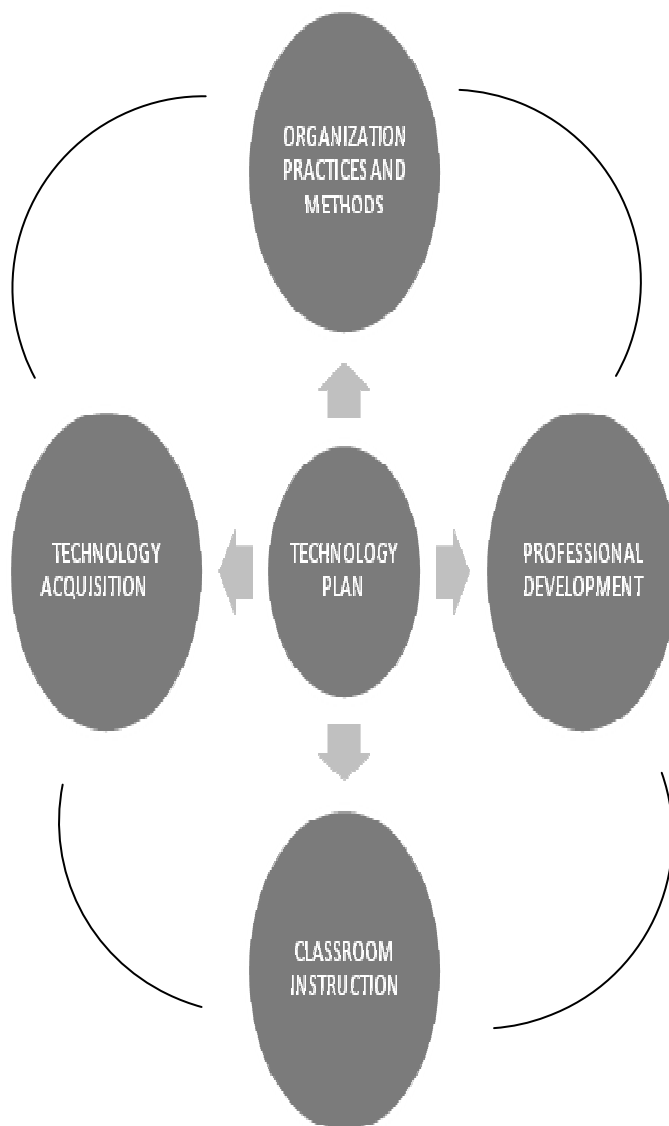
The trick is trying to understand if they are using it for the right things; you don't want to put an electronic babysitter in the classroom either. Just because there aren't any classrooms anymore, it won't stop the teacher from popping in a DVD and showing it on the Smart Board. We try to manage what the students are doing with the technology. We have banks of computers in the classrooms that have software that allows the teacher to monitor what the students are doing from their [teacher's] desk. That way, the teacher can moderate what is on the computers and freeze their [student's] computer if they go off task.

Finding 2 Summary

All ten of the CTE administrators who participated in this study believed their organization methods and practices, classroom instruction, and professional development initiatives had been influenced by technology. All of the CTE administrators believed technology was going to continue to change the manner in which they carried out their administrative duties; most specifically, how the administrators managed technology's influences on traditional school policy. However, the CTE administrators did not express any interest in looking at a systems approach as to how they might improve the integration of technology into their daily workday, or to shape a new school technology paradigm (See Figure 3).

In Finding 2, the efficacy of technology, evidence showed the administrators' perceived efficacy of technology in the classroom was of high value. However, the limitations of their technology skills and abilities hampered the administrators' capacity to fully grasp what types of technology were most effective for the CTE classroom. Policy limitations based on antiquated ideologies still plagued CTE leadership technology decisions, mostly due to a lack of understanding of how technology influences instructional methods and practices.

Figure 3.

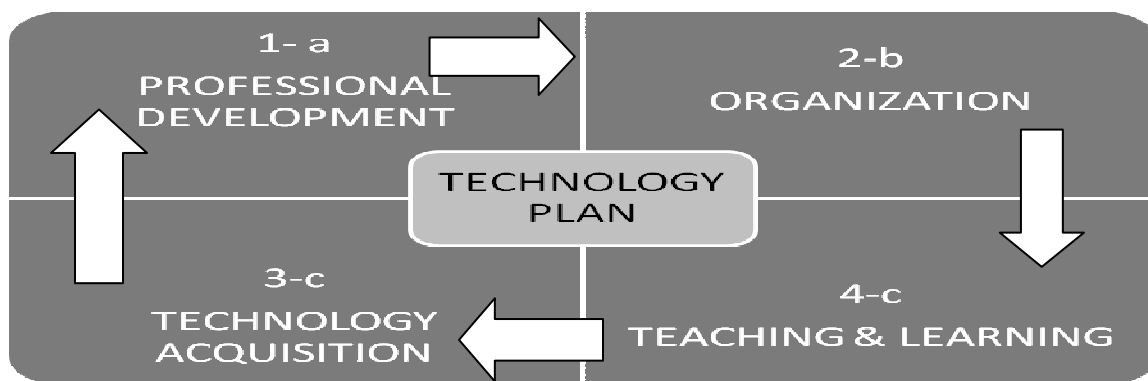
System Approach to Technology-Supported Learning Environment

There was consensus among the administrators that the frequency, use, and acquisition of technology had assisted in the transition process of the CTE programs. But again, evidence indicated there was little congruence among frequency, use, and acquisition, and a technology

policy and an organizational systemic change was a result of technology implementation (See Figure 4).

Figure 4.

21st-Century Technology-Supported Learning Environment



CHAPTER V

FINDINGS: TEACHING AND LEARNING WITH TECHNOLOGY

Teaching and Learning

Technology in the 21st-century classroom promotes learning as an active intellectual process controlled by the learner. The process for developing a 21st-century learning environment requires strategic planning including measurable implementation goals and assessments. Examination of teacher classroom observations; supervisor observations; program budgets, specifically, spending allocations for technology; and current BOCES-wide technology plans supported this construct.

Research Question 1, “What relationships exist among the CTE administrators’ technology comfort levels and proficiencies, and the degree to which 21st-century instruction is implemented?” spurred the examination and evaluation of the transition processes used by the CTE administrators. The CTE administrators were transitioning their 20th-century vocational shop classes to 21st-century CTE learning environments in which the role of the teacher was of facilitator and where technology provided the supports for learning. The interview question, “What is the current status of your BOCES technology plans and policies?” was fundamental in gaining insight into how the CTE administrators planned, developed, and implemented 21st-century CTE programs.

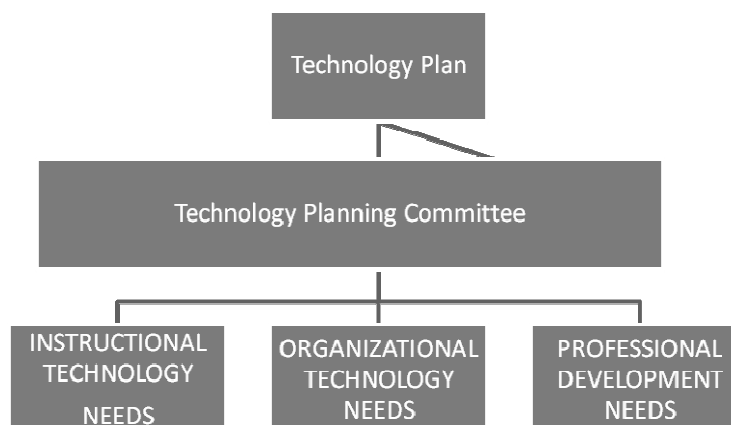
Finding 3: Technology Process and Planning

Disengagement was clear between the CTE administrators’ processes of planning for future technology initiatives, development and evaluation of classroom instruction and technology, and the BOCES organizational-wide technology planning process. The

disengagement did not signify any lack of attempts by the administrators to plan cohesively, but in fact, the disengagement was inherent throughout the technology planning process due to the inability of the administrators to understand the need to re-assess old practices and methods for relevancy in the advent of new program and instructional and curriculum technologies. During the administrators' interview sessions, the technology plan was discussed as a "global" entity that was summative in design (See Figure 5).

Figure 5.

Summative Technology Planning



Technology planning was developed based on technology needs reported to the technology planning committee. Rather than an upward design in collection of professional development needs, a living, day-to-day referenced, cumulative compilation of CTE technology staff and student needs would be optimum to drive 21st-century teacher professional development, lesson planning, organization technology, and program/curriculum development

and technology acquisitions.. The majority of administrators did not keep the technology plan readily available; it appeared to be a document reviewed only annually for needed updates and not for daily planning or assessment. The technology plan was requested as one of the documents for review. Colleen stated:

I can get it. I have to dig it out because, you know, they have to re-do it every five years. Now, you can't wait five years, it would be too much, so I think we do three-year plans now: I'm not sure. I'm not sure when it's due or when it was done. I am assuming it's current because we have dynamite technology director. So I don't; For me, I am not referring to it as, you know, a living document. I am sure the technology director is, but you know, I can refer to it if I need to answer your questions. But I know Smart Boards are a big push. We pretty much have one in every single classroom and the teacher training is to make sure they are being used not as blackboards.

Colleen was asked if she focused on teacher classroom skill or instructional strategy development because it was part of the tech plan objectives, and she replied,

The current [technology plan] status has goals and objectives. I would say it's probably due to come up for updating the goals again, because it has been a couple of years since I worked on them. The technology director develops the plans. We wanted Smart Boards and now we have them. I think everyone [all classrooms] has them.

The researcher inquired if, in fact, the directors of each division had a say in the development of the technology plan. Colleen answered,

Every division has a section of the technology plan, so there are goals and objectives for each division that make up the over-all technology plan. But it is pretty much the

technology director making the decisions, because you know, there are capacity issues. But to the extent she can, she wants us to write our division plans with her.

When probing questions were asked to find out to what extent the director could determine what technology equipment and software upgrades were priorities or preferred acquisitions, Ben reported,

We have to look at it [technology plan] again in order for me to really tell you. I am familiar with what is in the technology plan overall. You know, we would want to get this or that and we would refer it to the technology director. Like I said, I think it's due to be updated again, but it's only three years now.

Cora reported their technology plan as "a five-year plan that is reviewed annually for the purpose of checking on system upgrades and handling the different technology needs of the department, and keeping up with industry and instructional trends." Donna reported their technology plan's objectives included,

Upgrading of all administrative and clerical computers and all the old computers would be distributed to the classrooms to replace the older student computers. The plan's objectives also are to upgrade us to Windows 2010 and upgrade technology in shops as needed. We try to stay ahead of the curve.

Dennis reported the technology director took the lead on the development of the technology plan at his BOCES. Dennis explained,

We have a director of technology who is responsible for preparing all of the division's technology plans. She keeps up to date as to what to what is going on, and the budget usually covers some of the cost increases of our technology needs. For instance, we're getting ready as a campus to upgrade to Microsoft 2010 on all of the computers. We

[administrators] have already had the training. This upgrade started with Outlook and we'll have a couple more trainings to help us through the conversion. All of our other technology objectives are in professional development. The goal is for us to be able to do distance learning, to conduct Webinars from anywhere on the campus. We have developed a Moodle [online platform for instruction] for the teachers in the district and they [technology department] are looking to expand in other areas as well.

When asked when the technology plan was last updated and whether it was a three- or five-year plan, Dennis replied,

It was just recently updated. It's usually a five-year plan, and I think it was updated about a year ago and they [technology division] hired another staff member who has technology instructional capabilities so they can look at how to better put instruction and technology together, and how we are doing things. She reports to the technology director, but she basically focuses on instructional technology. She was the person who developed our Moodle. She has a lot of background in what happens in the classroom and how to integrate technology.

Barbara stated she sat on her BOCES technology committee and reported:

Our tech committee is looking at things like upgrading to the next generation of software and technology for our campus. The other thing they are looking at is how to use technology to integrate 21st-century skills into our teaching. Those will be the five-year goals. They are also looking at professional development, which is a big thing because I really want the teachers to use the software and technology properly. It really upsets me when I see a teacher using a Smart Board like a blackboard or white board or when I see a teacher using the Smart Board to show pictures.

Ben stated:

We [technology committee] have spent a lot of money on teacher training specifically for technology in the past two years. The focus was on how to integrate technology. It was a technology focus way beyond basic Smart Board training. I have the plan somewhere.

The focus was on the three different areas in technology, was the focus.

Ava stated their BOCES technology plan was up to date, and she purported:

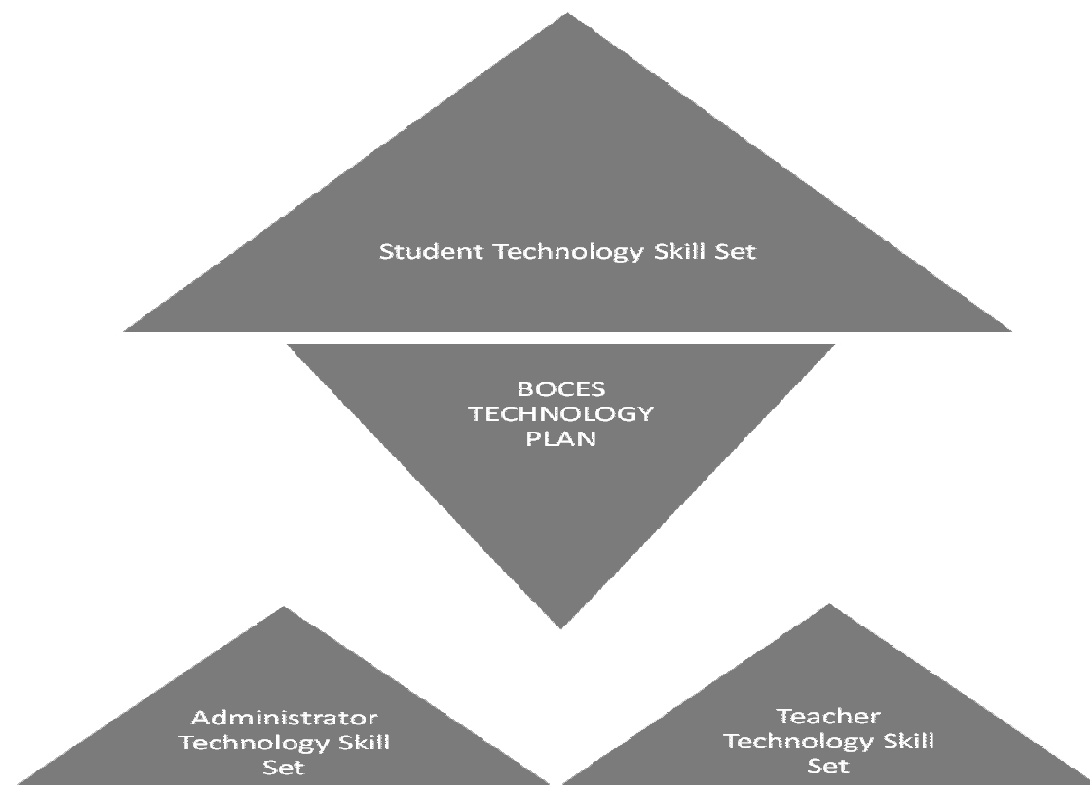
Just yesterday, we had the technology director look at our CTE goals we had established for our technology plan. Technology is very important to our CTE programs and the professional development for our teachers. There has been a definite shift in the agency's overall plan. It used to be focused on things like grant money and how to get technology initiatives funded, but now the focus is on technology for instruction. The agency has formed a curriculum instruction assessment (CIA) that includes BOCES-wide representatives from all the different departments, and Adam sits on committee.

Adam explained the purpose of the CIA:

The BOCES-wide CIA committee is a kind of outgrowth of the technology committee, which I think is very progressive. I remember reading BOCES technology plan; I think it is still posted on our website. But the CIA is progressive, and by that, I mean active in a way to improve instruction and build in efficiency. I'm not sure of the status of the BOCES technology plan, whether or not it is updated or activated.

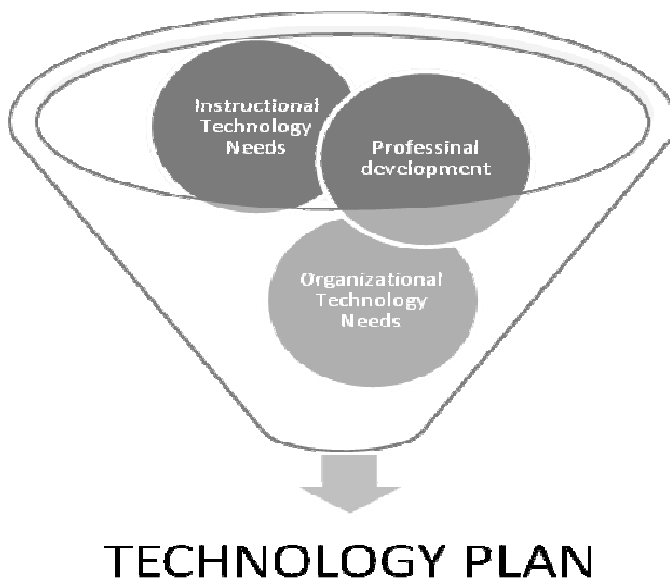
All of the directors were very confident that their current technology plans were comprehensive and supportive of their classroom instruction. However, when the researcher probed as to the perceived technology levels of their teachers, most felt the students were outpacing the teachers in technology skill acquisition (See Figure 6).

Figure 6.

Disengagement of Student and Teacher Technology Skill Levels and Technology Planning

Dennis quipped, “Maybe I should fire all the teachers and hire the students, because they have more [technology] skills than the teachers.” This statement, said in jest, probably holds more truth than he might want to admit. It is that logical consideration, a cumulative approach to technology professional development planning, including assessments of students’, administrators’, and teachers’ technology levels, that would be pivotal to the process of planning (See Figure 7).

Figure 7.

Cumulative Technology Planning

The benefits of implementing a cumulative model for technology plan development include the continuous capability to build upon already present technology skills of both the staff and students. Rather than utilizing a traditional planning process that limits the plan to the planners' abilities and knowledge, implementing a summative technology plan would support the 21st-century education paradigm for life-long learners.

Leadership and the Technology Assessment Process

The most recent supervisors' classroom observations still focused heavily on the pedagogy of theory or practicum methodologies. The teacher observations reviewed by the researcher found teachers were using the Smart Board to project a Power Point presentation that framed the day's lesson and lecture. The observation review noted students who were observed

writing longhand notes and completing handouts to reinforce the lecture. Donna, who had evaluated the lesson, summarized the lesson and noted the following on the observation:

A complete outline of the topic was prepared in Smart Notebook and was already up on the Smart Board as the students entered the classroom and acted as a backdrop for the teaching the lesson. I had a conversation with Mrs. [teacher] about having a “do-now” on the board when the students enter the classroom.

However, the BOCES utilized a professional growth plan (PGP) model for their teachers and submitted a sample for review in this study. The PGP was reflective in nature and recorded a teacher’s two-year approach to purposively developed, technology-supported lessons. The instrument had six targeted areas: pedagogy, teaching techniques, classroom management, interpersonal skills, professional responsibilities, and applying coursework/research to classroom practice. The PGP asked the teacher to self-reflect and respond to open-ended statements such as, “I would like to achieve the following goals.” The teacher wrote her reflections and stated:

In the past, even though I teach skills and had students repeat it in the lab, some students have problems mastering the procedures and sequencing of steps, especially special needs populations. Last year I was very successful using technology with my students; my goal this year is to use digital technology and change the way I teach and reinforce procedural skills and sequencing.

Even more interesting was the response to the second PGP probe, “Describe in more detail the impact you expect meeting this goal will have on student growth and achievement.” The teacher scribed, “If I use technology in the way I have planned, I expect students will comprehend procedures better and faster and be more successful passing their exams.”

Of interest was the capacity of this PGP plan to align with a 21st-century learning environment, wherein both the student and teacher learn and achieve new skills. The PGP overview and summary of the teacher goals was also developed by the teacher, in collaboration with Barbara, an administrator. The teacher noted:

The PGP took place over two years, starting last year and finishing next year. It will include a completed online senior project, a resume, technical diploma requirements, a mission statement, personal as well as professional goals; in essence a portfolio.

Preparation for needed technical skills was provided in after-school trainings.

The PGP artifact presented for review was very compelling, because it identified the need for a school to develop, implement, and assess its technology plan. The 21st-century classroom requires the teacher to continuously engage in meaningful technology professional development to maintain an equal student-teacher technology skill level. The supervising administrator also has to increase his or her technology capacity in order to provide a balanced teacher observation. A comprehensive technology plan will drive instruction and support teacher and student learning needs to be designed as a living document that will transition with student, teacher, and school organizational technology growth.

Document Review: Technology Plans

National Education Technology Plan. To create a baseline for the evaluation of effective technology plans, the researcher referred to The National Education Technology Plan (USDOE, 2010b) as an instrument of measure for the BOCES technology plans (Document 1a). The National Education Technology Plan (NTEP) was supported by a letter from Arne Duncan and was presented to Congress. The NTEP is an exemplar of 21st-century school technology plans, stating:

The model of learning described in this plan calls for engaging and empowering personalized learning experiences for learners of all ages. The model stipulates we focus what and how we teach to match what people need to know and how they learn. It calls for using state of the art technology and universal design for learning (UDL) concepts to enable, motivate, and inspire all students to achieve, regardless of background, languages, or disabilities. It calls for ensuring our professional educators are well connected to the content and resources, data and information, and peers and experts they need to be highly effective. And it calls for leveraging the power of technology to support continuous and lifelong learning. (USDOE, 2010b)

The NETP (USDOE, 2010b) calls for “revolutionary transformation rather than evolutionary tinkering.” The NETP stated,

The plan recognizes technology is at the core of virtually every aspect of our daily lives and work, and we must leverage it to provide engaging and powerful learning experiences and content, as well as resources and assessments that measure student achievement in more complete, authentic, and meaningful ways. Technology-based learning and assessment systems will be pivotal in improving student learning and generating data that can be used to continuously improve the education system at all levels. Technology will help us execute collaborative teaching strategies combined with professional learning that better prepare and enhance educators’ competencies and expertise over the course of their career. To shorten the learning curve, we should look to other kinds of enterprises, such as business and entertainment have used technology to improve outcomes while increasing productivity. (USDOE, 2010b, p. 7)

The NETP is focused on five discrete areas of a technology plan: learning, assessment, teaching, infrastructure, and productivity. The researcher examined the current BOCES technology plans submitted for this research and evaluated the NETP discrete targeted areas and the goals established in the BOCES' technology plans for congruence. With a good understanding of the national technology initiative, the researcher reviewed four of the five BOCES technology plans for congruence with the NTEP of 2010.

Document 2a. Document 2a in the review was a three-year (2008-2010) BOCES wide technology plan. The BOCES technology plan was comprehensive and presented five targeted goals, along with a strategic plan for each division of BOCES: curriculum, CTE, adult education, e-learning and model schools, school library services, media library, athletics, health and safety (risk management), and special education. The five goals supported in this technology plan were focused on resource management, digital use, protocols and infrastructure, accountability, and leadership. In this technology plan, the CTE division descriptor stated,

As a Career and Technical Education Center, we must ensure that our students are on the cutting edge with the latest technology in their chosen field and they must have access to and support for the technology.

Goal 1 focused on curriculum and the integration of technology in order to

- Maximize student engagement in the instructional setting through the integration of education technologies.
- Promote and strengthen students' use of technology in the learning process.
- Expose students to various online learning experiences.
- Identify developing technology and web-based resources that enhance the flow of information and opportunities for exchange of ideas.

Goal 2 focused on the professional development that would provide continuous and sustainable training for teachers, students, administrators, principals, and school library media personnel for ensuring, “successful and effective uses of technology.” The strategic plan objectives were designed to

- Increase student engagement in classroom instruction.
- Increase students’ use of technology to learn.
- Provide students with a collaborative delivery instruction by which students will identify and demonstrate teamwork strategies.

Document 3a. Document 3a in the review was a two-year (2010-2013) BOCES technology plan framed in six goals. The first goal focused on an integration of technology linked to curricular goals and objectives consistent with New York State Learning Standards and updated to include the Common Core Learning Standards (CCLS). Teachers were expected to give instruction focused on “not only in how to use computers, but also in how to design lessons with technology.” Professional development and curriculum specialists would “stay informed about both the new state assessments and technological innovations.” Teachers would be “exposed to model uses of technology in order to enable proper integration into the curriculum.”

The second goal focused on “sufficient and equitable access to equipment and software resources for all students and teachers.” Evidence of success was identified by the fair distribution of technology, special provisions for special needs students to receive appropriate adaptive devices, and alternative methods of material presentation supported by technology. Active center-level technology committees were to “determine priorities for how technology resources will be distributed throughout their centers.” The plan stated a “well-designed professional development program” would be developed, implemented, and evaluated, including

establishing a reliable technical infrastructure, with adequate support services in place to provide timely resolution to technical problems.

The third goal focused on implementing “a well designed professional development program.” Successful outcomes were providing evidence of staff understanding of the importance of technology and demonstrating a commitment to its successful integration into the curriculum. In addition, by identifying the minimal technology core skills, by division, that all staff members should master, this program provided stipends for summer training, scheduling of after-hours workshops, one-on-one training, and online courses. To set up an informal mentorship program that would pair more skilled employees with neophyte technology learners, this initiative included input for technology planning from staff, delivery of in-house staff development, modeling the use of technology, and “informally guiding staff as they begin to use technology.” Last, opportunities were provided to “experiment with a cohort approach to staff development, to promote peer-led, activity oriented, short-duration professional development activities to enhance curriculum.”

The fourth goal focused on the need to establish a “reliable infrastructure that will provide timely resolution to technical problems.” Successful outcomes would be identified by contracting with the local area Regional Information Center for LAN and WAN support and other communications technologies; having a “robust” network infrastructure including a high speed communication link, fast Ethernet, server-based LANs, Internet with filtering, easily assessable software applications from all locations, and access to e-mail and data from any location. An effort would be made to maintain an appropriate technology inventory to support the initiative and would assure each classroom was equipped with at least one Internet-connected computer.

The fifth goal focused on the commitment of the Board of Education, administration, faculty, and staff to ongoing technology upgrades and resources. Successful outcomes included purchase and acquisition of current technology hardware and software designed to be supported with technology training.

The sixth goal focused on a formal decision-making structure that ensured personal responsibility for the development, implementation, and evaluation of technology. The intent of this goal was to assure a process and method was in place to assure all of the initiatives' strategies would be measured and assessed for growth on a regular basis. Highlighted initiatives for this goal included overseeing the implementation of the plan, evaluating the plan, supervising and scheduling of plan initiatives, reviewing software, keeping current on new technologies, making recommendations for technology and software acquisitions, and assessing and making ongoing revisions to the plan.

Document 4a. Document 4a was a three-year (2010-2013) BOCES technology plan, which indicated a technology mission to “become knowledge brokers for best practices and to promote the use of technology which supports departmental goals. The committee will manage the process through conducting on-going needs and assessments and identifying best practices and future directions for technology in the field of education.”

The BOCES technology plan structure was by organizational division. The CTE division had seven goals, each with a supporting specific objective. Goal 1 stated: “Secondary students will be adept in using technology tools to produce classroom and homework projects.” The objective was for students to be able to master the use of a spreadsheet or other database technologies for developing a portfolio. The anticipated outcomes would result in 100% of students completing a portfolio that contained a database or spreadsheet.

Goal 2 stated, “Instructional staff, adult students, and secondary students and parents will communicate more effectively.” The supporting objectives were, “Teachers will post assignments on a personal website using School Wires; staff will post calendars and program catalogs on a website; and adult students will register online.” Anticipated outcomes predicted all three objectives would be accomplished by 2012.

Goal 3 stated, “District schools will have the ability to view students’ grade and attendance reports online.” The supporting objective stated, “Information and technology (IT), will work with Xenegrade to provide the ability for district schools to view student grade reports and attendance reports online”

Goal 4 stated, “Communication with parents will be timely and effective.” The supporting objective stated, “IT will work with Xenegrade to provide the ability for parents to view student grades.” This anticipated outcome would be accomplished by 2012.

Goal 5 stated, “Technology will be made available to enhance communication for Academy Team Leaders.” The supporting objective required team leaders to utilize electronic methods to communicate with their team members. The anticipated outcomes would be realized when the team leaders were fully trained in the use of e-mail, forums, and discussion groups. This goal was expected to be met by 2012.

Goal 6 stated, “Smart Board technology will be available to all CTE classrooms and labs.” The supporting objective was the installation of Smart Boards in all appropriate instructional areas. The placement was planned using a multi-year cycle and included all off-site locations. Additional corollary objectives stated team leaders would make the selections of the order in which instructors and classrooms received Smart Boards, and team leaders would

prioritize the process and order of installation. Anticipations were that team leaders would oversee the training of staff. This goal was to be met by 2012.

Goal 7 stated, “CTE programs will increase the use of course websites.” This goal had three supporting objectives: CTE teachers would review and update material on their websites every three months, CTE teachers would provide information, photos, and all other supporting material needed to keep the website current, and CTE teachers would receive support in updating their websites.

The National Education Technology Plan advised that schools planning transformations should, “Be clear about the outcomes we seek. Collaborate to redesign structures and processes for effectiveness, efficiency, and flexibility, and continually monitor and measure performance” (USDOE, 2010b).

Document 5a. Document 5a, the BOCES technology plan, was a targeted, strategic plan. This strategic plan offered a specific roadmap to integrate technology into the CTE classroom. The plan was for three years (2007-2010) and was similar in design to the other BOCES’ technology plans reviewed, with the exception that it was formatted as a strategic plan, with long- and short-range goals and objectives. Like the other BOCES plan, this technology plan was composed of a BOCES-wide umbrella of goals and objectives that included technology integration, hardware and software, Internet and webpage development, 21st-century literacy, and teacher and leadership technology literacy. The plan included specific CTE goals and objectives that addressed connectivity such as bandwidth and WAN/LAN, and professional development for students, teachers, and administrators. The technology plan initiatives were intended to be inclusive and should not be viewed as a separate entity. This ideology aligned with the 2010 National Technology Education Plan, which stated,

An essential component of the learning model is a comprehensive infrastructure for learning that provides every student, educator, and level of our education system with the resources they need when and where they are needed. The underlying principle is that infrastructure includes people, processes, learning resources, policies, and sustainable models for continuous improvement in addition to broadband connectivity, servers, software, management systems, and administration tools. Building this infrastructure is a far-reaching project that will demand concerted and coordinated effort. (p. 11)

Document 5a aligned with the NTEP as it evaluated the “process and methods” of practice and explained how technology will influence needs, supports, and evaluation criteria at all levels of the BOCES organization. The technology plan stated:

Technology is not a separate curriculum but an integral part of every curriculum at every level. Within technology, we have identified nine critical areas of technology integration. They are equipment, maintenance and technical support, funding, new and emerging technology, professional development, curriculum and instruction, technology standards, technology planning requirements, and evaluation.

The researcher examined additional documents, such as teacher observations and administrator observations and evaluations, Internet-acceptable policy, program technology acquisition budgets, and purchase orders, to see if there was alignment with the current technology initiatives.

Document Review: Teacher Observations

Document 1b. Teacher observation documents submitted for review included culinary, construction, cosmetology, and automotive technology classroom observations conducted in the past two years. The researcher reviewed a BOCES’ observation (Document 1b) that was

summative in nature and contained a general narrative description of what the observer witnessed in the classroom at the time of the observation, together with a comments and recommendations section. Within the comments and recommendations were sub-topics entitled “observation description,” “preparation,” “instructional delivery” and “classroom management.” The document had a post-conference section with a sub-topic titled, “future objectives and priorities,” where the teacher was able to collaborate with the supervisor/principal to discuss and record their discussion of next steps.

The researcher was advised, prior to the formal observation, a pre-conference was held at which the teacher and the supervisor discussed and recorded the priorities criteria. Listed criteria for evaluation included content knowledge, preparation, instructional delivery, student development, professional qualities and responsibilities, student assessment, collaboration, classroom management, and reflective and responsive practice. The teacher was also expected to state and record the intended outcomes in the pre-conference and on the observation form.

Document 2b. The researcher reviewed a construction electricity teacher observation, Document 2b. The criteria for evaluation priorities were preparation, instructional delivery, and classroom management. The intended outcomes stated were:

The student will gain knowledge of drawing and understanding three-way and four-way lighting circuits. Students and teacher will discuss the importance of troubleshooting circuits and how drawing them out helps with this process. Students will be exposed to and practice troubleshooting techniques.

A synopsis of the narrative composed by the supervisor observing the lesson stated:

The teacher lectures and relates some anecdotal examples of times in his career that he has installed these types of circuits. Students comply and begin drawing as teacher

continues lecturing on topics tangential to the main objective of the lesson. As the students work through the example, the teacher monitors the progress and walks about the room, checking on the students, providing feedback and guidance. After several minutes of work, he moves back to the front of the room and begins reviewing the problem on the board [Smart Board]. As he reviews the problem, he asks questions and checks for their understanding. The students comply with the routine and follow the direction of the teacher.

The teacher moves on to several new problems, presents them to the students, and goes over them in a similar manner. This routine of going over problems goes on for several minutes. When the teacher feels comfortable, he assigns independent work to the students. He hands out a worksheet with procedures related to completing the worksheet and notes there is an extra credit problem on it. As the worksheet is handed out, the students immediately begin working on it and the teacher simultaneously begins monitoring their work.

Under the sub-topic “preparation,” the supervisor noted; “was well prepared and demonstrated he employs the necessary pedagogical practices to support his instruction.” Under the sub-topic “instructional delivery,” the supervisor wrote, “In this class, your instructional delivery practices demonstrated you are aware you are responsible for active student involvement.” Under the sub-topic “classroom management,” the supervisor [Adam] expressed, “Your classroom management was excellent. You had a large group of students as noted above and they remained on task and directed to you for the entire observation. Continue the practice of conditioning the students to behave in this manner, as it will benefit your ability to help them reach their individual and collective full potential. Continue to make

classroom management your highest priority. Excellent preparation and management provide the basis and are fundamental to high quality and rich instruction.

Adam further encouraged the teacher in his remarks under the sub-topic, “future objectives and priorities” to “continue to develop and define lesson plans that meet the needs of the students and challenge them in ways will benefit them in their future careers or educational endeavors. Continue to maintain a strong classroom management style to maintain a positive classroom environment.”

The researcher noted a lack of observed technology integration in this lesson observation. There was a strong emphasis placed on “student management” as it related to a teacher-dominated lesson. All of the research documented in Chapter II of this research revealed the new 21st-century learning environment should not be a place where students are restricted by the teacher’s knowledge, but in fact, should be a place where the student and the teacher both learn through facilitated group learning activities that are technologically supported. In this lesson, it was evident there were no opportunities for the students or the teacher to conduct exploratory activities and research this topic on their own with the available computers in the classroom. The Smart Board was used as a blackboard and the hard copy handouts were the supporting material for the day. In the resulting observation, Adam did not encourage the teacher to explore technology as a means of expanding the learning possibilities of the students.

It appeared Adam enforced the chalk-and-talk teaching classroom style in which most teachers are proficient, in lieu of the 21st-century learning environment that would provide a less teacher-dominated lecture and guided instruction lesson. The observation also did not address how student learning was measured. In the 21st-century learning environment, assessment is integral to teacher preparation and lesson execution. The use of student achievement data would

provide the teacher the opportunity to set up the classroom for students to gain knowledge and skills independently, using software and other technologies. In such a learning environment, the teacher facilitates the learning process by creating learning opportunities through self-exploration, reflection, and assessment of the students' learned knowledge.

Document 3b. A second teacher observation, Document 3b, was of a culinary teacher observation. The pre-conference priorities criteria included professional qualities and responsibilities, collaboration, and reflective and responsive practice. A synopsis of the descriptive narrative read:

The teacher reviews the schedule for next week; she begins preparing them for the test by directing everyone to unplug. The students understand the directive and comply. The teacher asks them if any of them can live without music. This triggers a number of appropriate replies. The conversation is relevant and revolves around the opinions of the students in the class. Some love it and don't like not having access to it. Others have mixed reactions: they like but can live without it. The teacher gives her opinion and expresses the value of silence in her life—she seeks out silence on occasion so she can think and reflect on things. Some students react positively to this and acknowledge they like doing the same thing.

The observation continued to record the next steps taken by the teacher and stated:

They move as a group to a table in the middle of the room and begin working as a team on putting their birthdates down on a sheet of paper. They collectively and in silence begin placing their birthdates down on the paper. They are communicating via non-verbal cues and prompts. As they conclude the exercise, they move to the front of the room and line up in chronological order according to the date and year of their birth, from

youngest to oldest. The teacher gave them [sic] two minutes for the team exercise and then directed them to complete it. They complied and performed the exercise according to her parameters. She acknowledged their work and then announced they would now begin reviewing for the test. The students transitioned smoothly to the next activity.

Adam summarized the narrative and stated, “They [students] are all engaged and following along with the game. The teacher continues with this process until the end of the observation. The discussions and conversations were consistent and controlled throughout this time.”

Under the topic of collaboration, Adam wrote; “Over the course of the year, and most importantly, teacher X has consistently demonstrated she has engaged and collaborated with colleagues and the school community [Hospitality Academy] to develop and sustain a viable and common culture that supports high expectations for student learning.” Under “reflective and responsive practice,” Adam wrote:

Teacher X consistently assesses the effectiveness of an instructional activity; she reflects often and consults with her peers and colleagues regularly. She often seeks out best practices and looks for more efficient ways of doing things.

Under the sub-topic, “professional qualities and responsibilities,” Adam wrote:

She exhibits a sense of duty and loyalty to her profession beyond her years and can be relied upon when asked to go above the norm. This is a strong point and I encourage her to continue to maintain the high standards she has set for herself. As she acquires experience, the aforementioned attributes will benefit the program and ultimately the students.

During the post conference, the “future objectives/priorities,” his recommendations stated the teacher should, “Seek out training, courses, and or professional development activities that will enhance your professional growth, e.g., behavior management courses, seminars, and conferences.” The researcher found, typical of most classrooms, the teachers were asking students to “unplug.” This request to power down is in direct contrast to utilizing technology in the classroom. If educators have expectations of moving their classroom activities to include technology, then the negative connotation of “power down and let’s learn,” will counter initial efforts to integrate technology into the classroom. A positive motivational prompt, “turn on and let’s start learning,” should be the norm, rather than the exception.

The teacher further created a schism in approaches to learning by comparing “thinking and learning” with “silence.” In a collaborative 21st-century learning environment, students should be encouraged to use all of their senses as they self-reflect, discuss, collaborate, and serve as peer critics. This lesson, although engaging, lacked any opportunity for students to utilize any technology. It was teacher-dominated as seen by the lecture, the pre-selected activities, and the lack of student input in the learning process.

The supervisor enforced the need “to control” the classroom learning environment by stressing additional classroom management courses should be considered to improve upon the teacher’s classroom management. The supervisor did not focus on the teacher’s technology integration or skill improvement that was clearly outlined in the BOCES technology plan. Instead, the focus was on classroom management. In the 21st-century learning environment, these two are not exclusive, and in fact, good classroom management should be a by-product of a strong technology-supported learning environment in which students have the ability to learn, discover, and self-reflect with the guidance of the teacher.

Document 4b. The researcher reviewed an automotive technology teacher observation (Document 4b) submitted for this study. The observation's post-conference priorities criteria for evaluation were student development, professional qualities and responsibilities, and student assessment. A synopsis of the observation narrative stated:

All observed students were seated, focused, and clearly prepared to receive instruction, with their textbooks and notebooks open in front of them. A PowerPoint presentation of the chapter to be covered was up on the screen. The Smart Board was nearby and waiting for installation. The lesson began promptly by you introducing the topic for the lesson for the day.

The supervisor continued his observation and noted, "The delivery of the instruction was thorough and comprehensive." The observing supervisor made an instructional suggestion, "I would suggest waiting a little longer for student responses, though the students did respond well." The observing supervisor went on to describe:

Teacher X responded well to questions from the class. Teacher X displayed an instruction sheet and explained to the class when they do a compression check; the spark plugs have to be removed. He displayed a compression tester and pointed out each of the components, including different adaptors. Teacher X also said they could do a running compression test when one spark plug was left in. He displayed a spark plug with a short thread and a spark plug with a long thread, and then he displayed different adaptors.

Teacher X then warned the class they would never use a short thread spark plug on a long adaptor or the reverse. Teacher X stated when the parts are difficult to get, you have to sometimes be creative.

The supervisor continued to praise Teacher X and stated,

The delivery was excellent and your explanations and descriptions were well paced, uncomplicated, level-appropriate, and were clearly understood by the students. Teacher X's translation of information from the textbook was exceptional; you were able to put information into words the students could understand. Teacher X has an amazing wealth of knowledge and the students clearly recognized and appreciated your vast knowledge and expertise.

The observation summary concluded with

Teacher X, you are exceptionally interesting and engaging. You have created a comfortable, non-threatening classroom environment where learning is eventful. Teacher X, your lesson is outstanding in that you expertly balanced theory and instruction with practical application and wasted no learning time. You have clearly met your instructional goals with a challenging, engaging lesson.

The supervisor who observed this lesson noted in the post-conference "future objectives and priorities" section: "Once the Smart Board has been installed, take advantage of training so you can incorporate the use of the Smart Board with your lessons." The supervisor also noted; "Complete the re-certification process and look into hybrid training to add to the curriculum."

The researcher found that although the supervisor did in fact encourage the use of the Smart Board, the supervisor missed many opportunities to assist in guiding this teacher into creating a less teacher-dominated lesson. A student-centered lesson would allow students to learn in context how to read manuals, problem solve, and collaborate to find solutions. All of these activities could be supported with the use of software and applications that relate to industry trends and standards.

Simply using a Smart Board will not move this classroom away from a traditional chalk-and-talk teaching environment. Considering the foci of the teacher observation were pre-determined to evaluate student development, professional qualities and responsibilities, and student assessment, the supervisor's observations only referenced the teacher's "vast knowledge and expertise." Neither student achievement assessments nor technology integration was evaluated or observed, due to the lesson design that allowed only for teacher lecture, teacher-led discussion, and teacher-led practicum demonstrations. By encouraging the teacher to use technology, such as the laptops or computers in the classroom, students could have worked in groups to research and then report their findings on how spark plugs function, how they are installed, and how to "be creative" when specific parts are not available.

Document 5b. The researcher reviewed a cosmetology teacher observation, Document 5b. The observation had eight areas in which the teacher was observed: content knowledge, instructional delivery, classroom management, student development, student assessment, collaboration, reflective, and responsive practice. Each area had a summative rating check-off that included *not evident*, *partially evident*, and *clearly evident*. The observation concluded with a summary of the teacher's lesson. Under the sub-topic of content knowledge, the supervisor stated; "Clearly demonstrated her knowledge of hair cutting as evidenced by her ability to answer questions posed by the students during class." Under the sub-topic of preparation, the supervisor noted,

Was well prepared for this lesson. A complete outline of the topic was prepared in Smart Notebook; it was ready on the Smart Board as the student entered the classroom. I had a conversation about having a "do-now" on the board for the students when they entered

the classroom and Teacher X stated the “do-now” is done in the salon in their journal notebooks.

Under the sub-topic of instructional delivery, a narrative of the lesson observed was noted:

This lesson was delivered as a Smart Board-supported demonstration lesson. Teacher X started the lesson with a review of the vocabulary that was to be used during the lesson, and several times during the lesson, she went back over the vocabulary and reinforced them with the students. At one point during the lesson, Teacher X used the tool on the Smart Board that allows words to be moved to another location. She had students come up to the board and move the words to the correct location on the sketch she had used to introduce the material. This was an excellent use of the Smart Board and the students responded positively to it. She then demonstrated how to correctly hold a pair of scissors. I [supervisor] had a conversation with Teacher X about allowing the students check each other’s handling of the comb and scissors and how this might be helpful to each of the students. Teacher X commented the students need to pass a practical exam and she [teacher] needs to be personally sure each student is doing it correctly.

The researcher referenced this narrative as evidence that classroom technology was not being used to its greatest potential and administrators lacked the technology capacity to facilitate the process by which teachers would be able to transform their lessons to incorporate technology. Simply using the Smart Board to highlight vocabulary words or tag a diagram actually slows the learning process, due to the rudimentary elements of the teacher-directed tasks. The supervisor did address the issue of peer critiquing as a method of students collaborating and interacting as they learned new skills, yet he pulled back when the teacher stated she must dominate the

process of learning because she believed it was the only way to facilitate positive student achievement scores on assessments.

The supervisor checked *clearly evident*, for this observation's sub-topic had a criteria framework of "demonstrate the delivery of instruction results in active student involvement, appropriate teacher/student interaction, and meaningful lesson plans resulting in student learning." Under the sub-topic of student development, the administrator observer wrote:

Teacher X gave the students time to copy the notes off the board as she went through them. Teacher X was cognizant of the students who wrote slowly and asked if they were done copying before she moved on. As one student was not completely finished after a significant amount of time, Teacher X indicated to the student she would move on and give the student a copy of the notes. Teacher X and I spoke about pre-printing the notes for the students who struggles and she indicated she wants to challenge the students to excel and grow and always makes sure the students complete their notes before she leaves the classroom.

Technology would have proved to be a true support to the student who had obvious deficiencies in recording information. "Challenging" a student to grow and excel in a CTE learning environment is not measured by the ability of how fast he/she can write longhand notes. A teacher must first determine what measurable and sustainable student development growth criteria are desired and how he/she could use technology to support a student's skill development and contextual learning. Once this criterion is determined, evidence is gathered through observation of the teacher's lesson and student assessment data.

Leadership Annual Review

Document 6b. The researcher requested copies of the supervisors' annual reviews conducted by each director. Ava submitted Document 6b for review. Six areas of professional performance were reviewed annually: program, personnel, communications, finance, operations and maintenance, and a descriptive narrative of overall performance. The narrative synopsis stated, "Collaborates well with the administrative team and is thoughtful, insightful, and contributes much to the success of BOCES X initiatives." Under the personnel and communications sub-topics, the following was noted, "He is visible, accessible, supportive, and genuine. He is a regular presence in the classroom, which is welcomed by the students and the teachers."

Document 7b. Dennis submitted Document 7b for review. This document was an annual review form used to evaluate administrators. The document had three sections: A summative evaluation allowed the observer to describe and evaluate under the sub-topics of "description of major responsibilities" and "comment on performance related to responsibilities outlined in the job description."

The second part had several areas of evaluation, including several sub-topics: knowledge, foresight, follow-through, organization, initiative, resourcefulness, creativity, decision making, communication, ability to motivate, interpersonal relations, leadership, personality, communication of ideas, ethics, initiative, judgment, and self-control. This area of evaluation had a rating scale denoted as A-D, with a correlating appraisal factor to evidence for the rating. The third area of the evaluation was a summary of overall performance.

The researcher found the entire evaluation document was observer-subjective as opposed to evidence-based, with sustainable goals and objectives and assessment criterion. For example,

under the topic of leadership, the director rated the administrator an “A” and stated under the appraisal factor:

Administrator X possesses leadership skills that enable her to “look ahead” programmatically to see “what could be.” Her ability as a leader allows each program to grow and our staff to follow her vision. Her skills continue to grow and provide leadership in these challenging times.

The researcher reviewed both Document 6b and Document 7b for any connection to the BOCES technology plan (Document 2) and found none. The researcher also found no evidence in Document 6b that a teacher’s pedagogical performance would be evaluated for his/her ability to understand, integrate, and implement technology into classroom lessons. The BOCES technology plan clearly stated,

While much of this technology plan focuses on how technology will impact students, it is essential that teachers also be given opportunities to develop skills to allow them to use technology effectively. Since teachers take on much of the responsibility for educating students, their own use of technology will shape how their students will be using it.

Document 8b. Ellen submitted Document 8b for review. The document was an end-of-year, annual summative evaluation of a carpentry teacher. There were two areas of evaluation: focused learning proposal and professional performance. The focused learning proposal had six areas to select from for evaluation: individual project, group project, portfolio development, peer coaching, mentor/intern or student teacher and other. The professional performance criteria areas included content knowledge, planning and preparation, instruction/therapy, classroom/session management, student development, student assessment, professional collaboration, professional practice, and professional responsibility.

This summative evaluation was reflective in nature because it was framed by the teacher's reflections of his/her own progress or outcomes for the school year. The teacher was expected to write a summary of his/her school year experiences, and the administrator rated the teacher's reflection based on two criteria: "Staff member meets district standards for this school year," or, "Staff member does not meet the district standards for this school year. Performance Improvement Plan required." This summative evaluation, submitted for the researcher's review, was focused on an individual project, while the Professional Performance criteria selected were "Planning and Preparation." A synopsis of the teacher's reflection focused on the teacher's ability to implement a new component, such as, Home Energy Analyst Technician (HEAT) to the construction curriculum. The teacher wrote:

I implemented a new program into the Construction Academy. Home Energy Analyst Technician is a program sponsored by New York State Energy Research and Development Authority and the Building Performance Institute. The program was designed to train high school students with basic knowledge in home energy auditing, building science, and energy conservation. I felt this was a perfect program for our students to get involved with because it mirrors the Residential Energy program we already have here in place and it is in a module format. This format allowed me to teach stand-alone modules to the entire construction academy.

I have currently taught all six construction classes three different modules. It was great to get a chance to work with the all the different students in our wing. The students understand what I am trying to accomplish and seem to like the way I can tie it into their current curriculum. I hope that my efforts help our students, their families, and our school to become more energy efficient. I will continue to spread the knowledge I have

gained through training on to our future students. I will also continue to provide staff development in this area as long as I can. I am glad I have taken on this project and feel it has been very successful this far.

The researcher found this summative, “reflective” evaluation of the teacher’s “progress/outcomes” was devoid of any evidence of student success, as well as evidence of the teacher’s own pedagogical growth. Using statements such as “I hope my efforts,” and “I feel I’ve been very successful” to describe student and personal pedagogical success is fraught with uncertainty and deeply rooted in the teacher’s personal beliefs and perceptions. Alternatively, had the teacher been directed to list all of the technology innovations that supported this new HEAT program and describe how he had to change his method and practice of teaching to assure student understanding and skill development, the outcome might have been different. The teacher would be more confident and aware of the new strategies and would have been able to quantify his own efficacy as a pedagogue in a 21st-century CTE learning environment.

The administrator’s remarks praised the teacher for participating in training, meeting with industry representatives, and making the needed modifications to the curriculum to incorporate this new curriculum component. The remarks lacked specific pedagogical measures that would provide evidence of pedagogical efficacy. The administrator wrote:

Teacher X helped in developing the curriculum maps as part of the NYSED application process [CTE approval] for a new program. This year, Teacher X began implementing the program within the Construction Academy. However, prior to being able to deliver instruction in the Residential Energy Program, which follows the HEAT curriculum, Teacher X had to go through extensive training. After training, he collaborated with professionals working in the green technology industry as well as with other fellow

teachers to ensure he ordered the appropriate supplies, materials, and equipment necessary to meet the new standards. Teacher X also attended the X County Green Workforce Development Committee, whose focus is to share current trends and ensure appropriate measures are being taken to train future workers in this growing sector of the construction industry.

Similar to the teacher observation, the administrators' annual evaluation tools were subjective and spoke to amiability and personality traits, as opposed to defining measurable and sustainable goals and objectives that can be evaluated and assessed.

Leadership and Technology Policy

The researcher requested that the participating BOCES submit their current Technology Acceptable Use Policy so the researcher might understand if any policies would encourage or discourage the use of technology in the classroom. The researcher found the BOCES participating in this study all had board-approved similar Acceptable Use Policies that complied with the guidelines of the Children's Internet Protection Act (CIPA). The researcher determined all of the BOCES utilized a similar Technology Acceptable Use Policy template that had been developed by another NYS BOCES, which provides the service reviews policy and development for a fee. The researcher accepted Document 9b to represent the document review for the Technology Acceptable Use Policy and followed up with the other research participants for any additional or different policy directives. There were none. Document 9b, dated 2008, stated:

The BOCES Digital Information Systems (BDIS) are provided to enhance the educational programs of the BOCES; to further the BOCES mission, goals, and objectives; to conduct research; and to communicate with others. Use of the BDIS is a privilege and not a right. All staff members are encouraged to utilize the digital or

electronic devices and information systems available to them and the BOCES will provide staff training in the proper and effective use of the BDIS. When using the BDIS, staff is required to abide by the local terms and conditions as well as state and federal laws and regulations, copyright laws, rights of software publishers, and license agreements.

The researcher reviewed the Acceptable Use guidelines, which stated, “Educational and/or research purposes and management of a BOCES operation is consistent with the BOCES’ mission and goal.” The unacceptable usage was standard and addressed issues such as downloading inappropriate subject matter such as pornography and other unlawful or abusive material. Other unacceptable uses identified included harassing, maliciously harming equipment or material, unauthorized software installation, and unauthorized accessing of other personnel or student data. The researcher found unauthorized personal laptops were not allowed to access the network. In accordance with the Children’s Internet Protection Act (CIPA): Internet Content Filtering /Safety Policy, this BOCES’ Board of Education stated:

However, no filtering technology can guarantee staff and students will be prevented from accessing all inappropriate locations. Proper safety procedures, as deemed appropriate by the applicable administrator or program supervisor, will be provided to ensure compliance with the CIPA. In addition to the use of technology protection measures, the monitoring of online activities and access by minors to inappropriate matter on the Internet and World Wide Web may include, but shall not be limited to, the following guidelines: Ensuring a teacher/and or appropriate BOCES personnel is present when students are accessing the Internet and monitoring logs of access in order to keep track of the web sites by the students.

Document 9b also stated, “The determination of what is inappropriate for minors shall be determined by the Executive Officer. It is acknowledged that the determination of such inappropriate material may vary, depending upon the circumstances of the situation and the age of the students involved in online research.”

The researcher did not find the Acceptable Use Policy in place at the participating BOCES, which restricted the classroom teachers from integrating technology activities into their lessons. However, several of the administrators stated present restrictions placed on personal laptops or other BYOD needed to be re-examined for relevancy in the advent of the Smart phones, iPads, and other personal electronic devices students now possess. The researcher also found that the policy mandate that teachers must monitor and keep a log of visited websites was not as cumbersome as it sounded, because software is now available to monitor, store, and recall all visited websites.

Technology Budgeting and Financing

The researcher reviewed the technology acquisition capacity of the BOCES’ budgets to determine if any financial barriers persisted in the purchase and implementation of technology. The administrators reported their budgets had become increasingly stressed due to shrinking school and district budgets. All of the participating BOCES’ administrators in this study had the ability to purchase technology equipment through two primary sources: the BOCES general fund budget and the Carl Perkins Vocational and Technical Education Act (VATEA) annual grant administered through the New York State Education Department (See Table 1).

Table 1.

BOCES Annual Budget

BOCES	Administrative Budget	CTE Budget	Per Student	VATEA Allocation
A	\$48,380,752	\$12,466,032	\$76.99	\$309,242
B	44,660,167	12,234,036	49.52	213,713
C	22,029,623	5,224,945	58.32	126,616
D	74,990,864	5,698,570	61.42	534,931
E	89,328,562	16,923,115	40.31	676,180

The VATEA allocation of funds is formulated based the number of students projected to receive services from participating BOCES' district schools. Each year, BOCES directors or their designees developed and submitted a budget incorporating "major effort" initiatives that were implemented and supported through the requested VATEA-Perkins funds, based on previous year student statistics. Nine pre-determined grant guidelines required the CTE director or designee to formulate corresponding major effort initiatives. Every five years, the grant guidelines were updated. However, the grant application had to be submitted annually for approval. Directors must determine how to address the following nine mandated goals requiring each individual BOCES to

1. Strengthen the academic and career skills of students participating in career education through integration.
2. Link secondary career education and postsecondary career education, including implementing Title II [formerly Tech-Prep] programs.

3. Provide students with strong experience in and understanding of all aspects of the industry.
4. Develop, improve, or expand the use of technology in career education.
5. Provide professional development programs to teachers, counselors, and administrators.
6. Develop and implement evaluations of the career education programs carried out with funds under Title I of Perkins, including an assessment of how the needs of the needs of special populations are being met.
7. Initiate, improve, expand, and modernize quality career education programs.
8. Provide services and activities that are of sufficient size, scope, and quality to be effective.
9. Provide programs to prepare special populations for high skill, high wage, and high demand occupations.

The Director or designee had discretion when developing a budget based on the needs of students and staff categorized under the aforementioned initiatives. Typically, the primary purpose of the VATEA-Perkin's funding was to assist in financing new program equipment, upgrading older CTE programs to make them more rigorous, writing new CTE curricula based on career projections, purchasing technology for classroom instruction, and financing a portion of CTE staff salaries (excluding benefits).

The grant application was divided by areas of focus and dedicated funding allocations. For example, Code 16 could only be used for staff expenditures such as teacher aides and clerical assistance. Code 45 could only be used for supplies and materials such as instructional books, computers, software, and instructional items that did not exceed \$5,000. Code 40 was used for

consultant services, tuition, printing, and other contractual services. Code 15 was used for professional support staff salaries, such as counselors and special education teachers.

For the purpose of this study, the researcher focused on the Perkins grant (Document 1c) mandated Major Effort Activity 4, which stated, “Develop, improve, or expand the use of technology in career and education programs.” The researcher found the directors utilized budget code lines 15, 16, 40, and 45, supporting the finding that directors did indeed upgrade CTE programs with technology. Analysis of the total technology expenditures for the five participating BOCES in the past two years and evaluation of how much of their Perkins grant monies were allocated to technology initiatives indicated that two out the five BOCES did not use any of their funding allocations in the past two years for augmenting their CTE classroom equipment, supplies, or materials. The two BOCES utilized the entire allocation to support CTE staff salaries. This was an approved expenditure method, provided the staff salary was funded through the grant and could be shown to support achievement of any of the identified grant initiatives.

In the past two years, a total of \$144,295 was earmarked for technology among the five BOCES. In the 2010-2011 school year, a total of \$76,477 was allocated for technology among all five BOCES. In 2011-2012, the overall technology allocations dropped to \$67,818 for all five BOCES, with a total reduction of \$8,659 spent on technology. When the researcher questioned the drop in technology acquisition, the change was overwhelmingly attributed to the need to reallocate rapidly reducing monies to support staff salaries. Examination of the technology allocations for each BOCES in specific areas for the past two years indicated that Ben did not use any of the Perkins funding for technology, equipment, supplies, or materials, but used the entire Perkins grant to support CTE staff salaries.

All of the Perkins documents substantiated the technology allocations in Table 2 were from the NYSED division of CTE with permission of the five CTE directors who participated in this study. The review of the Perkins grant annual technology expenditures for the 2010-2011 showed Ava allocated a total of \$19,998 for technology specialists from Code 40 and a total of \$18,709 for the Perkins-mandated initiative 4. Colleen allocated \$6,070 from Code 45. Dennis allocated \$8,500 from Code 40 for the purpose of technology professional development. Ellen allocated \$2,000 from Code 40 for Smart boards and a Student Response System, as well as \$7,800 from mandated Activity 4 and \$15,600 from code 45 for 12 Apple iMac 21.5, Intel Core 2 Duo, and three Epson mounted projectors (See Table 2).

Table 2.

BOCES Technology Allocations

CODE	BOCES A	BOCES B	BOCES C	BOCES D	BOCES E
Mandate 4					
2010-2011	\$18,709				\$7,800
2011-2012	\$10,846				\$2,000
15					
2010-2011					0
2011-2012					
16					
2010-2011	0				0
2011-2012	\$27,198				\$27,198
40					
2010-2011	\$19,998			\$8,500	\$2,000
2011-2012					\$5,500
45					
2010-2011			\$6,700		\$13,400
2011-2012					\$22,274

In 2011-2012, Ava allocated \$27,198 for a technology specialist from code 16 and \$10,846.75 from the Perkins grant mandated initiative 4. This reduced the total annual technology allocations by \$8,659 dollars. Ava accounted for the increase to an upgrade for the graphic arts program, which required new and costly Alienware software and Apple iMacs. In 2010-2011, Dennis allocated \$8,500 for technology professional development and Colleen allocated \$6,070 under Code 45. The researcher followed up with the directors to solicit an explanation regarding the drop in technology funding allocations and Dennis responded:

It is impossible to continue to dedicated large amounts of monies to technology, due to the budget crunch. I find I am really struggling to find available funding to support our initiatives to provide technology professional development and purchasing any more technology right now. The budget is stressed enough as it is to provide salaries to keep teachers employed.

Ben stated:

Traditionally, we have really never relied on the Perkins funding to support our technology purchases. We generally budget those expenses through our general budget. We have always used our grant monies to augment our teacher salaries. Our business official did look at the possibility of implementing an installment purchase agreement to fund some of our technology initiatives. I'm not sure what became of idea.

Colleen explained:

We have so many other expenses; unfortunately, technology isn't a priority right now. Our budget is really tight; besides, we really have to look at how we are going to manage to update our technology to keep our classrooms current.

In addition to reviewing the Perkins grant expenditures, the researcher reviewed any purchase orders related to the acquisition of technology. Ben submitted Document 3c for review, which was a purchase order dated November 30, 2011. The purchase order was for three Dell laser printers at a cost of \$179 each, which was coded to the general BOCES CTE secondary budget. Ben also submitted corresponding Document 4c, an inter-budget transfer, dated November 4, 2011, to the in-house Instructional Services account to purchase, on behalf of BOCES, 30 laptops with carts at a cost of \$105,590.

Finding 3 Summary

The technology acquisitions aligned with and supported the initiatives of The National Education Technology Standards (ISTE, 2009) and Performance Indicators for Teachers, which identified the needed technology proficiency of a 21st-century teacher as

1. Facilitate and inspire student learning and creativity,
2. Design and develop digital-age learning experiences and assessments,
3. Model digital-age work and learning,
4. Promote and model digital citizenship and responsibility, and
5. Engage in professional growth and leadership.

The technology acquisitions also aligned with the ISTE (2009) National Education Standards (NETS) and Performance Indicators for Students, focused on the elements below as a baseline of measure when conducting the document review of teachers' and administrators' observations annual performance reviews.

- Creativity and innovation,
- Communication and collaboration,
- Research and information fluency,

- Critical thinking, problem solving and decision making,
- Digital citizenship, and
- Technology operations and concepts.

The researcher did not find any evidence of a process in place to measure the efficacy of the technology acquired by any of the CTE administrators interviewed. Evidence indicated that the observations and annual evaluations submitted failed to align with the BOCES' technology plan. In fact, the observations and evaluations were lacking in clear, defined, and targeted technology initiatives that could be considered measurable or sustainable and were inadequate to evaluate the supervisors' and teachers' technology proficiencies.

The technology plans appeared to be developed to support BOCES services and were comprehensive, although the process by which they were implemented and assessed was fractured and failed to support the processes for training and assessing teachers, administrators, and students for technology efficacy and proficiency. Pursuant to the technology plans, technology acquisitions and professional development were implemented and the purchases of equipment, materials, and professional development were completed. However, the instruments by which to measure the teachers' and administrators' proficiency in integrating and implementing the purchased technology into their daily lessons as well as into the teachers' and administrators' observation process seemed fragmented and disconnected from the goals and objectives of the technology plan.

CHAPTER VI

PROFESSIONAL DEVELOPMENT

“Professional development is more effective when it is a coherent part of the school’s overall efforts, rather than the traditional ‘flavor of the month’ workshop” (Darling-Hammond, 2010, p. 228). This belief speaks directly to the need for administrators to plan strategic and targeted professional development they can monitor and assess for pedagogical growth. The research question, “What relationships exist among the CTE administrators’ technology comfort levels and proficiencies and the degree to which 21st-century instruction is implemented” guided the researcher to the following finding.

Finding 4: Schism within Technology Professional Development

A chasm existed between teacher technology professional development opportunities, planning, implementation, and assessment, and a true understanding of the need for appropriate targeted training for technology-deficient teachers. The administrators all appeared to frame their responses to the following research questions around the concept that newer teachers had more advanced technology skills than some of the more senior teachers. The administrators purported the senior teachers lacked technology skills and did not readily embrace technology. All of the administrators indicated the teachers received and had access to professional development opportunities. The administrators all stated a lot of time and money had been invested in technology professional development training.

Evidence was found of the administrators’ inability to understand and determine a teacher’s specific technology deficiencies. As a result, the administrators frequently misclassified these deficiencies as “not willing” or “resistant” to learning new instructional technology. In contrast to this finding, the researcher found the administrators could clearly

articulate the presence of a skill gap among the senior teachers and their technology professional development needs.

The schism developed in the administrators' inability to correctly identify the senior teacher's technology needs. The administrators failed to differentiate between the teachers who needed appropriate, targeted, technology professional development to close their technology skill gaps and the teachers who had strong technology skills. The researcher found the administrators classified those who had weak technology skills, and therefore needed professional development, as "resistant."

Some of the administrators' own technology deficiencies negatively influenced the process of creating opportunities for the targeted, specific, technology professional development needed to address the varying technology skill levels of the teachers. This finding supported the administrators' admission to being "self-taught." These administrators, who were "digital immigrants" (Prensky, 2001), appeared to default to their own personal feelings and perceptions regarding technology when determining the efficacy of a particular technology professional development need and the teachers' technology development needs. This conditional default was mostly due to the advent of technology integration into the school and workplace. The shift in how people do work limited the administrators' ability to draw on personal technology experiences. The digital immigrant administrator failed to understand how to manage a teacher's technology deficiencies and understand the effects of these deficiencies on pedagogy on student outcomes.

Leadership and Professional Development

When the researcher asked the question, "In what ways do you think professional development has changed due to the increase of technology in education, and can you give an

example?” followed by a probing question of, “How would you describe your administrators’ skills in relation to technology and pedagogical support needs?” Ava responded,

We recognize if they [teachers] don’t know what you should know, then we [administrators], ideally, need to get with it and learn and provide the opportunity for them to learn. Getting people on board and providing the vehicle to make it happen is my responsibility. It is important to find those people who need help and move them forward by providing training.

Ava elaborated, stating,

Our professional development workshops consist of smaller groups where people can have their hands-on experience and learn how to use the technology rather than just hear a lecture about the new software or hardware. We have a Smart Board going and people at the computer working along with the presenter. Last week we conducted wiki training for all of the teachers, and they took them step by step through the process of creating a wiki.

Adam explained:

Professional development is a priority for us now because of technology. We have professional development available online as well as face to face and the biggest change is the informal training is going on between colleagues. An English teacher might say, “Hey, I need help with this live.com.” So I see this happening on a regular basis and I’m learning a lot. We may provide the stimulant at the presentation and they take it to the next level, the classroom.

Adam elaborated:

Our professional development has changed in that it is more personal. We have YouTube presentations on specific topics, video-conferencing, and training in our computer lab as opposed to conducting large group sessions in the auditorium.

Ava reported:

Our students now expect technology to change how things are done around here. Our students now do virtual tours of colleges and even some future work sites. They are all very comfortable with approach. There are still barriers in terms of the agency [BOCES] being cautious with the new technology. Unfortunately, we are still restricted from using certain technologies; for example, our YouTube is blocked for the students.

In response to the question regarding teacher's technology needs, Adam stated, I'm looking for more ways I can help the teacher improve. In the past, I think I was just trying to get things done and wasn't thinking about the bigger picture. But I have evolved, and I now go in looking at the lesson and see what is it that I can do to help improve this teacher's lesson and classroom instruction. I should see more technology in the lesson than I saw five years ago. I take it for granted the Smart Board will be used. The kids are not coming into the classroom now, being "wowed" by it. As I was telling a teacher the other day, when you write on the Smart Board, it can retain all your notes and lesson strategies. It's just not a marker board, it's a tool that allows you to capture, edit, and improve upon your lesson and instructions.

Adam further elaborated,

Technology has given us so much more access. Teachers post assignments on our software system, E-Chalk, and parents have access to follow up with their child.

However, for myself, I still use a traditional cell phone for communication. I guess I

could have my e-mail synced to my phone, but it has been a conscious decision not to at this point. Maybe in the next year or so I'll do it.

Ben explained his perspective of his administrative skills in relation to pedagogical support needs and stated,

I am towards the end of my career, and in my view, a new person coming into this job should have the same or better level of technology skills as the classroom teacher. I don't have those skills; I just do my job as the director. But at this point, I think it [technology] is such an integral part. It is necessary for the new person to have these additional skills.

When the researcher asked Ben to describe his perceived technology skill levels of his teachers, he said,

Overall, some are really embracing technology; I myself am just learning how to turn the computer on. I would say five years ago, there was minimal interest in technology by the teachers, but interest has grown tremendously over the years. New teachers coming in, they all possess the needed technology skills. So the gap is closing between the teachers who are lacking [technology] skills and the ones who are skilled. We have a professional development expectation that all of our teachers who need training will get it and improve their technology skills. Our teachers have to get on board now, because many of the industry exams the students have to take are requiring more and more technology proficiencies. We can no longer configure the tests to the teacher's limitations. As the director, I have to be concerned about the outcomes of the student tests.

When the researcher asked Barbara how her administrative skills related to her teachers' technology and pedagogical needs, she replied,

Pedagogy is one thing and technology is another. I see them as two separate concepts. I look for good classroom instruction: Is there instructional information posted? I have the basic skills to use technology to facilitate my work and to do the work I need to get done and I have resources in terms of personnel to help me. I know what has to be done, and if I don't have the pedagogical-related technology skills, I couldn't go into a classroom and teach using technology except for the basics, like laptops and Smart Boards.

The researcher followed up by asking about how technology had changed due to the advent of technology. Ben replied:

We spent a lot of money and time on professional development and building a professional development infrastructure so we can sustain ongoing professional development. We have some courses online and we have consultants come in and train. However, with the budget the way it is, I don't see that continuing, and that will limit our ability to sustain professional development.

Barbara added to this statement and explained:

I think it's that you expect the teacher to sustain and learn new skills: the problem is technology changes so rapidly. For example, we already have to download new software for the Smart Boards, so that will require the teachers to be retrained on the new software. This is the hardest part, keeping everyone current who has skills and bringing up the ones who have lower functioning skills at the same time.

Ben believed,

There is a learning curve that goes with all this new technology. The better teachers have a short learning curve, and the ones who do embrace the challenge and are able to go out and use it effectively, and for the others who do not embrace it, it will take years.

Barbara added,

Professional development is definitely more driven by technology and the need to learn technology. We are trying to focus on the next two years of improving technology professional development so our teachers can support the new technology needs of our curricula. For example, our computer program will require our students to get industry certification, so we are sending our teachers to training so they can pass the assessment and get certified in the new technology practices. We have a big investment in this, because we have purchased 100 vouchers for our students to take these exams. If we don't transition this program, we will be deficient in our college articulation agreements.

Colleen responded to the question; "How would you describe your administrative skills in relation to technology and pedagogical support needs," saying, "You have to do research and know whether it's truly a need or not, or if it is an industry need or classroom need or a combination." The researcher followed up by asking, "Are you comfortable making those determinations?" Colleen further explained,

Yes, I am just starting to get better at it. For example, we are starting to use an online professional learning committee to support professional development. Not many of the teachers sign on or participate, but some do, mostly the newer teachers, and I'm trying to become the coach who facilitates. I know you can't control in a technological environment. But I want to increase online learning and increase our technology use in the classroom.

Donna confided, "I feel I am technologically savvy. However, I need to hone my skills with social media. This would definitely be an area I would look to for added professional development for myself and the teachers." The researcher wanted to understand how the

administrators' beliefs and perceptions regarding the technology skill of their teachers influenced their decision making for teacher professional development recommendations. The researcher asked, "How would you describe your teachers' technology skills in relation to classroom instruction and student technology competencies?" Cora responded,

Many of our teachers have limited technology skills. They are able to use the computer, Smart Board, and e-mail, but have a lot of difficulty developing spreadsheets or other documents needed to manage student data. Many of our teachers still write handwritten notes instead of using other technology, and our students are much more advanced than our teachers.

Ellen replied,

All of our teachers have bought into our new initiative to raise the bar for our students. We now expect our students to achieve a score of 75 or above, and with that come new teaching methods and technology that are playing a role in this initiative. The teachers think it is exciting and many are self-driven and are searching out new professional development workshops and technology training for the classroom instruction and CTE equipment. So I have to say, I see the gap closing. Some of the veteran teachers are still using the overhead projectors, and then we have another teacher using virtual instruction. So we need to move these teacher veterans into using more updated technology.

Eileen concurred with the Ellen and explained,

We are trying to move our teachers to utilize more technology in the classroom. In the past, most of our professional development participation was voluntary. Now, because of technology, it's mandatory. Some of our workshops are webinars, and I'm not sure of its efficacy for our teachers. I think they need more hands-on workshops.

Donna had a different perspective and stated, “Most of our teachers are up to date with current technologies related to their industry in the classes they teach, such as auto technology, graphics, and TV/video.” Ben agreed with Donna and stated; “Our students come back after a year or two of attending a college and they tell us our CTE classroom technology is far more advanced than what their present college has in place.”

The researcher asked the administrators to submit evidence of professional development opportunities that were available to their teachers. Typical professional development training took place after school or during the workday when students were not scheduled for classes. Professional development planning and scheduling were at the discretion of the director. Although the technology plan stated it supported sustainable and ongoing technology development, it was up to the director to identify the professional development need, locate the training, schedule the workshops, and hire the trainers. In addition to the directors arranging professional development, the Regional Information Centers (RIC), also responsible for providing technology support to the district schools, provided professional development workshops for BOCES staff.

Although there appeared to be plenty of opportunities for teachers and administrators to attend technology workshops, there was no evidence such attendance was linked to any identified specific technology strategic plan. The technology professional development planning was ad-hoc and was typically determined by the availability of technology consultants and trainers. This process was not based on teacher need or on a strategic technology training plan that included targeted technology skill development plans for deficient teachers. Allowing teachers to pick and choose ad-hoc technology training and to determine the frequency of their attendance may be counterproductive when attempting to increase the growth of skills in the

technology-deficient teacher. This is particularly true for the teacher who has little or no skills in the use of basic technology instructional tools.

Ad-hoc professional development opportunities may not provide the deficient teacher with the emotional support and technology foundation needed to improve his or her technology level. Teachers who have limited technology skills or knowledge need to be assessed for levels of understanding and for their ability and willingness to learn. Prescribing appropriate professional development training is then necessary, rather than having the teacher select his/her own professional development training. This self-selection scenario would be like the doctor who allowed the patient to tell him what to prescribe for a determined illness, when the patient had no understanding of the illness or of how the self-selected prescription might influence a prognosis and possible cure.

Document Review of Professional Development Opportunities

The professional development documents submitted for review were examined for frequency, type of training, and the facilitation of methods and practices of professional development. All of the participating BOCES used My Learning Plan and one site also used E-Chalk. Web-based learning systems track and facilitate professional development and My Learning Plan and E-Chalk both provide structured professional development for teachers and administrators. Users must log in and view available professional development opportunities, and the software keeps a digital roster of the enrollee's professional development activities, dates, and durations. Supervising administrators have to authorize the enrollee's participation. Opportunity exists in this area for the administrator to access the professional development selections and determine if they are appropriate and sustainable technology training options for the deficient teacher.

Ava submitted Document 1d, which was a print of the online catalog for the upcoming school year, 2012-2013. The course offerings were all facilitated by Model Schools. Model Schools is a division of the Regional Information Center, whose primary purpose is to link teaching pedagogy to technology. The Model Schools mission is “To leverage technology to transform education to improve the learning and lives of students.”

Document 1d. Document 1d identified the duration and frequency of the listed professional development opportunities. All were a series of one- and two-day events and were dependent upon the training. The time varied from two hours to an all-day workshop. All of the classes advertised a maximum enrollment of 12-15 participants. The researcher reviewed the course offerings and found the courses were basic, providing a rudimentary baseline of information by which to support an enrollee who had limited technology skills. For example; “Smart Boot Camp: Up and Running for New Users (Level 1)” was a one-day course designed for the beginning Smart Board user. The course description stated:

This one-day course is designed specifically to help the novice user to immediately start using their Smart Board effectively as a means to support their lessons, and invite higher levels of student participation with content. Participants will become familiar with Notebook v. 10.7 as well as the basics of board operation, troubleshooting, and maintenance of a Smart Board. We will also see how the Office application Word, PowerPoint, and Excel have a built-in awareness of Smart tools. This one-day course is the first in a series of three and is designed to help the novice user to immediately start using their Smart Board effectively as a means to support their lessons and to invite higher levels of student participation with content. It is recommended that enrollees have current access to Smart Boards in their classrooms.

More advanced learning opportunities were offered in a course titled, “Tools for Teaching Simple Programming: ALICE.” This course offering stated the objectives:

ALICE is an innovative 3D programming environment that makes it easy to create an animation for telling a story, playing an interactive game, or making a video to share on the web. ALICE is a teaching tool for introductory computing. It uses 3D graphics and a drag-add-drop interface to facilitate a more engaging, less frustrating first programming experience. This session will walk participants through simple programming scenarios where they will become familiar with the interface, commands, and basic protocols.

Previous experience with programming is helpful but not necessary.

Most training sessions were conducted in a traditional classroom training setting wherein the enrollee had an opportunity to work one-on-one with the trainers. However, other sessions were conducted virtually through Webinars, such as “Webinar: Vital NY-Video in Teaching and Learning, sponsored by the LRHIC-Model Schools Courses.” The Webinar setting was flexible in that it could be downloaded and saved for a future broadcast, thus providing administrators with an opportunity to use the webinar as a support for teachers when needed.

Document 2d. Ellen submitted a professional development calendar (Document 2d) for the first half of the 2010-2011 school year. The professional development training was mandatory and took place on school days contractually approved by the unions and the BOCES Boards of Education. The calendar of events was organized by months: October, November, and December. Each month had a different focus for technology training. All of the training took place on-site between the hours of 4 PM and 7 PM. The first professional development training session, held in October, involved Google Docs training. The descriptor stated:

Learn how to collaborate with colleagues and students through GoogleDocs. Participants will learn about creative ways to use Google Docs in the classroom, such as sharing documents and folders, collaborating with team members, and sharing resources with one another.

Additional professional development training sessions were held in November and December and were sponsored by Model Schools. Teachers received training in “Professional Learning Networks.” This training provided teachers the opportunity to learn and reflect on their technology learning needs and professional growth, with network support.

Finding 4: Summary

The researcher determined each BOCES had an intact technology plan. Examination of the technology plans showed them to be comprehensive in breadth and scope of technology implementation, acquisition of technology, and technology training. However, they lacked a cohesive assessment process by which to evaluate the staff’s technology abilities. The plans failed to evaluate the degree to which the students’ advanced technology skill levels influenced the technology training needs of the classroom and the classroom teacher. Such a plan is crucial for purposeful technology efficacy and implementation assessment.

The director usually assigned teachers to professional development activities. Some teachers voluntarily selected professional development training based on their personal self-perceived technology deficiencies. No evidence of follow-up or encouragement by administrators was apparent either in the lesson plan reviews or in observations. This lack of follow up did not assist in closing the chasm between the perceptions of teacher technology deficiencies and teacher technology apathy.

CHAPTER VII

DISCUSSION AND RECOMMENDATIONS

Discussion

The purpose of this qualitative study was to examine how the technology beliefs of New York State Career and Technical Education Board of Cooperative Education Services administrators influenced their leadership behaviors. This chapter contains discussion of the process of researching the technology beliefs and perceptions of CTE administrators and of how these beliefs and perceptions might have influenced their leadership behaviors and decision. To achieve a full understanding of the administrators' beliefs and perceptions, the researcher examined whether the administrators' technology skill levels correlated with their beliefs and perceptions regarding technology, and if so, to what degree. The researcher also wanted to discover which concept, skill, or belief had the most influence on the transition process of CTE programs.

The participating CTE administrators graciously accommodated all of the researcher's study requests. All of the administrators expressed their overwhelming desire to assist in recording their thoughts and behaviors as they transitioned their CTE programs. The CTE administrators determined this to be an important study for two reasons. First, they believed this study would highlight the need for CTE programs to remain relevant in this time of educational change. National reforms, such as Race to the Top, require American educational systems to prepare students to be college- and career-ready, and CTE programs play an integral role in that initiative. Second, the advent of virtualization of education requires upgrading all training and instructional practices to prepare students for a 21st-century workforce and 21st-century citizenry.

This study represented an examination of how technology beliefs and perceptions influenced the behaviors of CTE school leaders charged with the task of selecting and determining the efficacy of Web 2.0 learning standards, curriculum, and teacher pedagogy. The 21st-century learning environment mandates that these three convergent entities may no longer be viewed as separate principles, but in fact, must be integrated, because one cannot successfully exist without the others in a 21st-century learning environment.

A 21st-century learning environment requires leadership with the capacity to assess the efficacy of technology, implement appropriate policies, and assure achievement of authentic student knowledge and understanding through project-based learning and through contextual learning opportunities. CTE 21st-century leadership must have a strong understanding of both teaching and learning concepts. Effective teaching and learning initiatives that drive successful student learning objectives are the underpinnings to the recent New York State Common Core Learning Standards edicts.

The researcher found all of the participating CTE directors were truly vested in their leadership responsibilities and had a strong understanding of CTE education. The administrators clearly wanted to seek out the newest technologies and they took great pride in their current acquisitions of classroom technology. The CTE administrators were continuously strategizing about ways to create new CTE programs and to update older traditional shop programs to meet the 21st-century industry trends in a time of financial austerity.

Through interviews, document reviews, and self-reflective survey responses, the researcher discovered a divergence between the willingness and the understanding about technology assessments by the CTE administrators and the implementation of these assessments beyond the standard Smart Board and classroom computer. Web 2.0-supported classrooms

require a different approach to staffing, technology support, student programming, and teacher pedagogy. The intent of this study was to understand whether these deviations were influenced by the administrators' personal technology beliefs and perceptions or by their lack of technology skills.

The researcher did not find the CTE administrators' personal beliefs and perceptions were a barrier to the transition process, but in fact, the process of transition appeared to be moving forward, devoid of any one person's subjective personal technology bias, perceptions, beliefs, or bureaucratic technology policies. The researcher found a rogue education transition process emerging as a result of the advanced skill levels of the students and the ubiquitous nature of technology in organizations, schools, and the 21st-century workplace. Collins and Halverson (2009) suggested,

Technologies for learners put learners in control of the instructional process. Learning goals are determined by the learner, and the learner decides when goals are satisfied and when new goals are in order. This is not to say technologies are unstructured, but rather such technologies can provide highly structured activities. The key difference is success is measured by the degree to which the system supports and fulfills learner agency. (p. 51)

Results in this study showed a consensus that the high-frequency use of technology was transforming the CTE classroom into a 21st-century learning environment. This finding was based on the CTE administrators' abilities to acquire current technology and to update their classroom hardware and software. The researcher found strong evidence that the implementation of technology into the classroom instruction was driven by the advanced technology skill levels of the students and by industry trends.

The conflicting technology policies of the school limited the use of students' personal technology devices in the classroom. Punitive "bag and tag" policies for student cell phones and Smartphones, which have the capacity to access a limitless number of software applications and to promote 21st-century education, did not prevent students and some teachers from utilizing the devices. For example, a BOCES CTE teacher who did not participate in this study stated, "I used to say, 'Put your phones away.' Now I say, 'Do you have a phone? Take it out, because we are going to download one of the construction math applications so we can complete this job.'" This 21st-century pedagogical concept speaks directly to what Halverson and Smith (2009) believed when they stated:

Communications technologies will continue to spark new learning opportunities, some of which will align with school priorities and some of which will flourish outside of school. Instead of opposing in-school and out-of-school learning, the advent of new learning technologies describes a pluralistic world in which out-of-school learning can complement in-school education. (p. 53)

Administrators and teachers of 21st-century CTE will have to become continuous technology learners in order to maintain parity with student technology skill levels. Learning is no longer limited to a bricks-and-mortar environment wherein students are restricted by schedules, programs, seat time requirements, and other antiquated learning mandates. The 21st century boasts of an instructional environment that can provide students and teachers with the opportunity to utilize technology to facilitate learning without time or space restrictions.

Recommendations

Recommendations for Future Research

The specific focus of this study was on the technology beliefs and perceptions of the CTE administrators and their influence on the transition process of antiquated vocational programs to 21st-century CTE learning environments. In the process of this investigation, the researcher discovered that exploration of other concepts in conjunction with the 21st-century learning environment was necessary. The researcher recommends further investigation into the concept of (a) Bring your own device (BYOD) and (b) the relationship between student achievement and a technology-supported learning environment.

Bring your own device (BYOD). This practice is increasing among the nation's schools. Students who can access their own personal devices such as iPads and Smartphones will support life experience learning. Life experiencing learning is evident when a student readily has the capabilities to access and store data and to apply learned concepts throughout the day. Information websites provide the student with the ability to apply learning on demand. Outdated school technology policies that were in place primarily to protect students from the exposure to the World Wide Web dangers are no longer relevant. Most students, digital natives (Presky, 2001), are savvy and prepared to utilize search engines as well as to download media and applications with no more exposure to danger than a visit to a mall. This is due to Internet danger awareness workshops provided by many schools, parents, and personal sophistication.

The option of allowing students to bring their own devices is cost effective for schools struggling to maintain updated technology for their learners. The high cost of annual maintenance and acquisition of technology has become an unexpected burden for administrators who must maintain balanced school budgets. A BYOD policy can provide school leaders with

the opportunity to have student learning expand beyond a singular classroom or school day. Schools that implement a BYOD policy will be able to have the freedom to move classrooms as needed, with little concern for the cost and without the laborious task of moving stationary wired computers. The installation of a wireless connection throughout a school campus provides Internet access where needed.

A BYOD policy is especially advantageous to CTE programs and students, because most practicum instruction demands that students work at workstations away from their desks, mimicking an authentic work site. The ability to have a mobile technology device to support the CTE hands-on activities with limitless applications at the ready will result in a career-ready student. Implementing a BYOD policy would give the student the ability to store needed information the student could recall to troubleshoot and to complete work tasks. A student's body of work can be recorded and sent to prospective employers and parents as evidence of mastery.

Technology, specifically stationary computers, should not be looked upon as a learning tool that should be accessed or provided only by the school. Maintaining the infrastructure and hardware is costly, and adequately providing current software is impossible. Instead of telling students, "Turn off your telephone and put it away," teachers should learn how to integrate these devices appropriately into lessons. Many telephone carriers provide training for educators to learn how to implement technology into their lessons and thus to maintain student engagement. The researcher finds an engaged student is more likely to stay on task, thus promoting self-motivation resiliency that supports positive student achievement.

The relationship between CTE teacher pedagogy and a technology-supported learning environment. This research focused only on CTE administrators' relationships to

technology. Future studies could investigate CTE teacher pedagogy in a 21st-century learning environment supported by online learning and assessments. Traditionally, CTE student achievement had been assessed by teacher-developed assessments, standardized testing mechanisms, and hands-on mastery skill. The new Race to the Top educational edicts requires student assessments to be completed online. These online assessments are not indicative of the old pencil-and-paper multiple choice and bubble-in answer sheet method, but instead require the students to use higher order thinking skills to troubleshoot, apply learned formulae, and demonstrate a working understanding of concepts.

This testing method is unique in requiring the classroom activities to focus more on trial and error techniques to solve problems, rather than the standard right or wrong question-and-answer assessments that are a byproduct of antiquated rote learning. Supporting these testing initiatives requires CTE teachers to utilize data to drive daily instruction and formative assessments to determine student educational growth. Presently, some CTE classrooms are supported with online student software that provides instructional activities with embedded assessments. These software systems provide on-demand reporting to assist the teacher with monitoring an individual student's strengths and weaknesses and capturing student academic growth patterns. Further research could assist colleges and universities to understand how traditional CTE pedagogical methods and practices are transitioning to accommodate these new software-supported classrooms.

Providing a relevant road map for CTE teacher preparatory programs is important. Traditionally, neophyte CTE teachers learned on-the-job practicum CTE teacher preparatory programs that provided CTE classroom strategies for teaching and learning. Technology has shifted this paradigm. On-the-job practicum classroom strategies and teaching and learning

strategies must be considered as one continuum to successfully prepare CTE teachers for a 21st-century classroom. The 21st-century learning environment is where student growth assessments are not measured failure attempts, student engagement and skill levels are valued, and classroom instruction is student driven, with less teacher-dominated rote learning and fewer standardized assessments.

Recommendations for Future Practice

Assess the practicality of technology professional development for CTE teachers.

The researcher discovered a clear disconnect between CTE teacher technology skill development needs and professional development opportunities. The recommendation is that all administrators be trained in technology, together with teachers, students, and office staff, to provide a seamless continuum of learning.

Update observations to make them more technology sensitive. Evidence was presented in this research supporting the need for all new teacher observations and annual professional performance review templates to include a technology integration measure. Such a measure would assure that technology, although ubiquitous, should be evident throughout classroom instructional methods and practices.

Include the technology plan as a core support to the implementation of technology.

The researcher discovered the comprehensive technology plans developed every three to five years need to be reviewed yearly and utilized as a living document to support organizational design, teacher development, and teaching and learning initiatives. To plan ad-hoc without strategic instruments to assess the sustainability of methods and practices wastes both time and money. A systems approach to implementing technology must be the primary goal of any administrator when integrating technologies.

Dedicate a percentage of resources to the use and maintenance of technology.

Presently, many schools are required to upgrade and acquire new technology to meet new instruction and organizational needs. Financial restrictions continue to plague school budgets and investigating alternative methods to fund technology must be a priority. School administrators need to re-evaluate the costs of traditional school supports such as books, paper, and mailing costs, and reallocate funding to support the acquisition of iPads, Smartphones, interactive software, and websites. Installment purchase agreements should be implemented immediately to mitigate large annual technology costs, thus providing a sustainable technology maintenance and acquisition process.

Implement a systems approach to the digitization of school organizational methods and practices. Technology changes the methods and practices of an organization's functionality. Administrators should not look to technology to simplify a traditional isolated task, but instead should view technology as an entire, ubiquitous entity that requires a strong understanding of software interface capabilities. Strategic planning must encompass the work to be done, the ways in which technology impacts staffing and organizational practices, appropriate training, and continuous assessment of relevance of tasks as technology expands to support organizational needs. Utilize the strong technological skills of students through a formal process of technology professional development and classroom instruction activities.

This researcher found students drive the transition process of the CTE classroom instructional methods and practices by demonstrating technology skills superior to those of the teacher and administrator. CTE teacher technology professional development training should be redesigned to include CTE students. As the workplace technologies advance, students and teachers alike will need ongoing technology support to maintain parity with industry. CTE

administrators are advised to schedule student and teacher technology training online Webinars as well as industry on-site training. This method of training is cost effective and assures that CTE teachers and students receive relevant technology training.

Promote high-tech instructional strategies to facilitate 21st-century pedagogy. All CTE classrooms should have wireless Internet connections to provide for BYODs, laptops, and iPads. These mobile devices that support CTE training require students and teachers to move about while learning and completing tasks. CTE teachers must prepare group learning tasks supported by contextual learning activities conducted online. Academics must be embedded and taught through contextual learning opportunities such as reading manuals, by applying math formulae to construct and design, and most importantly, by learning how to hypothesize through discovery of facts and data.

Use technology to evaluate student achievement and classroom instruction. Data collection requires teachers and administrators to have a true understanding of how to access, collect, manage, and analyze the digital student data that should drive daily instruction. CTE administrators must implement and train teachers to use classroom-based software to measure student growth through the newly implemented Common Core Learning Standards, thus requiring CTE administrators to shift to an evidence-based data collection process. Student achievement would be linked to individual teachers under the pending NYS teacher evaluation process. Student data should be managed digitally and be used to produce the evidence needed for supervisors to create an observation tool for a working road map for teachers by which they can develop effective teaching and learning strategies.

Individual instruction using technology to support skill ability cohorts versus age cohorts. The advent of technology in the educational systems requires school leaders to re-

evaluate the process by which students learn. The traditional school setting (PK-16), where students are introduced to formal education between the ages of 4 and 6, no longer holds validity. Technology has provided a virtual learning platform for children to learn from birth. Current software systems such as Baby Einstein promote infant learning through the humanities of how to interpret words, sounds, and music. Children are continuously exposed to learning opportunities away from a formal school setting. Schools will now have to accommodate students who are able to advance more quickly than others, and with technology, schools should now be implementing skill cohort learning advancement, as opposed to age or grade cohort promotion. Public school leaders need to evaluate and consider co-opting successful components of home schooling and distance learning skill development initiatives to remain a relevant educational option.

Conclusions

This research yielded information regarding the new and emerging issues, needs, and management skills necessary for optimal supervision of 21st-century CTE programs. Through comprehensive interviews, document reviews, and self-reflective surveys, the investigation identified new CTE administration and supervision skill sets. Also identified were the ways in which each CTE administrator functioned in a digital learning environment.

These data assisted in identifying the complexities of transitioning CTE instruction from a traditional teaching environment to a learning digital environment and determining how their beliefs and perceptions regarding technology influenced the transition. The results provided a focused lens to discover how the CTE administrators' beliefs and perceptions about technology supported or hindered the development of CTE digital learning environments. The lens highlighted the degree to which the CTE traditional administration leadership skill sets were able

to be transferred and by which they were able to address the new and emergent needs of the CTE learning environment.

Findings of this study have shown the importance of technology through a comprehensive analysis of the technology beliefs and perceptions of CTE administrators. The researcher utilized Bolman and Deal's (2008) four frames of leadership to frame the study and purposefully selected a traditional organizational theory lens by which to evaluate the ways in which technology influences the methods and practices of 21st-century organizations. The researcher believed use of a traditional organization theory model was important to structure an analysis of a transition process driven by the ubiquity of technology in an attempt to identify organization paradigm shifts due to technology.

The researcher found traditional bricks and mortar protocols were altered by the hybrid virtual learning and digitization of organizational practices and methods, thus prompting a systems change. A systems change is a shift in the way an organization processes and delivers services, including how it makes decisions. Decisions that influence evaluation of current policies will drive the development of relevant policies, program development, and resource allocation. Successful systems change is driven by the individual behaviors that come together to achieve a common goal using cohesive methods and practices. Successfully facilitating a system change is determined by which personal beliefs and perceptions influence the process of change.

The state mandated funding constraints influenced the uniqueness in the organizational design of a New York State BOCES. New York State legislation mandated each division within a BOCES be fiscally solvent. The researcher believed an established systems approach to funding technology throughout the BOCES would improve technology training, streamline

technology software and hardware acquisition, and minimize wasteful technology expenditure costs, thus maximizing resources. The researcher believed a systems approach to the implementation of technology in an organization would enhance administrators' ability to manage costs and to provide continuous, relevant, rigorous education that fosters relationships.

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APPENDIX A
ADMINISTRATOR SELF-REFLECTIVE SURVEY

1-Personal Productivity

LEVEL 1	LEVEL 2	LEVEL 3
I do not use a computer or other related information technologies	I use a computer to keep a calendar to which my secretary has access; to track addresses and phone numbers of professional contacts; and to compose professional correspondence.	I not only use technology to increase my productivity, but encourage my office staff to do so as well.
I am not aware of ways that technology can improve my productivity or the productivity of my office staff.	I use technology to do routine tasks more effectively and efficiently, which gives me more time for work with staff and on long-term goals and major projects.	All Correspondence from my office looks professional. All building supervisors/leaders use a shared calendar system for easy scheduling of meetings

2-Information Systems Use

LEVEL 1	LEVEL 2	LEVEL 3
My office staff uses a stand-alone student information system to keep track of basic student data and information need for district and state reports.	My office uses a system to accurately track student information including parental contact information, grade reports, discipline reports, and health records. The system is used to build a master class schedule.	Appropriate student information is used by all staff as well as by building leaders. The system is integrated with a district census database that is also tied to finance, transportation, and personnel/payroll records.
Network access is not given	Selected personnel building personnel and I can access the system through the network and use it for decision-making purposes.	I use the philosophy of the Schools Interoperability Framework (SIF) as a criterion when selecting a new or upgraded information system.
	The system is secure and back-up procedures in place.	The district plan has these attributes: <ul style="list-style-type: none"> • No information is entered manually more than once • All databases allow for easy importing and exporting of information into spreadsheets, graphic packages, word processors, and other databases. • Electronic data replaces paper when possible, including forms and seldom-used or often –modified documents, such as policy manuals and curriculum guides. • All staff members have the skills and access needed to use the system.

3-Record Keeping and Budgeting

LEVEL 1	LEVEL 2	LEVEL 3
I rely on a district system with paper reports for keeping track of budgets, inventories, and other financial records. I keep track of my budgets in a paper ledger format	I use a spreadsheet or simple packaged record keeping system to track my department or building's budget account. It is accurate and up to date.	I use the district's online accounting system to track my budget accounts.
	I can use my accounting system to cross check the district's financial system if discrepancies arise.	I can submit purchase orders electronically.
		I use networked inventory databases to keep track of my building's supplies, textbooks and equipment.

4-Data Use

LEVEL 1	LEVEL 2	LEVEL 3
I do not use reports or data that can be produced by information systems in the district to help make operational or policy decisions.	I can analyze census, discipline, scheduling, attendance, grading, and financial data reports produced by administrative systems to spot trends and highlight problems in my building or department.	I recognize areas in administration for which additional data are needed for the efficient and effective operation of the building or district.
	C can communicate the conclusions to staff, parents, and the community in understandable ways.	I can make recommendations about how that data can be gathered, stored, and processed electronically.
		I can use data mining techniques to draw conclusions and about programs' effectiveness

5-Communications and Public Relations

LEVEL 1	LEVEL 2	LEVEL 3
I ask that my secretary word process outgoing communications. Telephone messages are hand written.	I effectively use a variety of technologies to communicate with students, teachers, parents, and the public. I can use voice-mail and the fax machine. I have an email address, check my email on a regular basis, and communicate with building and district staff using email.	I contribute information and policy advice for our school's Webpage.
When I speak to the public, I use overhead transparencies or no audiovisual aids.	When speaking, I can use presentation software and the necessary hardware to effectively communicate my message. I use the district's cable television capabilities for public information uses in the school and community.	I encourage my staff to use technology to communicate with each other, students, parents, and the public.
	When speaking, I can use presentation software and the necessary hardware to effectively communicate my message. I use the district's cable television capabilities for public information uses in the school and community.	The public is encouraged to communicate electronically with the school.

6-Online Research and Professional Development

LEVEL 1	LEVEL 2	LEVEL 3
I do not use online resources to gather professional information or research.	I can effectively search and extract information from online resources such as educational journal databases, ERIC, and the internet. I subscribe to electronic journals and newsletters of professional relevance. I subscribe to electronic mailing lists (listservs) to gather information and problem solve with fellow professionals. I have participated in satellite-delivered educational forums (web forums)	I understand and can use online interactive communications (chat or messaging).
	I have participated in satellite-delivered educational forums (web forums)	Have taken classes or participated in professional development online.

7-Teacher Competencies

LEVEL 1	LEVEL 2	LEVEL 3
I cannot identify any specific skills that teachers in my school or district should have in order to use technology effectively.	Our school or district has a set of technology skills that teachers are expected to master correlated to the NETS or national standards.	<i>All teachers</i> are expected to use technology to increase their pedagogical effectiveness and integrate high level technology uses into their classes.
	A formal staff development program that offers teachers a range of staff development opportunities in technology and a means for assessing the effectiveness of those opportunities is in place.	
	Technology and training in its use for teachers has a high funding priority in my school/district.	

8-Student Competencies

LEVEL 1	LEVEL 2	LEVEL 3
I cannot identify any specific skills students in my school or district should have in order to use technology effectively after graduation.	My district has a well-articulated and well-taught information literacy curriculum that integrates technology into a problem-solving research process.	I serve on curriculum committees comprised of both educators and community/industry leaders that help identify the skills and competencies future graduates will need to successfully participate in society.
	Students have a wide-variety of opportunities in nearly all classes to practice the use of technology in meaningful ways. Benchmarks for student technology proficiency are written and understood by the staff and public.	I can clearly articulate how technology use affects student achievement.
	Our curriculum is based on national standards such as NETS OR AASL'S Information Literacy Standards for Student Learning.	

9-Envisioning, Planning, and Leading

LEVEL 1	LEVEL 2	LEVEL 3
I let others in my district or schools create technology plans. We purchase equipment, software, and technical support on an “as needed” basis.	I use software to facilitate brainstorming activities, to plan and conduct meetings, and to create decision-making models	I have a leadership role in my professional organization that stresses the effective use of technology in education.
	I take an active leadership role in building and district technology planning efforts helping make decisions about hardware acquisition, staff development in technology, and integration of technology into the curriculum.	I write and speak for my fellow practitioners on technology issues.
	. Our school and district have a model long range plan and short-term goals for technology use that are regularly assessed and updated.	

10-Ethical Use and Policy Making

LEVEL 1	LEVEL 2	LEVEL 3
I am not aware of any ethical or policy issues surrounding computer use.	I clearly understand copyright and fair use issues as they apply to information technology resources. I understand the school board policy on the use of copyrighted materials. I demonstrate ethical usage of all software and let my staff know my personal stand on legal and moral issues involving technology.	I am aware of other controversial aspects of technology use including data privacy, equitable access, and free speech issues.
	I know and enforce the school’s technology policies and guidelines, including its <i>Internet Acceptable Use Policy</i> . I am aware of the issues as technology relates to student safety and security and the physical health and environmental risks associated with technology use.	I can speak to a variety of technology issues at my professional association meetings, to parent groups, and to the general community.
	I have a personal philosophy and I can clearly articulate the use of technology in education.	

APPENDIX B
PERMISSION TO USE ISTE RUBRIC

Linda Maria Suarez
Director
Center for Career Services

From: Tina Wells [xxx@iste.org]
Sent: Friday, September 30, 2011 7:21 PM
To: Linda Suarez
Cc: Paul Wurster
Subject: Fwd: Permissions, NETS.A, Linda Suarez, NY

Dear Linda Suarez,

Thank you for your request for permission to use ISTE's National Educational Technology Standards for Administrators. My colleague Paul Wurster will respond to your request to reproduce L&L material. As long as your usage is noncommercial, not for profit, and for educational purposes only, you have our permission to use the NETS.A for the presentation described below. The rights granted herein are non-exclusive, non-transferable, print rights only. If the NETS are altered, then 1) you must not call your adaptation NETS and 2) you must indicate where the complete (unaltered) NETS can be found. Please use the following credit lines in all uses of the material:

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For Web viewing, you are free to link to the NETS. We prefer that you link to this material rather than posting:

NETS.A:

http://www.iste.org/Content/NavigationMenu/NETS/ForAdministrators/2009Standards/NETS_f_or_Administrators_2009.htm

Please let us know if we can be of additional assistance. We wish you every success with your project.

By the way, the ISTE bookstore, 1.800.336.5191,

www.iste.org/bookstore<<http://www.iste.org/bookstore>>,

carries 25-packs of the NETS. The cost is \$7.95 (\$5.55 for members) for a 25-pack of NETS.S or NETS.T or NETS.A. The Essential Conditions appear in each of these pamphlets.

Best regards,

Tina Wells

Book Production Editor

Rights & Permissions

International Society for

Technology in Education

xxx@iste.org

Begin forwarded message:

From: xxx@iste.org
 Date: September 29, 2011 8:05:22 AM PDT
 To: permissions <permissions@iste.orgmailto:permissions@iste.org>>
 Cc: "xxx@swbooces.org<
 Subject: Permissions and Reprints Request from Linda Suarez

A request to reprint ISTE material has been submitted from Linda Suarez

1. What material are you interested in? Check one or more:

National Educational Technology Standards for Administrators (NETS•A)

Article(s) from Learning & Leading with Technology
 Learning & Leading with Technology vol.29 no.2 pages 43, 44, 45.

2. Are you requesting (check all that apply):

Print Rights (How Many Copies?)

3. How do you intend to use the material? (The more detail you provide, the faster we will be able to process your request.)

I am presently in the process of writing a qualitative dissertation proposal (Fordham University) that will study the technology beliefs and perceptions of Career and Technical Education administrators and how their beliefs and perceptions influence their role as a 21st-century CTE administrator. I would like to use the ISTE Self -evaluation rubric to develop a (perceived) baseline of the administrators skill set. This study will be limited in scope to 5 administrators who presently work in New York State. All copyrighted materials will be cited and acknowledged. Your prompt consideration of my request would be greatly appreciated.

4. Is there a commercial aspect to this use? (ie. product charges, subscription fees, admission charges, etc.)

No

If yes, please explain:

ISTE Member Type: Non-Member
 ISTE Affiliate:

APPENDIX C
INTERVIEW QUESTIONS

School Organization

1. What is the current level of use of various technologies (school information systems, office technologies, office support staff, software [dragon, LiveScribe, administrator observed], peripherals [Smartboards, scanners] at your BOCES site?
2. What is the current status of your BOCES technology plans and policies, goals, and objectives?
3. What barriers do you perceive in implementing or increasing technology in your school organization? Why?

Instruction and Learning Environment

4. What have you observed during daily “walk-through”? Describe student engagement in classrooms that have integrated technology instruction.
5. How has integrated technology impacted classroom management? (student behaviors and instruction)
6. Describe how technology has affected student achievement? Can you give some examples?

Professional Development

7. At what level would you describe your own technology skills in relation to perceived administrator technology needs?
8. How would you describe your teachers’ skills in relation to classroom instruction and student technology competencies?
9. How would you describe your administrators’ skills in relation to technology and pedagogical support needs?

10. In what ways do you think that professional development has changed due to the increase of technology in education? Can you give me some examples?

APPENDIX D
FOCUS GROUP QUESTIONNAIRE

Please complete the following 10 questions related to CTE supervision of instruction, curriculum, faculty, facilities, budgets, technology, and NYSED compliance.

1. What are your concerns as an administrator relating to new NYSED instructional and program compliance mandates?
2. Do you feel your role as an administrator has changed in the past five years? If so, how?
3. How would you describe your present leadership style? What leadership methods and practices have you changed, if any, due to the influence of technology?
4. What concerns do you have relating to your personal technology skills?
5. What obstacles do you encounter as you implement new technologies into the classroom and school organization methods and practices?
6. How will the new RTTP reforms influence the transition process of CTE programs?
7. What additional training do you foresee is needed for yourself and CTE teachers?
8. What technology policies do you believe are antiquated and why?
9. How has technology influenced your budgets and program planning?
10. What differences, if any, do you perceive in today's CTE students? What changes will be needed be made in your leadership style to meet these new challenges?

BOCES _____ADMINISTRATOR _____

APPENDIX E
INVITATION LETTER



Greetings:

I would like to invite you to participate in a Fordham University doctoral research study that I am conducting under the supervision of Dr. Sheldon Marcus. This study will examine the technology beliefs and perceptions of the New York State Career and Technical Administrator; and how their beliefs and perceptions influence the transformation process of the career and technical education (CTE) programs they supervise.

Your selection to participate in this study was thoughtful as it should provide an opportunity for participants to self-access how new technology is influencing their roles as an CTE administrator and CTE programs; as well as provide the researcher with authentic CTE supervision and leadership data to analyze.

The study will require the participant to participate in at least two in-depth interviews, submit requested program documents for review and completing a short self-interest survey. All information acquired for the purpose of analysis will be destroyed at the completion of this study. Your names and location of your centers will remain anonymous.

If you decide you would be interested in participating, or would like additional information regarding this study, please call me at xxx.xxx.xxxx or e-mail: xxx@xxx.com

Sincerely,

Linda Maria Suarez

APPENDIX F
INFORMED CONSENT FORM



GRADUATE SCHOOL OF EDUCATION

Date _____

Dear _____

Please read this consent document carefully before you decide to participate in this study.

I am a graduate student conducting a research study under the direction of Dr. Sheldon Marcus, professor in the Fordham University Graduate School of Education's Education Leadership and Policy program. The purpose of this study, "Influence of Technology on the Leadership of 21st-Century Career and Technical Education Administrators," is to examine how the technology beliefs of New York State Career and Technical Education Board of Cooperative Education Services administrators influence their leadership behaviors.

I am requesting your participation, which will require at least two in-depth, 45-minute interviews sessions, completing a technology self-interest survey, and document review of pertinent material relating to technology planning, purchasing, and program design. Although there may be no direct benefit to you personally, it is anticipated that this study's findings will be helpful when planning or evaluating your CTE programs for 21st-century teaching and learning efficacy.

Your identity will be kept confidential to the extent provided by law. Your information will be assigned a code number that is unique to this study. The list connecting your name to this number will be kept in a locked file cabinet in my home as well as on a secured internet server that is password protected. Only the study director and the researcher will be able to see your

interview. No one at your school or in the district will be able to see your interview or even know whether you participated in this study. When the study is completed and the data have been analyzed, the list will be destroyed. Study findings will be presented only in summary form and your name will not be used in any report.

Your participation in this study is completely voluntary. If you choose not to participate in this study, this will have no effect on your employment or position. You may refuse to answer any of the questions and you may stop or end the interview at any time. You may choose to stop participating in the study at any time. This will have no effect on your employment or position.

If you have any questions concerning this study, please feel free to contact me at (xxx) xxx-xxxx or e-mail me xxx@xxx.xxx. For additional explanation about your rights as a research participant in the study, contact Name, Chair of the Fordham University Institutional Review Board, Address, City, Phone, and E-mail

Sincerely,

Linda Maria Suarez

YOU WILL RECEIVE A COPY OF THIS FORM WHETHER OR NOT YOU AGREE TO PARTICIPATE.

If you agree to participate in this study, please sign on the next page. Thank you.

Agreement:

I have read the procedure described above. I voluntarily agree to participate in the procedure and

I have received a copy of this description.

Name (Printed) _____

Signature: _____ Date: _____

Principal Investigator: _____ Date: _____

APPENDIX G
IRB APPROVAL

Dear LindaMaria,

Attached is the final report of action approving your study for data collection. You should use the attached letterhead for all consent forms. Please keep in mind that any changes to protocol cannot be made without IRB approval. You should also promptly alert the IRB office of any negative or unanticipated effects of your research. Finally, if this protocol relates to your dissertation research, please make sure that you submit a copy of your proposal to the Dean's office *before* you begin to collect data as per Graduate School of Education guidelines.

Best of luck with your research,

Akane Zusho (for the IRB)



GRADUATE SCHOOL OF EDUCATION

Greetings:

I would like to invite you to participate in a Fordham University doctoral research study that I am conducting under the supervision of Dr. Sheldon Marcus. This study will examine the technology beliefs and perceptions of the New York State Career and Technical Administrator; and how their beliefs and perceptions influence the transformation process of the career and technical education (CTE) programs they supervise.

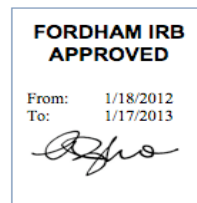
Your selection to participate in this study was thoughtful as it should provide an opportunity for participants to self-access how new technology is influencing their roles as an CTE administrator and CTE programs; as well as provide the researcher with authentic CTE supervision and leadership data to analyze.

The study will require the participant to participate in at least two in-depth interviews, submit requested program documents for review and completing a short self-interest survey. All information acquired for the purpose of analysis will be destroyed at the completion of this study. Your names and location of your centers will remain anonymous.

If you decide you would be interested in participating, or would like additional information regarding this study, please call me at xxx.xxx.xxxx or e-mail: xxx@xxx.com

Sincerely,

Linda Maria Suarez



APPENDIX H
ANALYSIS OF RESEARCH FINDINGS

ANALYSIS OF RESEARCH FINDINGS

		ORGANIZATION		
		Level -1	Level-2	Level -3
		Basic organization task completed without the use of technology	Traditional organization tasks are accomplished with “ad-hoc” software.	Organization tasks are evaluated for relevancy and redesign opportunities that would be supported by software that can interface with each other, thus streamlining the process of “doing work”.
TRADITIONAL SCHOOL SETTING		TEACHING AND LEARNING		
		<p>Traditional classroom setting “chalk and talk”, teacher dominated lessons. Limited computer or technology in classroom. All assessments and classroom assignments are completed in longhand. Minimal data used to drive instruction. *No Smartphones allowed!</p>	<p>Classrooms are equipped with technology (Smartboards, computers) and used in traditional teaching methods and practices. Lessons are observed and evaluated as satisfactory. There is more evidence of group learning and student driven lessons. Limited assessments completed online. Limited on-line (blended and distance learning) course opportunities for students. Data is used as a summative process and does not drive daily instruction. *No Smartphones allowed!</p>	<p>Technology supported classroom are aligned to student skill, activity and program content. Satisfactory observations of teachers, provides evidence of a lesson plan that utilizes websites, software and Smartboard to facilitate learning. All assessments are conducted online and resulting data will drive instruction so as to individualize lessons for students. Bring Your Own Device (BYOD) is encouraged and teachers are trained to implement Smartphone technology into appropriate lessons.</p>
TRADITIONAL SCHOOL SETTING		PEDAGOGICAL PROFESSIONAL DEVELOPMENT		
		<p>Teacher professional development is random and unconnected to any strategic planning</p>	<p>“Ad-hoc” professional development opportunities. Technology plan has limited influence on professional development, classroom technology acquisitions. There is random collaboration between technology support provider and teaching and learning initiatives.</p>	<p>Technology plan drives organization information methods and practices. Technology plan is integral to teaching and learning initiatives. Target professional development is assessed and determined by teacher need.</p>

21ST CENTURY LEARNING ENVIRONMENT

TRANSFORMATION PROCESS

