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Career and Technical Education (CTE) Graduation Rates in Tennessee: A Comparative Study.

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by

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ABSTRACT

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The purpose of this quantitative study was to determine if the number of Career and Technical Education (CTE) graduates who go on to postsecondary education or some other training program, to the military, or to employment upon high school graduation was significant in comparison to the state baseline for secondary placement. This study further compared CTE graduation rates to overall graduation rates. The graduation rates were compared based on gender as well. School systems that provided CTE courses and that had CTE concentrators for the 2007-2008 and 2008-2009 school years were used for this study. Eight school districts were chosen in the upper east Tennessee region and were evaluated using graduation data and secondary placement data from the Tennessee Department of Education Report Card.

The research cited in this study supported the supposition that CTE graduates do in fact help to increase the overall graduation rates for school districts. This study focused on five research questions and each null hypothesis was tested using a one-sample chi-square test.

Results indicated that there were positive significant differences for CTE concentrators who proceed to postsecondary education, military, and employment as compared to the

state baseline for secondary placement. The study further revealed that the graduation rate for Tennessee CTE concentrators was higher than the overall graduation rate for the selected school districts in this study. Positive differences were also noted between the sample CTE graduation rate and the overall Tennessee CTE graduation rate as well as between those rates and the overall Tennessee graduation rate for all students. Further analysis revealed that no significant differences existed between male CTE graduates and female CTE graduates. The research findings suggested that CTE graduation rates can help improve a school district's overall graduation rate.

DEDICATION

This study is dedicated to my friends and family who showed a tremendous amount of love and support throughout this entire process. I would like to thank my parents who always instilled in me the value of education and who emphasized the importance of setting and achieving goals. To my sisters and close friends, I am grateful for the encouragement you provided along the way. Many thanks go to Mrs. Meredith Trott, my mentor, who urged me to attend the meeting for this program and who inspired me to take this journey. I am further indebted to my husband Danny and my daughter Brittney for their understanding and patience throughout this endeavor and to each and every person who had faith to believe that I could complete this journey, even when I wasn't quite sure myself.

I would also like to thank my church family, Pearce's Chapel Freewill Baptist Church, who faithfully whispered many prayers on my behalf. Above all, however, I would like to thank God for walking beside me during this journey. I know that I can do nothing without His strong hand leading and guiding me. When I am weak, He is strong, and when I fall, He picks me up. Through faith, believing, I started on this journey, and only by His grace am I able to complete it.

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CHAPTER 1

INTRODUCTION

Career and Technical courses have long been an integral part of secondary education. The demand for what is now considered "career readiness" has not diminished over the years. From the early apprenticeships to the certification programs and articulation agreements in vogue today, the skills needed to survive and thrive in an ever-changing world are still viable commodities.

Offering students the opportunity to jumpstart their future careers or to simply develop life skills applicable to everything from social interaction to college preparedness, Career and Technical Education (CTE) fills a significant, growing role in both secondary education and society. The positive effect of CTE courses on society includes everything from growing the economy to decreasing crime. Of the high school students who enroll in at least one CTE course, many choose to follow a career path and will major, as it were, in one of the CTE programs.

The purpose of this study was to determine if the number of CTE graduates who participated in postsecondary education, military, or employment upon high school graduation was significant in comparison to the state baseline for secondary placement. This study also compared the CTE graduation rate to the overall graduation rate for the eight selected school districts in the upper east Tennessee region for 2 consecutive school years to determine if CTE graduates do in fact help to increase the overall graduation rate. Furthermore, this study compared the graduation rate for CTE concentrators to determine if there were significant differences for male and female graduates. CTE

graduation rates for the eight selected school systems were compared to the state of Tennessee overall CTE graduation rates to determine if there were significant differences. Likewise, the graduation rates for all Tennessee graduates were compared to the CTE graduation rates for the eight selected school districts to determine if significant differences did exist.

Statement of the Problem

With Tennessee high schools facing the demands of accountability based on test scores and graduation rates, all CTE program areas must incorporate rigor and relevance into their instructional planning to prepare students for the demands that they may confront after high school. Daggett (2010) qualifies the purpose of career and technical education as striving "to provide a foundation of skills that enable high school students to be gainfully employed after graduation – either full-time or while continuing their education or training" (para. 3). Research shows that almost 67% of CTE graduates continue their education after high school through some type of postsecondary or training program (Daggett, 2010).

The purpose of this study was to determine if the number of CTE graduates who participate in postsecondary education, military, or employment upon high school graduation were significant in comparison to the state baseline. Furthermore, the research on graduation rates for CTE concentrators in Tennessee is scarce, so this study compared graduation rates for CTE concentrators to the overall graduation rate for each school district included in this study, looking for significant differences. The CTE graduation rate for the eight selected school systems was compared to the overall CTE graduation rate for Tennessee and to overall Tennessee graduates to determine if

significant differences did exist. This study also compared gender to determine if male CTE concentrators graduate at a different rate from female CTE concentrators. This study included a sample of eight school districts in the upper east Tennessee region.

Research Questions

The following research questions were addressed in this study.

1. Is the number of high school CTE graduates who are secondarily placed significantly different from the expected number based on the state baseline for the school years 2007-2008 and 2008-2009?
2. Is there a significant difference in the CTE graduation rate and the overall graduation rate for the eight selected school districts in the upper east Tennessee region for school years 2007-2008 and 2008-2009?
3. Is there a significant difference in the CTE graduation rate between male and female students for the eight selected school districts in the upper east Tennessee region for school years 2007-2008 and 2008-2009?
4. Is there a significant difference in the CTE graduation rate for the eight selected school districts in the upper east Tennessee region and the overall CTE graduation rate for Tennessee students for school years 2007-2008 and 2008-2009?
5. Is there a significant difference in the CTE graduation rate for the eight selected school districts in the upper east Tennessee region and the overall graduation rate for all Tennessee students for school years 2007-2008 and 2008-2009?

Significance of the Study

CTE plays an integral role in the Tennessee Diploma Project that requires all 2013 graduates to complete a focused program of study. The State of Tennessee Department of Education, CTE Division (2010), has identified specific occupations within the 16 national career clusters. Career clusters are jobs that are grouped together under one cluster so that students, parents, counselors, teachers, and administrators can plan accordingly when assessing student interests and setting career goals for the future. Many students choose a CTE program of study that is aligned with one of these sixteen national career clusters. Each cluster is designed to prepare students for success in postsecondary education and for careers that are recognized as "high-skill, high-wage or high-demand."

To ensure that all students are "career ready" and "college ready," CTE programs must provide the necessary technical skills and must reinforce key academic standards as major components of their instructional strategies. Providing students with the essential skills needed to be successful in the 21st century is an integral part of the high school curriculum. Therefore, this study compared the number of CTE concentrators in secondary placement to the state baseline looking for significant differences for a sample of schools in the upper east Tennessee region. In addition, the study compared CTE graduation rates to the respective school district's overall graduation rates looking for any significant differences. This study also examined the CTE graduation rate for the eight selected school districts, comparing that rate to both the overall graduation rate for CTE concentrators in Tennessee and the overall graduation rate for all Tennessee students. Because the research on the impact of CTE concentrators on high school graduation rates

is scarce, this study may be useful to the directors, principals, administrators, counselors, and teachers of the eight school districts that were included in this study.

Definitions of Terms

1. AYP – Adequate Yearly Progress is a measurement defined by the federal NCLB Act that allows the U.S. Department of Education to determine how every public school district is performing academically according to results on standardized tests. NCLB mandates that 100% of students must score proficient in Reading/Language Arts and Math by 2014 and that school systems make advancements toward this goal each year in order to achieve AYP (Swanson, 2004).
2. Baseline Value – Baseline value for each school system is based on the actual performance in the baseline year; school systems will use their actual performance level as the baseline value if the actual performance of the baseline year is below the state's baseline value; school systems will use the average of state baseline value and their actual performance level if the actual performance is above or equal to the state baseline value (Tennessee Department of Education, 2010).
3. CTE – Career and technical education is instruction that incorporates hands-on experiences and practical application of specific skills in preparation for future career endeavors. CTE encompasses cooperative learning experiences, job shadowing, and internship opportunities along with an active student organization (Association for Career and Technical Education, 2010).

4. CTSOs – Career and Technical Student Organizations are vocational organizations that are a basic component of vocational education programs that enhance and support school and work-related learning. These organizations play a role in providing students with the skills needed to become productive citizens and leaders in their communities. Membership is extended to any student who is enrolled in a career and technical education program or course (Fiscus & Hyslop, 2008).
5. Graduation Rate – Graduation rate is a federally required benchmark that calculates the percent of on-time graduates receiving a regular high school diploma (Tennessee Department of Education, 2010).
6. NCLB – No Child Left Behind supports standards-based education reform based on the belief that setting high standards and establishing measurable goals can improve individual outcomes in education. States are required to develop assessments in basic skills to be given to all students in certain grades if those states wish to receive federal funding; standards are set by each state (Swanson, 2004).
7. Perkins IV - Carl D. Perkins Career and Technical Education Improvement Act of 2006 was first authorized by the federal government in 1984 and reauthorized in 1998. Its focus is to increase the quality of technical education in order to help the economy. The Perkins Act provides federal support for career and technical education programs in the United States. It is named after Carl Perkins, politician and House Representative from Kentucky

because he was instrumental in getting the original act passed in 1984 (Duncan, Dann-Messier, & Miller, 2010).

8. POS – Program of Study is a sequence of instruction that includes coursework, co-curricular activities, work-site learning, etc. in preparation for a career; this instruction is based on the skills and knowledge addressed in the state standards (Tennessee Secondary Career and Technical Education [TNSCTE], 2010).
9. SDE – State Department of Education. The State Board of Education is the governing and policy making body for the Tennessee system of public elementary and secondary education. The Board coordinates its efforts with the State Department of Education, which implements law and policies that are established by the General Assembly and the Board. The State Department of Education has some regulatory authority over local education agencies, but most issues related to elementary and secondary education fall under the authority of local school systems (Tennessee Department of Education, 2010).
10. Secondary Placement – Secondary Placement is the measure of the number of graduated CTE concentrators who were placed in postsecondary education or advanced training, in military service, or had employment in the second quarter following the program year in which they graduated from secondary education (Tennessee Department of Education, 2010).
11. TDP – Tennessee Diploma Project is an initiative to raise the standards and curriculum to better prepare Tennessee students for success after high school.

> It serves as a blueprint for making standards more rigorous and for aligning graduation requirements with the demands of college and the workforce (ACTE, 2009).

Limitations of the Study

This study was limited to a sample of high schools in the upper east Tennessee region who reported CTE concentrator data and graduation data for the 2007-2008 and 2008-2009 school years. In terms of secondary placement, this was significant because some schools may have more success than others in locating CTE concentrators after they graduate to determine if they are enrolled in a postsecondary institution, employed, or serving in the military. Efforts are made to gather information about each student, but it is possible that some students may no longer be in the area or that the instructor is unable to get in touch with them. It is also possible that when a student is contacted, he or she is not participating in any of the follow-up areas of postsecondary, employment, or military. The data for CTE concentrators is provided through follow-up data to the Tennessee Department of Education (TDOE) each school year, as is the graduation data for each school system.

Summary of Methodology

This study compared a sample of high schools in the upper east Tennessee region to determine if the number of students in secondary placement was significant when compared to the state baseline. Chi-square was the statistical test that was used to determine if there were significant differences in the number of students who participated in postsecondary education, the military, or the workforce when compared to the state baseline for secondary placement. The actual performance for the school districts was

compared to the expected performance, the state baseline score. This study also compared graduation rates for CTE concentrators to each school system's overall graduation rate to see if there were significant differences. Chi-square was the statistical test used to determine the statistical significance of any differences that existed between graduation rates. Further analysis was done to determine if there were significant differences between male and female graduates. Likewise, a one-sample chi-square test was used to determine if significant differences existed between the CTE graduation rates for the eight selected school districts and the overall CTE graduation rates for Tennessee. In addition, the CTE graduation rates for the eight selected school districts were also compared to the graduation rates for all students in Tennessee to determine if significant differences did exist.

Overview of the Study

Chapter 1 served not only to introduce the study but also to present the statement of the problem, the research questions, the significance of the study, the definitions of terms, the limitations of the study, and the summary of methodology. Chapter 2 included a review of the related literature regarding the topics of CTE instruction. The research design and methodology for the study were contained in Chapter 3. Chapter 4 offered an analysis of the data. The summary, conclusions, implications for practice, and recommendations for further research were presented in Chapter 5.

CHAPTER 2

REVIEW OF RELATED LITERATURE

Although Career and Technical Education (CTE) courses have previously been viewed as less demanding and not as relevant as traditional academic coursework, recent research is showing a diverging trend. Harris and Wakelyn (2007) point out that those students enrolled in CTE tend to be more motivated because they are learning skills that they feel have relevance. These applied learning opportunities engage the students in the learning process, resulting in lower dropout rates and increased earnings for high school graduates. With the demands of high school redesign, CTE courses are incorporating more and more rigor and relevance into their curriculums. Furthermore, Harris and Wakelyn substantiate the relevance of CTE, stating that "in most states, half of all high school students enroll in at least one CTE course, and 25 percent to 40 percent complete the three or four courses that comprise a typical program of study" (para. 9).

Career and Technical Education

The Carl D. Perkins Career and Technical Education Improvement Act of 2006 (Perkins IV) legislation defines a Career and Technical Education (CTE) concentrator as any student who has been enrolled in at least three consecutive courses within a specified program area. In Tennessee students may choose from seven CTE program areas: Agriculture, Business Technology, Family & Consumer Sciences, Health Science, Marketing, Technology Engineering Education, and Trade & Industrial. Sixteen different career clusters are associated with these program areas. These clusters allow students to gear their coursework toward their chosen career. The goal for the coming years,

according to the Tennessee Department of Education's "CTE 2020 Vision" (2010a, slide 6), is to offer Tennessee students the opportunity "to participate in a rigorous and relevant career and technical education program that leads to academic achievement and successful employment in a global economy." To achieve this vision CTE courses must combine academic and industry standards while using the best practices for delivering competitive education to students.

Further, "CTE 2020 Vision" (2010a, slide 7) reports that approximately 90% of high school students enroll in at least one CTE course each year. Those students enrolled in CTE courses are expected to complete a focused CTE program of study (POS) in preparation for postsecondary education or some type of industry certification. These rigorous programs of study are designed to lead to those occupations that are high skill, high wage, and high demand (slide 11). Meeting that goal requires incorporating career awareness and promoting workplace readiness standards into CTE courses while preparing students to meet rigorous state competency standards.

A significant part of CTE competency standards involves the integration of technology. Current culture demands that students be technologically literate. Today's students must function within a digital world, and, because globalization is on the rise, it is pertinent that they have the skills necessary to face the complex changes taking place around them. Speaking to the future of CTE, several groups offer educators and interested others the benefit of research and practice. Three such groups have amassed a database of their collective efforts. The North Central Regional Educational Laboratory (NCREL) is a nonprofit organization that specializes in providing research findings that speak to the best educational practices. Their findings often have direct impact on

decisions related to funding, policy, and programming. Another entity, the Metiri Group (2003), is a national consulting firm that focuses its efforts on more effective teaching and learning, on technology use in our schools, and on advancing 21st century skills in administrators, teachers, and students. The third group, the North Central Regional Technology in Education Consortium (NCRTEC), provides states and school districts with quality professional development as it relates to the integration of technology into the educational process. Together these organizations created *enGauge* (2003), a web-based framework that encompasses much of what schools and educators need. The *enGauge* 21st Century Skills were compiled from current research on Net-Generation characteristics, workforce trends, nationally recognized skill sets, literature reviews, input from educators, and data from educational surveys (enGauge, 2003).

EnGauge (2003) identifies four major sets of skills that today's students must possess to be productive members of society. The first skill set is digital-age literacy. With the globalization movement, multiculturalism is being taught at a very young age. Technology places ever-increasing demands on students, and math and science courses are being more sought after. The next set of skills that today's student must wield is inventive thinking skills. Students must adapt to the changing world to be able to thrive in an environment where quick decisions can be made using creative and innovative ways of thinking. Having the ability to effectively communicate that thinking is third on *enGauge's* list of skills. Being able to interact and collaborate with others, as well as to cooperate in a team setting, is paramount to students' future success. The final set of skills, high productivity skills, demands that students be competent in problem solving, planning and prioritizing, and effective time management.

Another vital part of developing effective and rigorous CTE courses is having high academic standards. The Tennessee Diploma Project (TDP), part of Tennessee's strategy for achieving better academic outcomes in all coursework, mandates that CTE courses include significant levels of academic competencies that correspond to language arts, math, and science. All CTE instructors are expected to partner with academic teachers in these key areas and to integrate the academic curriculum into the CTE course standards, focusing on key elements within both subject areas. The National Research Center for Career and Technical Education (NRCCTE, 2010) maintains that the integration of academic content into CTE courses is a key component to increasing students' overall achievement levels.

In previous years those students enrolled in vocational education courses were seeking to acquire the necessary skills to enter the workforce shortly after high school. However, with the passing of stringent academic and accountability standards, this can no longer take place. Like their academic counterparts, Career and Technical Education courses have more than just high expectations. Students must meet rigorous performance indicators and specific benchmarks set for skill attainment (Plank, DeLuca, & Estacion, 2005).

No Child Left Behind (NCLB) is the latest federal legislation that implements the theories of standards-based education reform founded on the belief that setting high standards and establishing measurable goals can improve individual outcomes in education (Swanson, 2004). To receive federal funding for education NCLB requires that states develop assessments in basic skills to be given to all students at certain grade levels. These standards are set by individual states, and NCLB holds each public school

system accountable for the performance of its students. Achievement test scores are used to determine success of these measures. Under NCLB the state accountability system mandates that at least one other indicator must be used. At the high school level, that indicator is the graduation rate.

Swanson (2004) notes that the two main objectives of NCLB include improving the performance levels of all students and closing the achievement gaps that exist between low-performing and high-performing students. According to NCLB legislation, all school systems are being held accountable for the performance of their students. At the high school level test scores and graduation rate are the primary means for assessing accountability (Swanson, 2004). Upon graduation students are expected to be both career and college ready. To achieve this goal for all students the high school curriculum must incorporate challenging academic standards along with the technical skills needed to be successful in today's digital world.

With the emphasis on accountability and student achievement, Career and Technical Education needs to change its focus to be a successful part of the Tennessee Diploma Project. CTE must continue to equip students with the necessary skills for the workplace while reinforcing academic standards and teaching the necessary life skills all students need. Just as both the work environment and technology constantly change, so must today's student to be able to adapt to the demands of job security. In CTE courses, students apply what they learn in real-world scenarios. Learning by doing or practical application has always been a key characteristic of vocational education courses. Most CTE courses are offered in a sequence and incorporate some type of internship, service learning, co-op, or other work-based learning activity (Daggett, 2002).

In his Rigor/Relevance Framework Daggett (2010) emphasizes that students and workers need to be able to apply the knowledge that they have acquired in real-world scenarios. In this real-world application, students and workers are often faced with unpredictable scenarios to which they must apply learned skills to arrive at a viable solution. The Rigor/Relevance Framework was developed by the International Center for Leadership in Education to be used as a tool for examining curriculum, instruction, and assessment (Tennessee Council on CTE, 2008). The Rigor/Relevance Framework is shown in Figure 1.

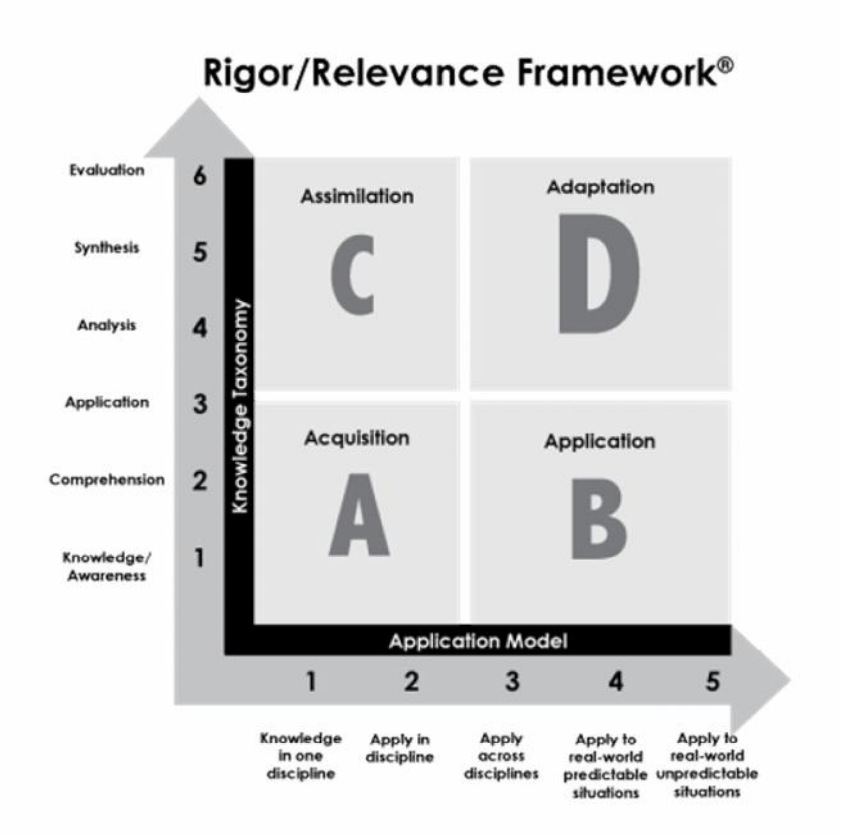

Figure 1 Rigor/Relevance Framework

Note. "Rigor/Relevance Framework," by Tennessee Council on CTE, 2008. Commissioned by the International Center for Leadership in Education. Printed with permission.

Daggett (2002) writes that career and technical education does a good job of reinforcing this concept. The knowledge and skills that are taught in CTE courses are applied and reinforced through hands-on activities and practical application. Daggett further contends that students learn more when they are motivated and that motivation stems from the link between knowledge or skills learned and the application of such to the real world. CTE has restructured its curriculum to include "rigorous and challenging academic content standards," offering students a nonduplicative sequence of courses which leads to "industry-recognized credentials or certificates, or associate or baccalaureate degrees" (Office of Vocational and Adult Education [OVAE], 2008, p.1). CTE instructors team up with academic instructors to collaborate and integrate their curriculums.

Higher standards and student achievement are the focal points of the Rigor/Relevance Framework. The knowledge continuum is based on the six levels of Bloom's Taxonomy. The lower end of the continuum involves the acquisition of basic knowledge, and the higher end involves more complex ways of applying the knowledge. The application continuum is based on how an individual actually puts knowledge to use, ranging from the low end of applying knowledge in one area to the high end of applying knowledge to solve real-world problems that are unpredictable.

Career and technical education both prepares students for the workplace and equips them with the necessary skills, academic and vocational, to be successful in postsecondary education or in a training program beyond high school. Most CTE courses explore various career opportunities that assist students in seeking out that future career. Because CTE courses incorporate classroom instruction, hands-on learning experiences,

and work-based learning activities, they tend to target the different learning styles of all students (OVAE, 2008).

Research shows that those students who participate in CTE courses have both increased academic achievement and earnings. The Association for Career and Technical Education (2006) reports that a 2001 Russell Sage Foundation study found that, "CTE graduates are 10-15% more likely to be in the labor force and earn 8-9% more than graduates of academic programs" (p.1). CTE contributes to the educational spectrum by preparing today's student to enter the workforce as a skilled worker. According to a 2003 report by the National Research Center for Career Technical Education (NRCCTE), CTE concentrators in the 1990s took more challenging academic courses including math and science than most general students. The Southern Regional Education Board (SREB) maintains that CTE concentrators who graduate from high school are twice as likely to be employed while in college as their "college prep" counterparts. In 2005 the NRCCTE reported that students who take at least one CTE course for every two academic courses are less likely to drop out of high school. Further, the 2004 NAVE Final Report indicated that 96.6% of all high school students take at least one vocational course (Association for Career and Technical Education [ACTE], 2010).

National Research Agenda

The Association for Career and Technical Education (ACTE) has developed a national research agenda. The Association further maintains that certain activities are crucial in maintaining and advancing CTE programs in ways that benefit students, business and industry, and society as a whole. Along with input from researchers, business leaders, and practitioners, ACTE has identified 15 different research objectives

that will keep CTE programs on the cutting edge of the American educational system. The research objectives are linked to five specific problem areas that are key components of the CTE philosophy and mission. Following ACTE's lead, Tennessee's "CTE 2020 Vision" (n.d., slide 5) defines Tennessee Career and Technical Education's mission as "preparing today's students for tomorrow's opportunities." Figure 2 represents the national research agenda diagram.

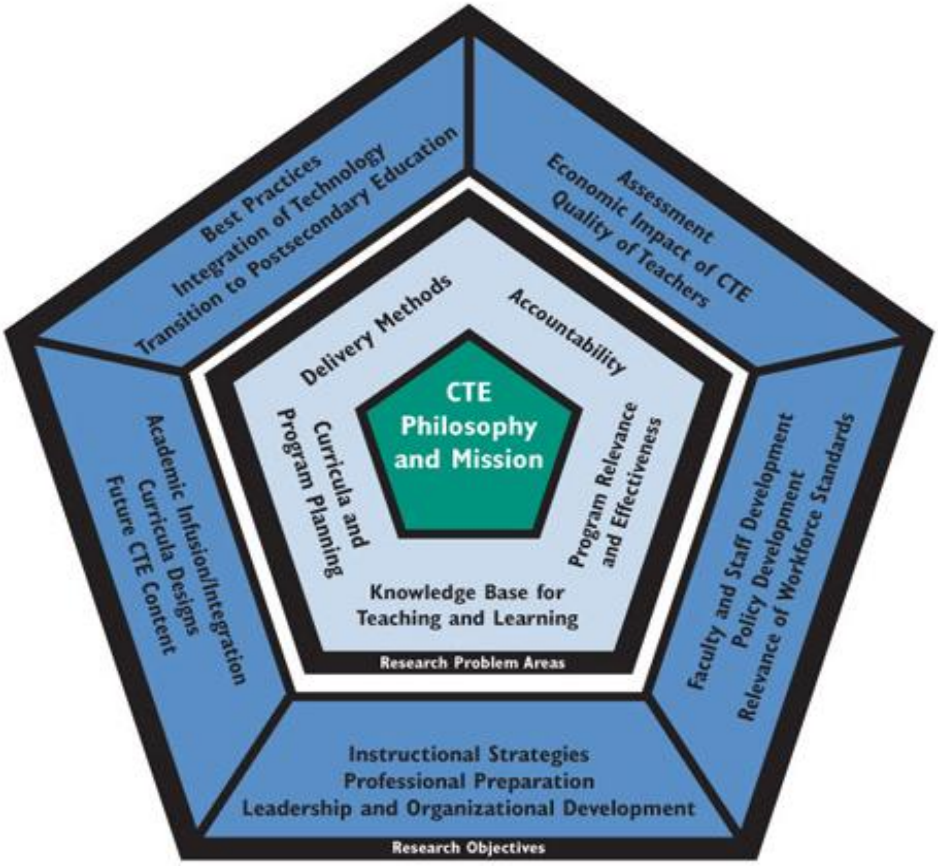

Figure 2 National Research Agenda

Note. "National Research Agenda," by ACTE, Tennessee CTE State Profile, 2009. Commissioned by the Association for Career and Technical Education. Printed with permission.

The first research problem area is delivery methods. Lambeth, Elliot, and Joerger (2008) identify the specific research objectives as best practices, integration of technology, and transition to postsecondary education. CTE teachers and administrators must evaluate and apply best practices to improve and advance the programs as much as possible. It is recommended that CTE programs incorporate as many aspects of technology as possible. In an effort to minimize costs and maximize resources, many CTE courses can be shared across counties, allowing students to experience interactive projects and virtual field trips without leaving their schools. The problem of transitioning is also being addressed because of the increasing demand of post high school training. With this in mind, CTE assists in making the transition from secondary education to postsecondary education as seamless as possible.

Accountability is the second research area identified. The related objectives are assessment, economic impact of CTE, and quality of teachers. According to Lambeth et al. (2008), the most predominant means of advancing CTE programs is through accountability. The focus for most assessment methods is high-stakes testing and graduation rate; however, alternative methods of assessing accountability are also viable. For example, students may demonstrate their skills through capstone projects and portfolios that are becoming more prevalent. Also falling under accountability, the influence CTE has on the economy has always been substantial. ACTE maintains that CTE provides advantages in that it incorporates skills that lead to high-skill, high-wage, or high-demand jobs; higher wages for CTE graduates leads to higher tax revenues and lower crime rates and reduces the cost of public health care. Finally, accountability involves the CTE instructors. Because of the varying skill set of CTE teachers, specific

educational programs need to be established to ensure that CTE programs have qualified teachers (Lambeth et al., 2008).

Lambeth et al. (2008) further identify program relevance and effectiveness as a problem area. The specific research ideas include faculty and staff development, policy development, and relevance of workforce standards. Because of the decrease in the traditional CTE training through colleges of education, many states are recruiting their teachers from business and industry. Many school districts have to consider alternative teacher certification programs to provide high-quality teachers. To stay in compliance with local, state, and federal policies, CTE advisory boards include business and industry representatives and local workforce investment members. Furthermore, CTE programs must align their standards with the most current workforce standards to best provide students with the training needed to enter the labor force.

The fourth research problem that Lambeth et al. (2008) address is knowledge base for teaching and learning. Specific topics of concern are instructional strategies, professional preparation, and leadership and organizational development. To improve outcomes CTE teachers must rely on research to develop high-quality teaching strategies that address the variety of learning styles in their classrooms. Also, because CTE programs are quickly becoming the leaders in providing 21st century technical skills that are needed for college and the workforce, it is imperative that CTE teachers and administrators receive high quality training and professional development in the most current technical skills so that they may translate that knowledge into offering viable and tangible skills to students within their classes and organizations. Moreover, the knowledge base for learning must involve leadership and organizational development.

According to Fiscus and Hyslop (2008) students who participate in career and technical student organizations (CTSOs) tend to more fully develop the leadership and employability skills needed to be successful in the workforce and college.

Lambeth et al. (2008) discuss curriculum and program planning, the last and fifth problem area. The specific related objectives are academic infusion and integration, curricula designs, and future CTE content. CTE programs are incorporating more rigor and relevance into their curriculum by partnering with academic teachers. Many CTE teachers collaborate with academic teachers and reinforce academic standards through the CTE curriculum. Team teaching and offering CTE courses for academic credit are practices that are becoming more and more popular. Therefore, CTE courses need to be challenging both academically and technically, and they should incorporate the most current industry standards into the curriculum. Meeting the demands of the workforce now and in the future requires that CTE constantly adapt to provide the skills necessary for the newest and emerging career paths.

No Child Left Behind (NCLB)

The No Child Left Behind Act of 2001, signed into law under the Bush administration, supports standards-based educational reform. This reform effort is based on the idea that incorporating higher standards and measurable goals can lead to an increase in individual performance levels. In order to receive federal funding states must develop standardized assessments in basic skills to be given to all students in specific grades. The standards to be assessed are set by each state (Swanson, 2004).

One of the main objectives of NCLB was to increase the accountability of schools. The most common means of assessing accountability at the high school level

are test scores and graduation rates. An astounding amount of data-based research suggests that CTE graduates actually have a higher completion rate and help increase the overall graduation rate for some schools. When graduation rates in Tennessee were compared for 2005-2006, graduates who had a CTE focus graduated at a rate of 91.51% compared to the state average graduation rate of 80.70% (Tennessee Council on CTE, 2008).

Much debate exists among states as to the specific elements involved for high school graduation rates. School systems have challenged the fact that those students who do not receive a regular diploma are not included in the calculation of a school's graduation rate. The NCLB legislation defined high school graduation rates as "only students who received a regular standards-based diploma on time with their class" (Swanson, 2004, p.1). This formula does not take into account those students who only receive a certificate of attendance, a GED, or who may take more than 4 years to complete their high school graduation requirements.

Under NCLB each state sets its yearly goals for progress and can face sanctions as a result of not meeting these pre-established objectives. Swanson (2004) said that schools cannot make "adequate yearly progress under the law unless they meet their annual performance objective for students as a whole and for each subgroup defined on the basis of race and ethnicity, socioeconomic level, disability status, and English language proficiency" (p. 3).

CTE's Role in Dropout Prevention

In their 2006 study Bridgeland, Diulio, and Morison cite research regarding national graduation rates, noting averages between 68% and 71% and stating that this rate

drops to 50% for minority students. Almost one third of the nation's high school students do not graduate with a regular high school diploma. The graduation rate for whites and Asians lingers around 75% to 77%, which means that approximately 25% of these students fail to graduate.

Many factors exist that must be considered when calculating high school graduation rates. Students may transfer between schools and school systems; they may be retained in a grade; or they may lose so many credits because of failing grades that they do not graduate with their classmates. In general, it is often quite difficult to document those students who just drop out of school for a number of reasons. Schools are on target to decrease dropout rates and increase test scores, and CTE is a major part of the strategy for combating these problems (Swanson, 2004). Swanson further notes that the rising high school dropout rate affects students and communities both economically and socially. Dropout prevention, therefore, becomes paramount, and CTE becomes a viable means of achieving that.

Research by ACTE (2003) shows that one out of three students who start high school will not complete it within 4 years. CTE programs play a key part in keeping these numbers to a minimum. The risk of students dropping out of high school decreases as students enroll in CTE courses. "High-risk students are eight to ten times less likely to drop out in the 11^{th} and 12^{th} grades if they enroll in a CTE program instead of a general program" (ACTE, 2003, para. 2).

The negative implications of students who drop out of high school can be quite detrimental for the economy and society as a whole. Those students who do not complete high school are more likely to live in poverty and benefit from many public assistance

programs. They tend to have more health problems, and they tend to engage in criminal acts more often. Moreover, as Plank et al. (2005) point out, those students who are high school dropouts are on the unemployment line more often than those students who graduate from high school.

The National Dropout Prevention Center/Network has identified the 15 strategies that have the most positive effect on the dropout rate. Among these strategies is Career and Technical Education (ACTE, 2003). The Center further contends that Career and Technical Education can help in the endeavor to raise academic standards for all students by integrating academic skills and career-based skills. CTE courses often involve contextual learning. The U.S. Department of Education's Office of Vocational and Adult Education defined contextual learning as "learning that motivates students to make connections between knowledge and its applications to their lives" (NRCCTE, 2010, p. 9).

Participation in CTE courses engages students in the learning process and provides opportunities for students to see the relevance of what they are learning. ACTE (2003) posits that students in CTE courses are more motivated to learn when it has a real-world application. They seem more interested in learning skills that they feel are useful for a potential career path. Moreover, students in CTE courses are often able to form positive relationships with their teachers and the other students in the class. Students also tend to build connections with adults in the community through involvement in the Career and Technical Student Organizations (CTSOs) that have students complete community service projects and other group activities throughout the school year. In

many ways CTE teachers serve as mentors for those students who participate in work-based learning activities such as job shadowing or an internship program (ACTE, 2003).

In a study completed in 2004 Rumberger (as cited in Plank et al., 2005) states that the process an individual undergoes to make the decision to quit school is a collective one. Essentially, when the student takes into consideration his or her behavior and attitude toward school, he or she finds that he or she has not been engaged in the process of learning for quite some time. This disengagement includes both academic and social disengagement. From as early as the 1960s many studies have been conducted about whether or not CTE helps to prevent the student dropout rate. In 1998 Kulik (as cited in Plank et al., 2005) estimated that participation in CTE decreased the dropout rate by about 6%.

Alex Harris, Senior Policy Analyst with the National Governors Association Center for Best Practices, contends that CTE courses can have a positive impact on high school graduation rates, on enrollment at the postsecondary level, and on labor market forecasts. He contends that current workforce demands include a solid set of academic and technical skills, proficiency in technology, and postsecondary education or training (Ainsworth, Oliver, & Harris, 2007).

With the emergence of standards-based reform, the old mindset that CTE is a second-tier track, specifically regarding options and preparation for the future, is gradually changing as many states are reporting much higher graduation rates for CTE students than for their overall student population. The North Carolina Department of Public Instruction contends that those students enrolled in CTE courses have a much better chance of graduating high school. In 2009, their report for 30 school districts

statewide showed that the cohort graduation rate was 90% or above for those students who were CTE concentrators (Lavender, 2010). Lavender further reports that while the state graduation average was 71%, CTE students in Lenoir County graduated at 83% and Greene County showed an 81% graduation rate (para. 7, 10).

Furthermore, the Guilford County, North Carolina statistics for the 2008 school year are just as supportive. The graduation rate for CTE concentrators was more than 91% compared to the district's overall graduation rate of about 78% (Hogan, 2010, para. 1). In 2007 the Federal Department of Education released its *Education Accountability Brief #12,* and, as noted by Stonefield (2008), the 2005-2006 graduation rates for Nevada high school students who were enrolled in CTE programs of study was 82.5% as compared to the State rate of 67.5% (p. 2). This was an astounding 15 percentage points higher for CTE concentrators. Likewise, Stonefield observes that the dropout rate for CTE students in Nevada for that same school year was only 1.6% as compared to the State's overall dropout rate of 4.6% (p. 2).

Activists for CTE argue that its presence in the high school curriculum can help reduce the number of students who drop out. The reasons they cite are: CTE classes are more interesting; they have more value; they provide specific skills for specific careers; and they are more engaging because they have a definite career focus in perspective (Plank et al., 2005). A statement in the 2003 report of the Advisory Committee for the National Assessment of Vocational Education sums up the significance of CTE in helping to reduce the dropout rate:

> Career and technical education empowers students by providing a range of learning opportunities that serve different learning styles. CTE relies on a powerful mode of teaching and learning that cognitive scientists call 'contextual' or 'situated' learning, both in classrooms and in workplaces.

> For many students, applying academic and technical skills to real-world activities, using computers and other tools, and being able to see how their learning is related to the world of work make CTE classes more interesting and motivating, and more educationally powerful than standard academic classes. A career focus often gives students a sense of direction and motivates them to achieve and to stay in school. Practically inclined students can be hooked on academic learning through CTE study….Just having the option of being able to concentrate in CTE in high school results in more young people staying in school because more individually relevant courses are available to them. (Plank et al, 2005, p. 5)

It is, therefore, imperative that CTE becomes a fundamental part of each high school student's education.

The History of Vocational Education

Vocational education has its roots in colonial times with apprenticeships as an avenue into a trade. Gordon (2002) traces the history of vocational education, beginning with the Old Deluder Satan Act of the Massachusetts Bay Colony that required that those youngsters in apprenticeships be taught both academic and vocational skills. This soon evolved into industrial education where job training was the emphasis. Gordon also cites the well-known educator Booker T. Washington who endorsed vocational education as a means of African Americans making a better life for themselves.

An important milestone in the history of vocational education came when Congress passed the Morrill Act of 1862. The Morrill Act made provisions for the first land-grant colleges, allocating public lands based on each state's congressional representation in 1860. Each state was to sell the land and use the money to establish colleges. When racial inequality became an issue, a second statute, the Morrill Act of 1890, was passed to provide land grants to institutions that served all white and nonwhite applicants (Gordon, 2002).

Meeting the demands of the labor force became more difficult with increasing industrialization. As Gordon (2002) notes the Smith-Hughes Act of 1917 was the first form of federal support for vocational education. Senator Hoke Smith and Representative Dudley Mays Hughes, two Georgia lawmakers, considered that the youth of the country needed to learn occupational skills that would prepare them for entry-level employment. The Smith-Hughes Act endorsed vocational education as being separate from academic education in the form of specific courses that were offered by vocational schools.

Under the Smith-Hughes Act, a Federal Board of Vocational Education was established to oversee all vocational education programs. State boards were created and annual reports were required to detail the status of vocational education in each state. This act gave vocational education its place in the public school system (Fiscus & Hyslop, 2008).

With the concept of separate vocational schools intact, Congress recognized the need to incorporate vocational education into the already existing comprehensive high school system (Gordon, 2002). The 1963 Vocational Education Act was a major expansion of vocational education in the American school system. The entire focus of vocational education shifted to equipping America's youth with the skills necessary for employment. The Amendments to the Vocational Education Act of 1968 covered vocational education's expansion to meet special education needs (Gordon, 2002).

Alongside the school reform efforts of the 1980s came the passing of the Carl D. Perkins Vocational Education Act of 1984. The Perkins Act, which emphasized the importance of vocational education in our society, served two purposes – to advance the

skills of the workforce and to provide equal opportunities for adults of all classes (Gordon, 2002). Soon to follow was the passing of the Carl D. Perkins Vocational and Applied Technology Education Act of 1990, Perkins II. This act was passed by Congress to revise and improve the previous act of 1984.

In conjunction with the Perkins Act, the School-to-Work Opportunities Act (STWOA) was passed in 1994. This act provided for education and business to form partnerships to create a more skilled workforce. Gordon (2002) states that while it provided opportunities for students to participate in work-based instruction, it further helped transition the student from school to work and gave him or her a better understanding of what to expect as a member of the labor force.

The Carl D. Perkins Vocational and Technical Education Act (Perkins III) was signed in 1998 by President Clinton in an effort to boost accountability and allow more flexible use of funds (Gordon, 2002). This federal funding is the primary source for career and technical education programs at the secondary and the postsecondary levels. Each state must determine how the funds will be allocated between secondary and postsecondary education. The average allocation tends to be 60% to secondary and 40% to postsecondary.

The focal point for this piece of legislation was accountability. Congress set up performance requirements to which all CTE programs must adhere. The requirements were set "to assess the effectiveness of the state in achieving statewide progress in career and technical education, and to optimize the return of investment of federal funds in vocational and technical education activities" (OVAE, 2008, pp.1-2). Each state was required to report annually on four core indicators of performance:

- Academic and vocational skills attainment;
- Completion of a secondary school diploma or its equivalent;
- Placement and retention in postsecondary education or advanced training, military service, or employment;
- Participation in and completion of programs that lead to nontraditional training and employment.

Additionally, the Office of Vocational and Adult Education (2008) states that each state was required to report progress by disaggregating it by race, gender, and ethnicity. Special population students should be reported as well. Special population students include: disabilities, economically disadvantaged, foster children, single parents, single pregnant women, displaced homemakers, limited English proficiency, and any other barrier that may hinder educational achievement.

With the onset of Perkins III, states had to submit how they would measure student performance, which students would be included in the performance measures, and what their baseline level would be for each core indicator of performance. Each state negotiated its baseline levels of performance by which it would be evaluated (OVAE, 2008).

With Perkins III legislation, a new vision evolved for career and technical education in the 21st century. This new vision focused on student achievement and on helping prepare students for postsecondary education and high-skill, high-wage careers. One of the main goals of this restructuring was to make certain that students were prepared to meet state academic standards along with the industry standards that are an integral part of all CTE courses (Fiscus & Hyslop, 2008).

Technical Preparation or Tech-prep was originally set up to provide a pathway for those students going on to a technical school or community college for a technical career. Students would participate in a program of course work that included academic and vocational courses for 4 years-- the last 2 years of high school and the first 2 years of postsecondary. Although this was the original set up of tech prep, most schools do not offer tech prep classes in this fashion. A vast majority of high schools set up articulation agreements with technical schools and/or postsecondary institutions so that students are able to earn college credit for high school CTE courses that coincide with similar courses at the postsecondary level. The competencies at the high school level must reflect postsecondary standards, and the students must pass a test to receive the credit at the postsecondary level. In essence, the curriculums at the high school and the postsecondary levels are aligned with related knowledge and skills (Silverberg et al., 2004).

The Carl D. Perkins Career and Technical Education Improvement Act of 2006 (Perkins IV) took vocational education a step further. The purpose of this Act was to raise the level of academic achievement of career and technical education students, to provide stronger connections between secondary and postsecondary education, and to improve accountability at the state and local levels. These goals would be accomplished by:

- Incorporating rigorous standards that provide students with the academic and technical skills that lead to high skill, high wage, or high demand careers;
- Integrating academic and CTE instruction and linking secondary education to postsecondary education;

- Providing flexibility in the way state and local entities advance the activities of CTE;
- Distributing information about best practices and emerging research that will improve CTE programs;
- Offering assistance for all CTE-related professionals (teachers, administrators, counselors) through effective professional development activities;
- Encouraging partnerships between all CTE stakeholders (secondary, postsecondary, business and industry); and
- Offering opportunities for all individuals to develop the skills needed to keep the United States competitive (U.S. Department of Education, 2006).

The Perkins Act supports program improvement and innovation for CTE programs offered at the secondary and the postsecondary levels. Some of the specific activities that these funds maintain are: an accurate and strong accountability system; integration of CTE and academic instruction; accessibility for special populations students; development and implementation of new courses; equipment purchases that allow for the latest technological tools in CTE classrooms; and professional development and support for instructors, counselors, and administrators. Members of the National Association of State Directors of Career-Technical Education Consortium describe the Carl D. Perkins Career and Technical Education Act as an opportunity for high school students to move to postsecondary through experiences such as articulation, integration, and industry certification that link the two pathways together. The funds from the Perkins Act can be used to distribute information about best practices and employment activities that help students make critical decisions in regard to their education and their

future career choices. Perkins IV has helped revitalize and restructure curriculum and best practices within CTE programs (National Association of State Directors of Career Technical Education Consortium [NASDCTEC], 2010).

Perkins IV

The Carl D. Perkins Career and Technical Education Act of 2006 mandates that each state offer career and technical programs of study that provide alternative coursework from which students and parents may choose. To receive funding each school must offer at least one CTE program of study. These programs of study must meet the following requirements: "incorporate and align secondary and postsecondary education elements; include academic and CTE content in a coordinated, non-duplicative progression of courses; offer the opportunity, where appropriate, for secondary students to acquire postsecondary credits; and lead to an industry-recognized credential or certificate at the postsecondary level, or an associate or baccalaureate degree" (OVAE, p. 1). Students following these programs of study, CTE concentrators, are defined differently from state to state. The state of Tennessee defines a CTE concentrator as "a secondary student who earned three or more credits in a single CTE program area or two credits in a single CTE program area, but only in those CTE programs where two-credit sequences at the secondary level are recognized by the state" (Duncan et al., 2010, p. 64).

Perkins IV legislation requires that all states report annually on their core indicators of performance. At the secondary level those performance indicators are: academic attainment in reading and language arts and mathematics; technical skill attainment; secondary school completion; student graduation rates; secondary placement; nontraditional participation; and nontraditional completion. Each state negotiates its

baseline for each performance indicator with the Office of Vocational and Adult Education (OVAE). Each state is also required to disaggregate the data based on certain special population categories (Tennessee Department of Education, "Perkins IV," 2007).

To qualify for Perkins funding all program areas must meet the 10 quality program indicators. Those quality indicators are:

1. A program of study must be of size to offer a sequence of three or more earned credits or two credits in a single CTE program area, but only in those programs in which two-credit sequences at the secondary level are recognized by the state and/or its local eligible recipients.
2. A program must be of such scope that is aligned with a state approved program of study within career clusters.
3. A program must have a certified and appropriately endorsed teacher.
4. A program must teach the state-approved curriculum standards.
5. A program must have a state-approved articulation agreement for the program of study or an approved articulation agreement approved by the lead administrators of secondary and postsecondary institutions where available.
6. A program must be supported by current labor-market data to support high-skill, high-wage, or high-demand jobs.
7. A program must teach all aspects of an industry.
8. A program must have an active advisory panel.
9. A program must have a career and technical student organization (CTSO) as an integral part of the instructional program.

10. A program must promote CTE and academic curriculum integration. (ACTE, 2009).

Tennessee Diploma Project (TDP)

All Tennessee high school students graduating in 2013 and after will see a major change in the high school graduation requirements as a result of Tennessee joining the American Diploma Project (ADP) Network. Tennessee joined the national initiative with the purpose of closing the state's "expectations gap--the gap between what a student knows upon graduating from high school and what the students need to know to be successful in college or the workforce" (Potts & Cour, 2009, p. 4).

The Tennessee Alignment Committee led the effort for Tennessee with input from state and local government officials, business and industry, K-12 education, and postsecondary education. The Tennessee Diploma Project (TDP) focused on the skills that students need for college and for the workforce and increased the number of credits required to graduate from 20 to 22. The statistics for the number of students who are college and work ready were quite alarming. According to the Education Consumers Foundation (ECF) (n.d.), "Only 58% of Tennessee high school graduates are fully prepared for college and only 55% are fully prepared for the workforce" (para. 1). ECF maintains that, essentially, Tennessee high schools inherit many students who have academic deficiencies that they carry over from elementary and middle school.

The committee consulted the Tennessee Business Roundtable, a statewide organization of CEOs, regarding the skills and knowledge that high school graduates should obtain. The specific areas that they identified were:

- Stronger math and science skills with focus on mastery of basic mathematics and the ability to think critically toward a focused solution;
- Stronger communication skills, verbal and written;
- Ability to work in teams to solve real-world problems;
- Ability to think, apply, and use what they know; and
- Stronger work ethic-- i.e., be at work regularly and on time. (Potts & Cour, 2009)

These areas are the key focus for further course development.

The Tennessee CTE Division has adopted the national definition of career clusters and programs of study. Career clusters are "groupings of occupations or career specialties used as an organizing tool for curriculum design and instruction" (Tennessee Secondary Career and Technical Education [TNSCTE], 2010, p.2). These occupations or career specialties are based on a required set of common knowledge and skills which prepare learners for a spectrum of occupations or career specialties, "focusing on the holistic, polished blend of technical, academic and employability knowledge and skills." (p. 2). A program of study is "a sequence of instruction (based on recommended standards and knowledge and skills) consisting of coursework, co-curricular activities, work-site learning, service learning and other learning experiences" (p. 2). From these definitions it is apparent that demands for teachers and students will continue to increase and be in flux as college and workforce demands change (ACTE, 2006).

A central component of the TDP is that all students must complete a planned course of study. This can be a CTE program of study. The State Department of Education CTE division includes seven program areas: Agriculture, Business Technology, Family & Consumer Sciences, Health Science, Marketing, Technology

Engineering Education, and Trade & Industrial. They have adopted the national career clusters model of 16 career clusters and have developed programs of study that align with these clusters (see Appendix A). These clusters support the state's main economic areas that help prepare students for postsecondary education. They also highlight student performance in regard to assisting districts in meeting or exceeding their negotiated performance levels on Perkins IV accountability assessments (ACTE, 2009).

As college and workforce demands change, the Association for Career and Technical Education contends that CTE will be a forerunner in providing the skills necessary to prepare students for these issues. Because of ever-changing technology and the increased competition worldwide, future jobs will require more knowledge and skills than ever before and will demand that workers be more flexible. As Tennessee's CTE handbook notes, "Tomorrow's workers must be prepared to change jobs and careers several times, continually updating their knowledge and skills." (p. 1). Career clusters help students see the relevance in what they are learning for their future careers. Seeing the connection between high school and either postsecondary education or the workplace tends to motivate students to work toward that future career goal, thus leading them to enroll in some of the more challenging courses. Programs of study at the secondary level assist students in making the transition from high school to postsecondary less difficult. It also allows them to develop the skills and knowledge needed to work toward high-skill, high-wage, and high-demand careers (TNSCTE).

Competency Attainment Rubric

Under the most recent Perkins Act reporting technical skill attainment is a requirement. This necessity has raised the possibility of CTE students taking third party

tests based on their courses or their POS. The use of third party testing could prove to be quite costly; therefore, Tennessee has developed the Competency Attainment Rubric (see Appendix B). Tennessee is one of the first states to use this type of assessment for student performance. The Rubric was developed as a valid and reliable tool for assessing student performance and for measuring the level of rigor required in all CTE classes. With this rubric Tennessee hopes to develop a standard by which students can understand the kind of performance that will be expected of them when they continue into the workplace and/or postsecondary education (Tennessee Career and Technical Education, 2010).

Each CTE course has competency check sheets that align with business and industry standards. For each competency covered in a CTE course, the teacher must determine the performance level of each student. In previous years, the teacher simply marked whether the student mastered the competency or not. With the new rubric the teacher rates the proficiency level of the students. The performance levels for the rubric are: advanced, proficient, basic, and below basic. The proficient level means that a student meets postsecondary readiness standards and entry-level career readiness standards. The basic level means that a student has trouble with prior knowledge and requires additional training or remediation to meet career and/or postsecondary readiness standards. In its "CTE Rubric" the Tennessee Department of Education lists the categories: knowledge attainment; technical skills; problem solving; career awareness; and communication and literacy (Tennessee Department of Education [TNDOE], 2010). These performance indicators must be followed to assure rigor in CTE courses.

The Competency Attainment Rubric was developed around Webb's Depth of Knowledge (DOK) Levels (see Appendix C). All CTE standards are being modified in an effort to incorporate more rigor and relevance into their curriculum. The Southern Regional Education Board (SREB) defines rigor as "the expectation that students will be able to perform at levels of cognitive complexity necessary for proficiency at each grade level, and readiness for college and the workplace…alignment of instruction and assessment with standards/objectives that are at those levels of cognitive complexity is a critical part of increasing rigor in schools" (TNDOE, "CTE Rubric – Competency Attainment," 2010c).

Level One of Webb's DOK involves simple recall of information. This level is the basic level of illustration, reporting, recalling, recognizing, and identifying. Level Two is basic application of skills and concepts. Demonstration of knowledge within this level may involve organizing, classifying, comparing, or interpreting. Level Three evolves to strategic thinking. Within this level, one is expected to assess, differentiate, critique, and formulate. Level Four requires more extended thinking including the ability to connect, analyze, prove, and synthesize. The Tennessee CTE rubric will help teachers "assess a student's level of proficiency based on student work and the complexity of assignments given" (TNDOE, 2010, p.2).

The Competency Attainment Rubric was developed for a variety of specific reasons. It was designed to assist students as they proceed through a program of study that expands beyond high school into postsecondary education and/or employment. It was intended to be used both as a valid and reliable tool for marking competencies on the student checklists in a more consistent manner and as a means of providing teachers with

data that leads to new and improved instructional strategies. This set of data is then used to assess curriculum and performance on a large scale (Tennessee Career & Technical Education, 2010). After competency check sheets are marked for each student, they are manually input by CTE teachers into the state data system, *eTiger*.

The data that are entered into the *eTiger* system are then verified by the CTE director and are used to prepare Perkins reports and the CTE School Report Card. The *eTiger* data collection system allows for the electronic submission of data that are more accurate and that can be verified by the teacher at any time and on a regular basis. Data entered into the EIS (Education Information System) can be uploaded automatically (TNSCTE, 2010).

Career and Technical Education and Technology

As our national economy has become more globalized, the American public is relying more and more on the education system to prepare students for the 21st century. Vocational education plays a substantial role in this endeavor. Many employers complain that today's workers are not ready to meet the demands of the workforce—they are not on time for work, they miss for any reason, and their overall attitude and work ethic are terrible. Many workers lack integrity and responsibility; many are not able to problem solve and make decisions; and many simply lack the basic skills of reading and writing that are essential elements of a well-rounded worker (Gordon, 2002). Career and technical education assists in the task of preparing students for postsecondary education and the workforce by placing emphasis on core academic skills, employability skills, and technical skills. The Association for Career and Technical Education (2010) maintains that it takes all of these broad skill sets for their endeavors beyond high school whether

that is postsecondary education, a specialized training program, an area technical school, or employment.

Today's graduates must have a combination of academic skills and vocational training to be competitive and to meet the qualifications for some of the top careers. In essence, combining employability skills with academic achievement seems to be the formula for success for many high school students. Research confirms that academic and vocational integration can emerge through a variety of different models: by merging academics into vocational classes; by relating academic courses with vocational courses; by collaboration between vocational and academic teachers in an effort to integrate academic content into vocational standards; by aligning the curriculum across all courses; by allowing students to complete projects that demonstrate proficiency in both academic and vocational competence; through academy schools, vocational high schools, and magnet schools that align the curriculum to focus on occupational skills; or through career clusters or programs of study that provide a sequence of courses that reflect a specific occupation or major (Gordon, 2002).

Today's student is accustomed to text messaging, cell phones, and laptops – quite different from a student just a decade ago. In 2002 participants at the 21st Century Literacy Summit stated that "Information and communication technologies are raising the bar on the competencies needed to succeed in the 21st century" (as cited in Lemke, p. 2). Today's children know more about the latest technological tools than adults do; they are "growing up digital." In previous years access to technology tended to be the stumbling block for many people. However, the question for most educators now is how the technology can be implemented to enhance the learning outcomes of all students. U.S.

Department of Labor experts assert that "we are living in a new economy – powered by technology, fueled by information, and driven by knowledge" (p. 5). In today's Digital Age technology plays an important role in the learning process. It serves as a catalyst for change, requiring today's student to possess an entirely different set of skills to be successful. Technology also provides a bridge for high academic achievement because it can offer opportunities for more personalized and relevant learning. Finally, technology has created a platform for more informed decision-making and accountability by allowing more timely use of data and feedback that enhances learning outcomes (Lemke, 2003).

Career and technical education provides students with the technical skills needed to be successful in today's global world. As technology evolves, so must the skills that students need to be competitive in their chosen careers. Students need to be exposed to real-life scenarios to be able to effectively apply the technical and academic competencies that they have practiced throughout their school years. CTE courses provide opportunities for students to apply what they have learned through hands-on experiences. The federal government recognized that our students need to advance their skills when NCLB included technology literacy as a component of its legislation. Through the use of federal funds, many CTE courses include the most up-to-date technology and equipment available to provide students with the knowledge and skills they need to be successful citizens (enGauge, 2003).

enGauge 21st Century Skills

The *enGauge* 21st Century Skills were identified by consulting educators regarding their thoughts on national skills that students need to have upon graduation and

via research on Net-Generation traits as well as business and industry reports on workforce trends. The following matrix illustrates the skills needed to succeed in the Digital Age. These skills, when combined with the latest technological tools, must revolve around core academic standards. Figure 3 represents the 21st Century Skills framework developed by *enGauge*.

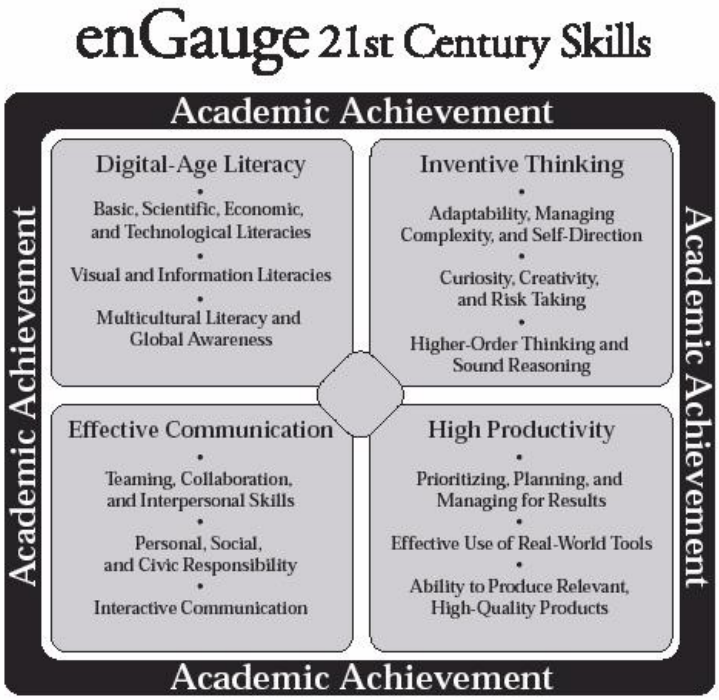

Figure 3 enGauge 21st Century Skills

Note. Lemke, Coughlin, and Thadani . engauge 21st Century Skills: Digital Literacies for a Digital Age. Commissioned by the North Central Regional Educational Laboratory. Printed with permission.

The first set of skills needed in the Digital Age according to Lemke (2003) is digital-age literacy. These skills include: basic literacy; scientific literacy; economic literacy; technological literacy; visual literacy; information literacy; multicultural literacy; and global awareness. Each person must have a basic understanding and knowledge of language, science, economics, technology, and communication. He or she

must also be able to analyze information, recognize that there are many cultures interacting within our culture, and develop an understanding of the interrelationships between individuals across the globe.

e*nGauge* (2003) identifies the second group of skills as inventive thinking skills that encompass the following life skills: adaptability and managing complexity, self-direction, curiosity, creativity, risk-taking, and higher-order thinking and sound reasoning. Students must be able to adjust and manage the complexities of life, set measurable goals, and seek to learn about the things that interest them. Lemke (2003) addresses students' ability to be creative, take risks when necessary, and be able to solve complex problems through the process of cognitive reasoning.

Lemke (2003) illustrates that the third skill set speaks to effective communication. This set of skills includes: teaming and collaboration, interpersonal skills, personal responsibility, social and civic responsibility, and interactive communication. Individuals must be able to interact and work cooperatively with other people and to take responsibility for their own actions.

The final skill cluster identified by *enGauge* (2003) is that of high productivity. Students need to be able to prioritize, plan, and manage for results; to effectively use real-world tools; and to produce relevant, high-quality products. They must be able to set goals and work toward accomplishing them; they must be able to collaborate and communicate using the latest technological tools; and they must be able to problem solve and make decisions when given real-world scenarios (Lemke, 2003).

According to the ACTE (2010) for a student to be considered "career ready," he or she needs to possess core academic skills, employability skills, and technical, job-

specific skills. Research shows that these are the necessary skills for careers that lead to wages that support a family and that offer avenues for advancement in a given career. Students must develop academic skills by mastering basic knowledge in core academic subjects such as math and language arts. To be considered "college ready" students must enter postsecondary education without having to enroll in remedial courses. Students must be able to take the knowledge and skills learned in academic courses and apply them to real-world situations. Because students spend their class time listening to teachers lecture as opposed to learning by doing, a large number of today's students are simply unable to apply the knowledge and skills learned. Career and technical education reinforces these skill sets through real-world applications and a variety of hands-on activities (Daggett, 2010).

In addition to basic academic skills, a student must possess employability skills such as being responsible, being flexible, being able to work in teams, having good communication skills, and being able to solve problems in a real-world context. For students to be prepared to enter a specific career area, they must possess some job-specific skills. ACTE (2010) points out that many careers require knowledge of specific technical skills and industry certifications to even be considered for entry-level positions.

21st Century Learning

ACTE advocates educational advancements that help prepare students, old and young, for thriving career opportunities. One of their main focuses is to ensure that students are equipped with the knowledge and skills necessary for the 21st century. The Partnership for 21st Century Skills has developed a framework for 21st century learning that incorporates student outcomes and the support systems necessary to produce those

student outcomes. The Framework for 21st Century Learning is included in Appendix D.

To better prepare today's student to be successful and competitive in the ever-changing global economy, the American educational system must focus more intently on 21st century readiness. This involves college, careers, and civic responsibility. Many CTE programs are already incorporating 21st century skills into their curriculums. Employers require a workforce that is fully equipped with skills beyond the basics of reading, writing, and arithmetic. This strategy includes the "4 Cs of critical thinking and problem solving, communication, collaboration, and creativity and innovation skills" (Bray, Green, & Kay, 2010, p. 9). According to the Association for Career and Technical Education (2010) many students simply do not possess the skills necessary to be successful past high school.

The Partnership for 21st Century Skills further maintains that K-12 education must look at ways to better prepare students for the 21st century. Students need to be prepared for lifelong learning and earning. This goal can be achieved by combining challenging academic standards with employability and technical skills in CTE programs (ACTE, 2010). Through collaborative alliances with postsecondary education and business and industry, many CTE competencies are aligned with workforce demands and incorporate 21st century skills. According to a 2010 ACT survey, "only one in four high school seniors, at best, are college-ready" (Bray et al., 2010, p. 10)

Summary

CTE is an integral component of the student success equation. It provides students with the knowledge and skills needed for the 21st century and is an essential part

of the American economy. CTE education links secondary to postsecondary by increasing student engagement, both through integration of key academic skills and by meeting the demands of employers and the economy.

CHAPTER 3

RESEARCH DESIGN AND MEHTODOLOGY

Overview

This chapter presented the methodology of the study. The purpose of this quantitative study was to determine if the number of high school CTE graduates who proceed to employment, military, or postsecondary education was significant when compared to the state baseline for secondary placement. In this study the researcher also sought to determine if there were significant differences in the graduation rate for CTE concentrators and the overall graduation rate for the selected school systems. Further analysis was done to determine if a relationship existed between CTE concentrators in regard to male and female concentrators. Furthermore, to note any significant differences, the study compared the CTE graduation rate for the eight school districts to the overall CTE graduation rate for Tennessee students and to the overall graduation rate for all Tennessee students.

Research Questions and Null Hypotheses

1. Is the number of high school CTE graduates who are secondarily placed significantly different from the expected number as based on the state baseline for the school years 2007-2008 and 2008-2009?

$Ho1_1$: There is no significant difference in the number of high school CTE graduates who are secondarily placed when compared to the expected number as based on the state baseline for the school year 2007-2008.

$Ho1_2$: There is no significant difference in the number of high school CTE graduates who are secondarily placed when compared to the expected number as based on the state baseline for the school year 2008-2009.

2. Is there a significant difference in the CTE graduation rate and the overall graduation rate for the eight selected school districts in the upper east Tennessee region for school years 2007-2008 and 2008-2009?

$Ho2_1$: There is no significant difference in the CTE graduation rate and the overall graduation rate for the eight selected school districts in the upper east Tennessee region for school year 2007-2008.

$Ho2_2$: There is no significant difference in the CTE graduation rate and the overall graduation rate for the eight selected school districts in the upper east Tennessee region for school year 2008-2009.

3. Is there a significant difference in the CTE graduation rate between male and female students for the eight selected school districts in the upper east Tennessee region for school years 2007-2008 and 2008-2009?

$Ho3_1$: There is no significant difference in the CTE graduation rate between male and female students for the eight selected school districts in the upper east Tennessee region for school year 2007-2008.

$Ho3_2$: There is no significant difference in the CTE graduation rate between male and female students for the eight selected school districts in the upper east Tennessee region for school year 2008-2009.

4. Is there a significant difference in the CTE graduation rate for the eight selected school districts in the upper east Tennessee region and the overall CTE graduation rate for Tennessee students for school years 2007-2008 and 2008-2009?

$Ho4_1$: There is no significant difference in the CTE graduation rate for the eight selected school districts in the upper east Tennessee region and the overall CTE graduation rate for Tennessee students for school year 2007-2008.

$Ho4_2$: There is no significant difference in the CTE graduation rate for the eight selected school districts in the upper east Tennessee region and the overall CTE graduation rate for Tennessee students for school year 2008-2009.

5. Is there a significant difference in the CTE graduation rate for the eight selected school districts in the upper east Tennessee region and the overall graduation rate for all Tennessee students for school years 2007-2008 and 2008-2009?

$Ho5_1$: There is no significant difference in the CTE graduation rate for the eight selected school districts in the upper east Tennessee region and the overall graduation rate for all Tennessee students for school year 2007-2008.

$Ho5_2$: There is no significant difference in the CTE graduation rate for the eight selected school districts in the upper east Tennessee region and the overall graduation rate for all Tennessee students for school year 2008-2009.

Research Design

This quantitative study was designed to determine if the number of CTE concentrators who go on to employment, military service, or postsecondary education was significant when compared to the state baseline for secondary placement. Furthermore, this study was designed to compare the CTE graduation rates to the overall

graduation rates for the eight selected school districts in the upper east Tennessee region to determine if there were significant differences. Additional tests were conducted to determine if there were significant differences between male and female CTE graduates, between the CTE graduation rates for the sample of school districts used in the study and the overall CTE graduation rates for Tennessee, and between the CTE graduation rates for the sample of school districts and the overall graduation rates for all Tennessee students for the selected school years. The study was conducted using secondary data that was available on the Tennessee Department of Education Report Card. The data were obtained through the use of each school's State Report Card by using attendance and graduation data and Career and Technical Education data.

Barrett (as cited in McMillan & Schumacher, 2010) proposed five reasons for relying on secondary data. Researchers may take advantage of using secondary data because it can cut down on the amount of time required to collect primary data: (1) It can cut out the cost of collecting primary data; (2) It provides a more reputable set of data that are reliable and valid when estimating population means; (3) It provides a larger sample size for the research that adds more credibility and reliability to the findings; (4) It is much easier to work with because the databases are available to the public; and (5) It generally does not require IRB review and approval.

The main concerns for any research study are validity and reliability. It is important that the research measures what it is intended to measure and that the results are truthful and real. This ensures the validity of the study. To ensure reliability, or consistency of results, the study should render the same results if it were repeated by other researchers under the same conditions (McMillan & Schumacher, 2010). Because

this study used secondary data and a large sample size, it made the validity of this study stronger. Likewise, because the data are compiled from a secondary database that is available to the public, it increased the reliability of the study.

Participants

Participants in this study were CTE concentrators from eight similar school districts in the upper east Tennessee region who provided follow-up data and graduation rates for their CTE graduates. The data provided to the State Department of Education - CTE Division on an annual basis determine if each school meets its negotiated performance level for each core indicator of performance. This study used core indicator 5S1, Secondary Placement and core indicator 4S1, Student Graduation Rates. Core indicator 4S1, Student Graduation Rates, and 5S1, Secondary Placement, addressed Research Question #1. For this question, the data for one school from each school system were used. Five of the school systems used in the study only had one high school within their school system and the remaining three school systems had four and two high schools. For the three school systems with more than one high school, the participants were randomly selected for the purposes of Research Question #1. Core indicator 4S1, Student Graduation Rates, addressed Research Questions #2, #3, #4 and #5.

To assure anonymity, pseudonyms were selected for each school system represented in the study. The school districts in the study are referred to as District 1, 2, 3, 4, 5, 6, 7, and 8. Likewise, the districts were not ranked in any particular order. The data used for Research Question #1 were available from each school system's Report Card under the Career-Technical Education tab. The data for Research Questions #2, #3, #4 and #5 were available from each school system's Report Card - graduation and

attendance tab and the Career-Technical Education tab. Generally, research that involves the study of existing data does not require the subjects' informed consent (McMillan & Schumacher, 2010).

The Institutional Review Board (IRB) is the professional panel responsible for approving studies that involve human subjects. This study falls into the category of an exempt study, which is a study requiring some review but is not subject to all federal guidelines. Use of an existing database is one of the categories that falls under this type of study (McMillan & Schumacher, 2010). After receiving notice from the ETSU IRB office that this study did not require review and approval, the data collection process began.

Data Collection Procedures

All CTE programs that receive Perkins IV funding must report specific data to the State Department of Education on an annual basis. The CTE Director reports explicit information that is used to determine if each school and/or school district meets its core indicators of performance each school year. Each school district has a negotiated performance level and a state baseline whereby it is evaluated on its performance. Each CTE instructor manually inputs his or her students' proficiency level on state standards into the State database, *eTiger*, and the CTE Director verifies that the data are correct before electronically submitting them to the State Department of Education.

The specific data used for Research Question #1 of this study were the secondary placement data for CTE concentrators. All CTE concentrators who graduate each school year are tracked for the following year after they leave high school. Participants are mailed a survey that provides the opportunity to mark the appropriate category. They

have the choice to mark whether or not they are enrolled in postsecondary education including any technical or specialized training program; whether or not they are in the military; or whether or not they are employed. If the survey is not returned within a specified period of time, two attempts via phone calls are made to determine the status of the student.

The data were available through each school system's Report Card under the Career and Technical Education tab, specifically looking at 5S1, Secondary Placement. The data for a sample of schools from the eight selected school districts in the upper east Tennessee region for 2 consecutive school years, 2007-2008 and 2008-2009, were used.

The subjects for the study were selected using nonprobability sampling methods. This tends to be the most common form of sampling for educational purposes. Instead of using any type of selection process from the population, subjects are chosen based on a specific set of characteristics or those who are easily accessible. For this study purposeful sampling of those subjects with certain characteristics was employed to include subjects who would be representative of the research topic (McMillan & Schumacher, 2010). To be specific, this study focused on CTE concentrators who graduated from high school and included all subjects based on their educational or employment status since high school: postsecondary, military, or employed. Therefore, the study included schools with similar economic and social characteristics and that provide follow-up data to the SDE on their CTE graduates.

The specific data used for Research Question #2, #3, #4 and #5 of this study were the overall graduation rates for each school district; the CTE graduation rates for each school district; male and female CTE graduation rates; the overall CTE graduation rate

for Tennessee; and the overall graduation rate for all Tennessee students. These data are available through the Report Card and the Career and Technical Education tab. The data for each of the eight school districts in the upper east Tennessee area for two consecutive years, 2007-2008 and 2008-2009 were used.

Data Analysis

A series of one-sample chi-square tests was employed to analyze the data for this study. McMillan and Schumacher (2010) identify the chi-square nonparametric procedure as a common one that is used when the researcher has nominal data and is looking to determine relationships that may exist between categories. This statistical test measures the frequencies of observations in specific categories by comparing the observed, reported, frequencies with expected, theoretical, frequencies.

Research Question #1 was addressed by using a sample of schools that were pulled out from the eight selected school districts in the upper east Tennessee region for school years 2007-2008 and 2008-2009 to evaluate the data. Out of the eight school districts used in this study, five of the school districts only had one high school in the school district. The remaining three school districts included two with four high schools and one with two high schools. Therefore, the five school districts with only one high school were represented along with one high school chosen from each of the remaining three school districts. A request was made to the TDOE data specialist for the specific data for the sample schools, and the data were transmitted on an Excel spreadsheet via email with the follow-up information requested. The data were not inclusive of any student names, student numbers, or other identifying information. Generally, research that involves the study of existing data does not require the subjects' informed consent

(McMillan & Schumacher, 2010). The spreadsheet included the school year, the district name and district number, the school name and school number, and three columns – postsecondary, military, and employed. For each of the three columns, a "1" or a "0" was indicated. A "1" being representative of a student that was identified in that particular category, and a "0" being representative of a student that was not identified in that particular category.

The data from the spreadsheet were analyzed by summing the number of CTE graduates who were marked in postsecondary, military, or employed. It is important to note that there were overlaps in the students' status. For example, a student could be enrolled in postsecondary education and working at the same time or a student may be in the military and taking some postsecondary courses as well. If a student was counted in more than one category, it would skew the actual number of students in the population of the data. Therefore, it was necessary to determine which category would take priority for the data analysis. If a student was marked in more than one category, postsecondary education was counted as the primary category.

A "zero" in any category indicates that a student is not placed or not located. Each school system may have difficulty locating every student listed on the follow-up report. Likewise, a student may be located but may not be participating in any of the follow-up categories. These students are considered not placed. After the totals for each of the three categories were computed, a colleague math instructor verified the computations for each school selected for each school year.

For Research Question #1, the observations were secondary placement for a sample of eight schools from the eight selected school systems. One school was selected

from each of the eight school systems represented in the study. The observed score for each of the eight schools came from the spreadsheet sent by the data specialist. The observed score for each school district was listed on the State Report Card CTE section for Secondary Placement, 5S1. Performance indicator 5S1 is calculated as follows: actual numerator – the count of CTE concentrators who graduated in the reporting year and who were placed in postsecondary education or advanced training, in military service, or had employment within one year of graduation; actual denominator – the count of CTE concentrators who graduated in the same reporting year as numerator of 5S1. The expected score was the state baseline for this performance indicator, 87.22%. This was the overall state average for secondary placement. The state baseline was calculated by using the number of CTE graduates from Performance Indicator 4S1.

Research Questions #2, #3, #4, and #5 were addressed using data from the State Report Card graduation and attendance section and the CTE section for Student Graduation Rates, 4S1. Performance indicator 4S1 is calculated as follows: actual numerator – the count of CTE concentrators who graduated on time with a regular diploma in the reporting year; actual denominator – the count of CTE concentrators who were included in the State's computation of its graduation rate in the reporting year.

For Research Question #2, the observations were graduation rates between the different populations of CTE graduates and overall graduates for the eight selected school districts in the upper east Tennessee region. The data for this research question were analyzed by comparing the number of CTE graduates to the overall mean graduation rate for the eight selected school districts for school years 2007-2008 and 2008-2009. The

mean graduation rate for 2007-2008 was 86.19% and the mean graduation rate for 2008-2009 was 89.74%.

For Research Question #3, the observations were CTE graduation rates between male and female CTE concentrators for the eight selected school districts in the upper east Tennessee region. A one-sample chi-square test was conducted to assess whether there was a significant difference in the CTE graduation rate between male and female students for the eight selected school districts in the upper east Tennessee region for school year 2007-2008. The observed scores were based on the number of male and female CTE graduates for the eight school districts who were included in the 4S1 performance indicator calculations, Student Graduation Rates. A request was made to the TDOE data specialist for the specific data for the sample schools and the data were transmitted on an Excel spreadsheet via email with the breakdown of CTE graduates between male and female graduates for each school year. The data were not inclusive of any student names, student numbers, or other identifying information. The data for this research question were analyzed by comparing the total number of male and female CTE graduates from 4S1 and the overall mean number of male and female secondary students for the eight selected school districts for school years 2007-2008 and 2008-2009. The overall mean number of male secondary students was 652 for 2007-2008 and 617 for 2008-2009. Therefore, the chi-square analysis was based on the number of male students from each of the eight selected school districts in the upper east Tennessee region who were included in the breakdown of the 4S1 performance indicator, Student Graduation Rates.

For Research Question #4, the observations were the CTE graduation rate for the sample of school districts in the upper east Tennessee region and the overall state CTE graduation rate. The data for this research question were analyzed by comparing the total number of CTE graduates from 4S1 for the eight selected school districts and the state CTE graduation rate for school years 2007-2008 and 2008-2009. The state CTE graduation rate for 2007-2008 was 84.40% and the state CTE graduation rate for 2008-2009 was 90.95%.

For Research Question #5, the observations were the CTE graduation rate for the sample of school districts and the overall graduation rate for all students in Tennessee. The data for this research question were analyzed by comparing the total number of CTE graduates from 4S1 for the eight selected school districts and the overall graduation rates for all students in Tennessee for school years 2007-2008 and 2008-2009. The overall graduation rate for all students in Tennessee for 2007-2008 was 82.20% and the overall graduation rate for all students in Tennessee for 2008-2009 was 83.20%.

CHAPTER 4

DATA ANALYSIS

Introduction

This chapter provides a demographic profile of overall students as compared to CTE students for each of the school districts represented in the study. Each table provides a breakdown of gender, ethnicity, and socioeconomic status. The demographic information used in this study is available from the Tennessee Department of Education Report Card for 2008 and 2009. Participants in this study were CTE concentrators from eight similar school districts in the upper east Tennessee region. The number of CTE graduates for 2007-2008 was 1,207 and the number for 2008-2009 was 1,165. These data are available from Performance Indicator, 4S1, Student Graduation Rates, from the CTE Report Card for 2008 and 2009. This chapter also presents the research questions and null hypotheses for the study. For each research question, a brief analysis of the statistical findings is provided as well.

Demographics

District 1

District 1 serves grades 9-12 with total enrollment of 1,869 and 1,737, respectively, for 2008 and 2009. The total CTE enrollment was 1,514 and 1,429, respectively. Table 1 and Table 2 show demographic information for district 1 for 2008 and 2009.

Table 1 2008 Demographic Information for District 1

STUDENT ENROLLMENT				
	Total 9-12 HS Students	%	9-12 CTE Students	%
Male	984	52.65	809	53.44
Female	885	47.35	705	46.57
White	1,839	98.40	1,482	97.89
Hispanic	16	.86	11	.73
Asian/Pacific Islander	5	.27	5	.33
African American	8	.43	6	.40
Native American/Alaskan	1	.05	0	.00
Unknown/Other	0	.00	0	.00

Table 2 2009 Demographic Information for District 1

STUDENT ENROLLMENT				
	Total 9-12 HS Students	%	9-12 CTE Students	%
Male	919	52.91	766	53.60
Female	818	47.09	663	46.40
White	1,707	98.27	1,408	98.53
Hispanic	18	1.04	12	.84
Asian/Pacific Islander	4	.23	2	.14
African American	7	.40	5	.35
Native American/Alaskan	1	.06	2	.14
Unknown/Other	0	.00	0	.00

District 2

District 2 serves grades 9-12 with total enrollment of 4,107 and 3,843, respectively, for 2008 and 2009. The total CTE enrollment was 2,914 and 2,801, respectively. Table 3 and Table 4 show demographic information for district 2 for 2008 and 2009.

Table 3 2008 Demographic Information for District 2

STUDENT ENROLLMENT				
	Total 9-12 HS Students	%	9-12 CTE Students	%
Male	2,134	51.96	1,523	52.27
Female	1,973	48.04	1,390	47.70
White	4,053	98.69	2,800	96.09
Hispanic	18	.44	14	.48
Asian/Pacific Islander	16	.39	11	.38
African American	10	.24	9	.31
Native American/Alaskan	10	.24	5	.17
Unknown/Other	0	.00	0	.00

Table 4 2009 Demographic Information for District 2

STUDENT ENROLLMENT				
	Total 9-12 HS Students	%	9-12 CTE Students	%
Male	2,016	52.46	1,497	53.45
Female	1,827	47.54	1,304	46.56
White	3,787	98.54	2,761	98.57
Hispanic	20	.52	17	.61
Asian/Pacific Islander	10	.26	7	.25
African American	15	.39	11	.39
Native American/Alaskan	11	.29	6	.21
Unknown/Other	0	.00	0	.00

District 3

District 3 serves grades 9-12 with total enrollment of 3,417 and 3,031, respectively, for 2008 and 2009. The total CTE enrollment was 2,202 and 2,125, respectively. Table 5 and Table 6 show demographic information for district 3 for 2008 and 2009.

Table 5 2008 Demographic Information for District 3

STUDENT ENROLLMENT				
	Total 9-12 HS Students	%	9-12 CTE Students	%
Male	1,750	51.22	1,188	53.95
Female	1,667	48.79	1,014	46.05
White	3,278	95.93	2,044	92.83
Hispanic	61	1.79	40	1.82
Asian/Pacific Islander	19	.56	7	.32
African American	51	1.49	16	.73
Native American/Alaskan	8	.23	3	.14
Unknown/Other	0	.00	3	.14

Table 6 2009 Demographic Information for District 3

STUDENT ENROLLMENT				
	Total 9-12 HS Students	%	9-12 CTE Students	%
Male	1,566	51.67	1,143	53.79
Female	1,465	48.33	982	46.21
White	2,897	95.58	2,040	96.00
Hispanic	67	2.21	43	2.02
Asian/Pacific Islander	18	.59	11	.52
African American	38	1.25	23	1.08
Native American/Alaskan	11	.36	8	.38
Unknown/Other	0	.00	1	.05

District 4

District 4 serves grades 9-12 with total enrollment of 934 and 752, respectively, for 2008 and 2009. The total CTE enrollment was 566 and 496, respectively. Table 7 and Table 8 show demographic information for district 4 for 2008 and 2009.

Table 7 2008 Demographic Information for District 4

STUDENT ENROLLMENT				
	Total 9-12 HS Students	%	9-12 CTE Students	%
Male	476	50.96	314	55.48
Female	458	49.04	252	44.52
White	884	94.65	539	95.23
Hispanic	42	4.50	21	3.71
Asian/Pacific Islander	1	.11	0	.00
African American	4	.43	1	.18
Native American/Alaskan	3	.32	1	.18
Unknown/Other	0	.00	0	.00

Table 8 2009 Demographic Information for District 4

STUDENT ENROLLMENT				
	Total 9-12 HS Students	%	9-12 CTE Students	%
Male	369	49.07	259	52.22
Female	383	50.93	237	47.78
White	710	94.42	473	95.36
Hispanic	36	4.79	19	3.83
Asian/Pacific Islander	2	.27	0	.00
African American	4	.53	3	.61
Native American/Alaskan	0	.00	1	.20
Unknown/Other	0	.00	0	.00

District 5

District 5 serves grades 9-12 with total enrollment of 745 and 745, respectively, for 2008 and 2009. The total CTE enrollment was 575 and 670, respectively. Table 9 and Table 10 show demographic information for district 5 for 2008 and 2009.

Table 9 2008 Demographic Information for District 5

STUDENT ENROLLMENT				
	Total 9-12 HS Students	%	9-12 CTE Students	%
Male	394	52.89	324	56.35
Female	351	47.11	251	43.65
White	726	97.45	561	97.57
Hispanic	11	1.48	6	1.04
Asian/Pacific Islander	1	.13	0	.00
African American	3	.40	3	.52
Native American/Alaskan	4	.54	3	.52
Unknown/Other	0	.00	0	.00

Table 10 2009 Demographic Information for District 5

STUDENT ENROLLMENT				
	Total 9-12 HS Students	%	9-12 CTE Students	%
Male	405	54.36	371	55.37
Female	340	45.64	299	44.63
White	726	97.45	656	97.91
Hispanic	10	1.34	7	1.05
Asian/Pacific Islander	1	.13	1	.15
African American	4	.54	1	.15
Native American/Alaskan	4	.54	1	.15
Unknown/Other	0	.00	0	.00

District 6

District 6 serves grades 9-12 with total enrollment of 2,619 and 2,186, respectively, for 2008 and 2009. The total CTE enrollment was 1,353 and 1,348, respectively. Table 11 and Table 12 show demographic information for district 6 for 2008 and 2009.

Table 11 2008 Demographic Information for District 6

STUDENT ENROLLMENT				
	Total 9-12 HS Students	%	9-12 CTE Students	%
Male	1,366	52.16	717	52.99
Female	1,253	47.84	636	47.01
White	2,137	81.60	995	73.54
Hispanic	102	3.90	49	3.62
Asian/Pacific Islander	56	2.14	31	2.29
African American	322	12.30	171	12.64
Native American/Alaskan	2	.08	3	.22
Unknown/Other	0	.00	5	.37

Table 12 2009 Demographic Information for District 6

STUDENT ENROLLMENT				
	Total 9-12 HS Students	%	9-12 CTE Students	%
Male	1,162	53.16	723	53.64
Female	1,024	46.84	625	46.37
White	1,782	81.52	1,021	75.74
Hispanic	87	3.98	58	4.30
Asian/Pacific Islander	45	2.06	19	1.41
African American	269	12.31	162	12.02
Native American/Alaskan	3	.14	3	.22
Unknown/Other	0	.00	1	.07

District 7

District 7 serves grades 9-12 with total enrollment of 744 and 759, respectively, for 2008 and 2009. The total CTE enrollment was 520 and 635, respectively. Table 13 and Table 14 show demographic information for district 7 for 2008 and 2009.

Table 13 2008 Demographic Information for District 7

STUDENT ENROLLMENT				
	Total 9-12 HS Students	%	9-12 CTE Students	%
Male	378	50.81	279	53.65
Female	366	49.19	241	46.35
White	699	93.95	453	87.12
Hispanic	6	.81	5	.96
Asian/Pacific Islander	8	1.08	3	.58
African American	29	3.90	22	4.23
Native American/Alaskan	2	.27	3	.58
Unknown/Other	0	.00	2	.39

Table 14 2009 Demographic Information for District 7

STUDENT ENROLLMENT				
	Total 9-12 HS Students	%	9-12 CTE Students	%
Male	380	50.07	313	49.29
Female	379	49.93	322	50.71
White	713	93.94	596	93.86
Hispanic	9	1.19	7	1.10
Asian/Pacific Islander	6	.79	3	.47
African American	28	3.69	22	3.47
Native American/Alaskan	3	.40	3	.47
Unknown/Other	0	.00	0	.00

District 8

District 8 serves grades 9-12 with total enrollment of 1,368 and 1,327, respectively, for 2008 and 2009. The total CTE enrollment was 828 and 694, respectively. Table 15 and Table 16 show demographic information for district 8 for 2008 and 2009.

Table 15 2008 Demographic Information for District 8

STUDENT ENROLLMENT				
	Total 9-12 HS Students	%	9-12 CTE Students	%
Male	697	50.95	450	54.35
Female	671	49.05	378	45.65
White	1,260	92.11	751	90.70
Hispanic	22	1.61	12	1.45
Asian/Pacific Islander	13	.95	10	1.21
African American	66	4.83	41	4.95
Native American/Alaskan	7	.51	3	.36
Unknown/Other	0	.00	0	.00

Table 16 2009 Demographic Information for District 8

STUDENT ENROLLMENT				
	Total 9-12 HS Students	%	9-12 CTE Students	%
Male	681	51.32	363	52.31
Female	646	48.68	331	47.70
White	1,210	91.18	609	87.75
Hispanic	17	1.28	6	.87
Asian/Pacific Islander	12	.90	6	.87
African American	84	6.33	49	7.06
Native American/Alaskan	4	.30	1	.14
Unknown/Other	0	.00	2	.29

Research Question 1

Is the number of high school CTE graduates who are secondarily placed significantly different from the expected number as based on the state baseline for the school years 2007-2008 and 2008-2009?

$Ho1_1$: There is no significant difference in the number of high school CTE graduates who are secondarily placed when compared to the expected number as based on the state baseline for school year 2007-2008.

A one-sample chi-square test was conducted to assess whether the number of high school CTE graduates who were secondarily placed was significant when compared to the expected number as based on the state baseline for school year 2007-2008. The expected scores for secondary placement were calculated based on the state baseline score of 87.22% and the observed scores were based on the number of CTE graduates who were included in the 4S1 performance indicator calculations, Student Graduation Rates. The results of the test were significant, $\chi^2(1, n = 712) = 33.082, p < .001$. Therefore, the null hypothesis was rejected. The proportion of high school CTE graduates who were secondarily placed was significantly greater than the hypothesized proportion as based on the state baseline. The observed and expected frequencies for the number of CTE graduates who were secondarily placed when compared to the state baseline for the eight selected school districts for 2007-2008 were compared. The comparison yielded a total sample size of 712 with observed scores of 673 placed and 39 not placed as compared to expected scores of 622 placed and 90 not placed.

$Ho1_2$: There is no significant difference in the number of high school CTE graduates who are secondarily placed when compared to the expected number as based on the state baseline for school year 2008-2009.

A one-sample chi-square test was conducted to assess whether the number of high school CTE graduates who were secondarily placed was significant when compared to the expected number as based on the state baseline for school year 2008-2009. The expected scores for secondary placement were calculated based on the state baseline score of 87.22% and the observed scores were based on the number of CTE graduates who were included in the 4S1 performance indicator calculations, Student Graduation Rates. The results of the test were not significant, $\chi^2(1, n = 706) = .6239, p > .05$. Therefore, the null hypothesis was retained. The proportion of high school CTE graduates who were secondarily placed was not significantly different from the hypothesized proportion as based on the state baseline. The observed and expected frequencies for the number of CTE graduates who were secondarily placed when compared to the state baseline for the eight selected school districts for 2008-2009 were compared. The comparison yielded a total sample size of 706 with observed scores of 623 placed and 83 not placed as compared to expected scores of 616 placed and 90 not placed.

Research Question 2

Is there a significant difference in the CTE graduation rate and the overall graduation rate for all students for the eight selected school districts in the upper east Tennessee region for the school years 2007-2008 and 2008-2009?

$Ho2_1$: There was no significant difference in the CTE graduation rate and the overall graduation rate for the eight selected school districts in the upper east Tennessee region for school year 2007-2008.

A one-sample chi-square test was conducted to assess whether the difference in the CTE graduation rate and the overall graduation rate for the eight selected school districts in the upper east Tennessee region was significant for school year 2007-2008. The observed scores were based on the number of CTE graduates for the eight school districts who were included in the 4S1 performance indicator calculations, Student Graduation Rates. The actual number of CTE graduates was 1207 and the number of non-CTE graduates was 139 for 4S1. The expected scores were calculated by using the mean overall graduate rate of 86.19% for the eight school districts. The results of the test were significant, $\chi^2(1, n = 1346) = 13.78, p < .001$. Therefore, the null hypothesis was rejected. The proportion of CTE graduates was significantly greater than the hypothesized proportion of overall graduates for the eight selected school districts in the upper east Tennessee region. The observed and expected frequencies for the graduation rate for CTE graduates and overall graduates for the eight selected school districts for 2007-2008 were compared. The comparison yielded a total sample size of 1,346 with observed scores of 1,207 CTE graduates and 139 non-CTE graduates as compared to expected scores of 1,160 CTE graduates and 186 non-CTE graduates.

$Ho2_2$: There is no significant difference in the CTE graduation rate and the overall graduation rate for the eight selected school districts in the upper east Tennessee region for school year 2008-2009.

A one-sample chi-square test was conducted to assess whether the difference in the CTE graduation rate and the overall graduation rate for the eight selected school districts in the upper east Tennessee region was significant for school year 2008-2009. The observed scores were based on the number of CTE graduates for the eight school districts who were included in the 4S1 performance indicator calculations, Student Graduation Rates. The actual number of CTE graduates was 1165 and the number of non-CTE graduates was 130 for 4S1. The expected scores were calculated by using the mean overall graduate rate of 89.74% for the eight school districts. The results of the test were not significant, $\chi^2(1, n = 1295) = .0754, p > .05$. Therefore, the null hypothesis was retained. The proportion of CTE graduates was not significantly different from the hypothesized proportion of overall graduates for the eight selected school districts in the upper east Tennessee region. The observed and expected frequencies for the graduation rate for CTE graduates and overall graduates for the eight selected school districts for 2008-2009 were compared. The comparison yielded a total sample size of 1,295 with observed scores of 1,165 CTE graduates and 130 non-CTE graduates as compared to expected scores of 1,162 CTE graduates and 133 non-CTE graduates.

Research Question 3

Is there a significant difference in the CTE graduation rate between male and female students for the eight selected school districts in the upper east Tennessee region for school years 2007-2008 and 2008-2009?

$Ho3_1$: There is no significant difference in the CTE graduation rate between male and female students for the eight selected school districts in the upper east Tennessee region for school year 2007-2008.

A one-sample chi-square test was conducted to assess whether there was a significant difference in the CTE graduation rate between male and female students for the eight selected school districts in the upper east Tennessee region for school year 2007-2008. The observed scores were based on the number of male CTE graduates for the eight school districts who were included in the 4S1 performance indicator calculations, Student Graduation Rates. The actual number of CTE graduates was 1207 and the number of male CTE graduates was 663. The expected scores were calculated by using the mean number of male secondary students for the eight school districts which was 652. The results of the test were not significant, $\chi^2(1, n = 1207) = .4036, p > .05$. Therefore, the null hypothesis was retained. The proportion of male CTE graduates was not significantly greater than the hypothesized proportion of female CTE graduates for the eight selected school districts in the upper east Tennessee region. The observed and expected frequencies for the graduation rate for male CTE graduates and female CTE graduates for the eight selected school districts for 2007-2008 were compared. The comparison yielded a total sample size of 1,207 with observed scores of 663 male CTE graduates and 544 female CTE graduates as compared to expected scores of 652 male CTE graduates and 555 female CTE graduates.

$Ho3_2$: There is no significant difference in the CTE graduation rate between male and female students for the eight selected school districts in the upper east Tennessee region for school year 2008-2009.

A one-sample chi-square test was conducted to assess whether there was a significant difference in the CTE graduation rate between male and female students for the eight selected school districts in the upper east Tennessee region for school year

2008-2009. . The observed scores were based on the number of male CTE graduates for the eight school districts who were included in the 4S1 performance indicator calculations, Student Graduation Rates. The actual number of CTE graduates was 1165 and the number of male CTE graduates was 657. The expected scores were calculated by using the mean number of male secondary students for the eight school districts which was 617. The results of the test were significant, $\chi^2(1, n = 1165) = 5.5132, p < .05$. Therefore, the null hypothesis was rejected. The proportion of male CTE graduates was significantly greater than the hypothesized proportion of female CTE graduates for the eight selected school districts in the upper east Tennessee region. The observed and expected frequencies for the graduation rate for male CTE graduates and female CTE graduates for the eight selected school districts for 2008-2009 were compared. The comparison yielded a total sample size of 1,165 with observed scores of 657 male CTE graduates and 508 female CTE graduates as compared to expected scores of 617 male CTE graduates and 548 female CTE graduates.

Research Question 4

Is there a significant difference in the CTE graduation rate for the eight selected school districts in the upper east Tennessee region and the overall CTE graduation rate for Tennessee students for school years 2007-2008 and 2008-2009?

$Ho4_1$: There is no significant difference in the CTE graduation rate for the eight selected school districts in the upper east Tennessee region and the overall CTE graduation rate for Tennessee students for school year 2007-2008.

A one-sample chi-square test was conducted to assess whether the difference in the CTE graduation rate for the eight selected school districts in the upper east Tennessee

region and the overall CTE graduation rate for Tennessee students was significant for school year 2007-2008. The observed scores were based on the number of CTE graduates for the eight school districts who were included in the 4S1 performance indicator calculations, Student Graduation Rates. The actual number of CTE graduates was 1207 and the number of non-CTE graduates was 139 for 4S1. The expected scores were calculated by using the mean overall CTE graduation rate for all Tennessee students of 84.40%. The results of the test were significant, $\chi^2(1, n = 1346) = 28.44, p < .001$. Therefore, the null hypothesis was rejected. The proportion of CTE graduates for the eight selected school districts in the upper east Tennessee region was significantly greater than the hypothesized proportion of overall CTE graduates for Tennessee. The observed and expected frequencies for the graduation rate for CTE graduates for the eight selected school districts and overall CTE graduates for Tennessee for 2007-2008 were compared. The comparison yielded a total sample size of 1,346 with observed scores of 1,207 CTE graduates and 139 non-CTE graduates as compared to expected scores of 1,136 CTE graduates and 210 non-CTE graduates.

$Ho4_2$: There is no significant difference in the CTE graduation rate for the eight selected school districts in the upper east Tennessee region and the overall CTE graduation rate for Tennessee students for school year 2008-2009.

A one-sample chi-square test was conducted to assess whether the difference in the CTE graduation rate for the eight selected school districts in the upper east Tennessee region and the overall CTE graduation rate for Tennessee students was significant for school year 2008-2009. The observed scores were based on the number of CTE graduates for the eight school districts who were included in the 4S1 performance

indicator calculations, Student Graduation Rates. The actual number of CTE graduates was 1165 and the number of non-CTE graduates was 130 for 4S1. The expected scores were calculated by using the mean overall CTE graduation rate for all Tennessee students of 90.95%. The results of the test were not significant, $\chi^2(1, n = 1295) = 1.588, p > .05$. Therefore, the null hypothesis was retained. The proportion of CTE graduates for the eight selected school districts in the upper east Tennessee region was not significantly different from the hypothesized proportion of overall CTE graduates for Tennessee. The observed and expected frequencies for the graduation rate for CTE graduates for the eight selected school districts and overall CTE graduates for Tennessee for 2008-2009 were compared. The comparison yielded a total sample size of 1,295 with observed scores of 1,165 CTE graduates and 130 non-CTE graduates as compared to expected scores of 1,178 CTE graduates and 117 non-CTE graduates.

Research Question 5

Is there a significant difference in the CTE graduation rate for the eight selected school districts in the upper east Tennessee region and the overall graduation rate for Tennessee students for school years 2007-2008 and 2008-2009?

$Ho5_1$: There is no significant difference in the CTE graduation rate for the eight selected school districts in the upper east Tennessee region and the overall graduation rate for Tennessee students for school year 2007-2008.

A one-sample chi-square test was conducted to assess whether the difference in the CTE graduation rate for the eight selected school districts in the upper east Tennessee region and the overall graduation rate for Tennessee students was significant for school year 2007-2008. The observed scores were based on the number of CTE graduates for

the eight school districts who were included in the 4S1 performance indicator calculations, Student Graduation Rates. The actual number of CTE graduates was 1207 and the number of non-CTE graduates was 139 for 4S1. The expected scores were calculated by using the mean overall state graduation rate for all Tennessee students of 82.20%. The results of the test were significant, $\chi^2(1, n = 1346) = 51.72, p < .001$. Therefore, the null hypothesis was rejected. The proportion of CTE graduates for the eight selected school districts in the upper east Tennessee region was significantly greater than the hypothesized proportion of overall graduates for Tennessee. The observed and expected frequencies for the graduation rate for CTE graduates for the eight selected school districts and overall graduates for Tennessee for 2007-2008 were compared. The comparison yielded a total sample size of 1,346 with observed scores of 1,207 CTE graduates and 139 non-CTE graduates as compared to expected scores of 1,106 CTE graduates and 240 non-CTE graduates.

$Ho5_2$: There is no significant difference in the CTE graduation rate for the eight selected school districts in the upper east Tennessee region and the overall graduation rate for Tennessee students for school year 2008-2009.

A one-sample chi-square test was conducted to assess whether the difference in the CTE graduation rate for the eight selected school districts in the upper east Tennessee region and the overall graduation rate for Tennessee students was significant for school year 2008-2009. The observed scores were based on the number of CTE graduates for the eight school districts who were included in the 4S1 performance indicator calculations, Student Graduation Rates. The actual number of CTE graduates was 1165 and the number of non-CTE graduates was 130 for 4S1. The expected scores were

calculated by using the mean overall state graduation rate for all Tennessee students of 83.20%. The results of the test were significant, $\chi^2(1, n = 1295) = 42.713, p < .001$. Therefore, the null hypothesis was rejected. The proportion of CTE graduates for the eight selected school districts in the upper east Tennessee region was significantly greater than the hypothesized proportion of overall graduates for Tennessee. The observed and expected frequencies for the graduation rate for CTE graduates for the eight selected school districts and overall graduates for Tennessee for 2008-2009 were compared. The comparison yielded a total sample size of 1,295 with observed scores of 1,165 CTE graduates and 130 non-CTE graduates as compared to expected scores of 1,077 CTE graduates and 218 non-CTE graduates.

CHAPTER 5

SUMMARY, CONCLUSIONS, IMPLICATIONS FOR PRACTICE, AND RECOMMENDATIONS FOR FUTURE RESEARCH

Chapter 5 contains the findings, conclusions, and recommendations for those readers who may use the findings to support the significance of CTE in the high school curriculum. Students, along with assistance from parents, counselors, administrators, and instructors, must choose a concentrated program of study upon entrance into high school. Career and Technical Education (CTE) is one of the programs of study available to students. The purpose of this quantitative study was to compare CTE graduation rates to overall graduation rates. Additional analysis was conducted on CTE graduation rates between male and female graduates. Furthermore, this study analyzed the number of CTE graduates who were secondarily placed when compared to the state baseline. The analyses for all research questions were conducted on a sample of eight school districts in the upper east Tennessee region for school years 2007-2008 and 2008-2009.

Summary of Findings

The statistical findings reported in this study were guided by the research questions presented in Chapter 1 and explained in Chapter 3. In Chapter 3, ten null hypotheses were presented for the five research questions included in this study. For Research Question 1, a one-sample chi-square test was conducted to compare the number of high school CTE graduates who were secondarily placed to the state baseline for the school years 2007-2008 and 2008-2009. For Research Question 2, a one-sample chi-square test was conducted to compare graduation rates for the CTE graduates and the

overall graduates for the selected sample school districts for the school years 2007-2008 and 2008-2009. For Research Question 3, a one-sample chi-square test was conducted to determine if there were significant differences in the CTE graduation rates between males and females for the selected sample school districts for the school years 2007-2008 and 2008-2009. For Research Question 4, a one-sample chi-square test was conducted to compare the CTE graduation rates for the selected sample school districts and the overall state CTE graduation rate for the school years 2007-2008 and 2008-2009. For Research Question 5, a one-sample chi-square test was conducted to compare the CTE graduation rates for the selected sample school districts and the overall state graduation rate for all Tennessee graduates for the school years 2007-2008 and 2008-2009.

The data for each research question were obtained from the TDOE data specialist and from each school district's TDOE Report Card and the CTE Report Card. The overall graduation rates for each school district were based on the attendance and graduation data that were reported to the TDOE for each school year. The CTE Secondary Placement and Graduation data were based on 4S1 and 5S1 data that were reported to the Tennessee Department of Education – CTE Division for each school year. For two research questions, a sample of schools was pulled out from the eight selected school districts in the upper east Tennessee region and analyzed for purposes of this study.

Conclusions

The following conclusions were based upon the findings from the data for this study:

1. The findings of this study supported claims made by Daggett (2002) that 67% of CTE graduates continue their education after graduation – either full-time or while working. These findings provided evidence that the number of CTE graduates who go on to postsecondary education, military, or workforce upon high school graduation exceeded the expected score set by the state. However, for school year 2008-2009, there was evidence that the number of high school CTE graduates who were secondarily placed when compared to the state baseline for the eight selected school districts was not significant at the .05 significance level.
2. A significant difference was found in the CTE graduation rate and the overall graduation rate for the eight selected school districts in the upper east Tennessee region for school year 2007-2008. These findings did not coincide with ACTE (2003) research which shows that one out of three students who start high school will not graduate within 4 years. ACTE points out that CTE plays an integral role in keeping these numbers to a minimum, and the findings of this research support that those students who graduate as CTE concentrators do graduate at a higher rate than a school district's overall graduates. However, for school year 2008-2009, there were no significant differences found between the CTE graduation rate and the overall graduation rate for the eight selected school districts in the upper east Tennessee region.

3. A significant difference was not found in the CTE graduation rates between male and female students for the eight selected school districts in the upper east Tennessee region for school year 2007-2008. However, for school year 2008-2009, a significant difference was found in the CTE graduation rate and the overall graduation rate between male and female students for the eight selected school districts in the upper east Tennessee region.
4. A significant difference was found between the CTE graduation rate for the eight selected school districts in the upper east Tennessee region and the overall CTE graduation rate for Tennessee students for school year 2007-2008. However, for school year 2008-2009, no significant differences were found between the CTE graduates from the eight selected school districts in the upper east Tennessee region and overall CTE graduates in Tennessee.
5. A significant difference was found in the CTE graduation rate for the eight selected school districts in the upper east Tennessee region and the overall graduation rate for all Tennessee students for school year 2007-2008. In their 2006 study, Bridgeland, et al cite research regarding national average graduation rates between 68% and 71%. The findings of this study show that Tennessee graduates graduate at a much higher rate than the national average and that CTE graduates help to keep that graduation rate up for many school districts. When the Tennessee Council on CTE (2010) compared graduation rates in Tennessee for 2005-2006, CTE graduates graduated at a rate of 91.51% compared to the state average graduation rate of 80.70%. This study further supports those differences. For 2007-2008, CTE graduates in Tennessee graduated at a rate of

84.40% as compared to the state overall graduation rate of 82.20%. Likewise, for 2008-2009, CTE graduates in Tennessee graduated at a rate of 90.95% as compared to the state overall graduation rate of 83.20%. Research shows that many states are reporting higher graduation rates for CTE concentrators than for their overall graduates. Lavender (2010) reports that North Carolina's CTE graduation rate for 2009 was 90% while the state graduation average was 71%. Likewise, Stonefield (2008) noted that Nevada CTE graduation rates for 2006 were 82.5% as opposed to the state graduation rate of 67.5%. Likewise, for school year 2008-2009, a significant difference was found between the CTE graduation rate for the eight selected school districts in the upper east Tennessee region and the overall graduation rate for all Tennessee students.

The findings of this study show evidence that graduates with a CTE concentration can improve a school district's overall graduation rate.

Recommendations for Practice

Results of this study indicate that there is a strong relationship between CTE graduates and secondary placement in terms of the number of students who proceed into postsecondary education, military, or employment upon high school graduation. The results also indicate that the CTE graduation rate is significantly different when compared to overall graduation rates. This factor has a positive effect on each school district's graduation rate for the purposes of meeting NCLB mandates. The results of this study support Harris's statement (as cited in Ainsworth et al., 2007) that CTE courses can have a positive impact on high school graduation rates, on enrollment at the postsecondary level, and on labor market forecasts. CTE programs of study tend to be attractive to those

students who are interested in a particular career path, thus, sparking the students' interests and keeping their motivation high to succeed in their chosen program of study. Therefore, it is recommended that guidance counselors, teachers, and administrators emphasis and encourage CTE programs of study to incoming freshmen in an effort to produce positive results in a higher graduation rate for the cohort 4 years later.

Recommendations for Future Research

Results of this study indicate that Career and Technical Education can have a positive impact on a school system's overall graduation rate. Additional research needs to be conducted to clarify the effectiveness of this impact. Recommendations for further quantitative research include comparing graduation rates between states. This study could also be replicated to compare Tennessee graduation rates to the national graduation rate. Further study that may validate the effectiveness of CTE programs may be to compare graduation rates within CTE program areas in order to determine if a specific program area has more of an impact on the graduation rates. Many states report the effectiveness of CTE programs in reducing the number of dropouts, so a study that compares the dropout rate between CTE graduates and overall graduates might substantiate the effectiveness of CTE programs of study in the current high school curriculum. A qualitative study could be conducted by interviewing administrators, teachers, students, parents, business people, and community members about their perceptions of Career and Technical Education.

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APPENDICES

Appendix A

National Career Clusters and Related POS

Cluster	Description	Programs of Study
Agriculture, Food & Natural Resources	*The production, processing, marketing, distribution, financing, and development of agricultural commodities and resources including food, fiber, wood products, natural resources, horticulture, and other plant and animal products/resources.*	* Agribusiness Food Products and Process Systems * Animal Systems-Pre-Veterinary * Animal Systems-Production Animals * Environmental and Natural Resources Systems * Plant Systems-Horticulture Production * Plant Systems-Turf Grass/Nursery Production * Power, Structures and Technical Systems
Architecture and Construction	*Careers in designing, planning, managing, building and maintaining the built environment.*	* Landscape Design * Interior Design * Design & Preconstruction * Construction Carpentry * Construction Electrical * Construction HVAC/R * Construction Masonry and Concrete * Construction Plumbing * Construction Welding
Arts, A/V Technology & Communication	*Designing, producing, exhibiting, performing, writing, and publishing multimedia content including visual and performing arts and design, journalism, and entertainment services.*	* Fashion Design * Audio Technology * Design Communications * Graphic Communications * Journalism and Broadcasting
Business, Management, and Administration	*Business Management and Administration careers encompass planning, organizing, directing and evaluating business functions essential to efficient and productive business operations. Business Management and Administration career opportunities are available in every sector of the economy.*	* Administrative and Information Support * Business Analysis * Business Financial Management and Accounting * Business Management * Human Resources * Marketing and Communications Development
Education and	*Planning, managing and providing*	* Teaching Training Services

Training	*education and training services, and related learning support services.*	* Pre K-Early Childhood Education * Teacher Training Services
Finance	*Planning services for financial and investment planning, banking, insurance, and business financial management.*	* Banking and Finance * Financial Planning
Government & Public Administration	*Executing governmental functions to include Governance; National Security; Foreign Service; Planning; Revenue and Taxation; Regulation; and Management and Administration at the local, state, and federal levels.*	* Public/Nonprofit Management and Administration * National Security
Health Science	*Planning, managing, and providing therapeutic services, diagnostic services, health informatics, support services, and biotechnology research and development.*	* Biotechnology Research and Development * Diagnostic Services * Health Informatics * Support Services * Therapeutic Services * Therapeutic Emergency Services
Hospitality & Tourism	*Hospitality & Tourism encompasses the management, marketing and operations of restaurants and other foodservices, lodging, attractions, recreation events and travel related services.*	* Food and Beverage Services * Hospitality Management and Lodging Services * Recreation, Attractions, Sports and Entertainment * Travel and Tourism
Human Services	*Preparing individuals for employment in career pathways that relate to families and human needs.*	* Consumer Services * Counseling and Mental Health Services * Early Childhood Development and Services * Family and Community Services * Nutritional Counseling * Personal Care Services
Information Technology	*Building Linkages in IT Occupations Framework; for entry level, technical, and professional careers related to the design, development, support and management of hardware, software, multimedia, and systems integration services.*	* Electronic Publishing * Interactive Multimedia * Networking Systems * Web Design
Law, Public Safety, Corrections &	*Planning, managing, and providing legal, public safety,*	* Security & Protective Services

Security	*protective services and homeland security, including professional and technical support services.*	* Law Enforcement Services
Manufacturing	*Planning, managing and performing the processing of materials into intermediate or final products and related professional technical support activities such as production planning and control, maintenance and manufacturing/process engineering.*	* Engineering * Precision Productions * Production Design * Operations & Maintenance
Marketing, Sales and Services	*Planning, managing, and performing marketing activities to reach organizational objectives.*	* Channel Management * Marketing Communication * Marketing Management * Marketing Research * Merchandising * Selling and Sales Management
Science, Technology, Engineering & Mathematics	*Planning, managing, and providing scientific research and professional and technical services (e.g., physical science, social science, engineering) including laboratory and testing services, and research and development services.*	* Engineering and Technology * Science & Mathematics
Transportation, Distribution, and Logistics	*Planning, management, and movement of people, materials, and goods by road, pipeline, air, rail and water and related professional and technical support services such as transportation infrastructure planning and management, logistics services, mobile equipment and facility maintenance.*	* Automotive Technology * Aviation Flight * Aviation Maintenance * Collision Repair Technology * Diesel Technology * Leisure Craft/Small Engine Technology

http://www.careerclusters.org

Appendix B

Tennessee CTE Competency Attainment Rubric

Tennessee Career & Technical Education	Tennessee Career and Technical Education • Competency Attainment Rubric			
	Advanced	Proficient	Basic	Below Basic
	4	3	2	1
Knowledge Attainment	Applies technical vocabulary and past knowledge to design solutions to complex problems.	Consistently demonstrates comprehension and use of technical vocabulary and content.	Demonstrates comprehension and use of foundational technical vocabulary and content.	Recognizes various technical terms and knowledge.
	Identifies and analyzes a problem, completes a project or research, and reports results/solutions.	Applies knowledge to new situations and to complete a relevant project.	Needs assistance in applying knowledge to complete a relevant project.	Requires detailed supervision to complete a relevant project.
Technical Skills	Consistently applies and synthesizes technical skills in authentic situations and extends skills to emerging technologies and problems.	Consistently applies technical skills and adapts to emerging technology.	Applies limited technical skills and demonstrates limited knowledge of emerging technology.	Requires assistance to apply technical skills and displays limited knowledge of technologies.
Problem Solving	Works independently and collaboratively to investigate a complex authentic problem using multiple resources; generates solutions to the problem using appropriate technology and data to provide evidence of reasoning.	Works independently and collaboratively in solving authentic problems and incorporates technology as appropriate.	Conducts observations, identifies patterns of events or behaviors, formulates simple inferences, and incorporates technology with assistance.	Describes a situation, condition, or issue using limited technical terminology. Uses technology with significant assistance.
	Identifies and analyzes complex or routine problems, prioritizes and implements multiple solutions, and evaluates the solutions' effectiveness.	Identifies and analyzes a routine problem, recommends and implements a solution, and evaluates the solution's effectiveness.	Identifies and analyzes a routine problem and implements a solution with occasional assistance.	Follows a set of uncomplicated/simple instructions.
Career Awareness	Demonstrates initiative in integrating information from diverse career-related resources for professional growth.	Identifies and uses various career-related resources (i.e., professional/student organizations, professional publications, occupational certifications, etc.).	Identifies some career-related resources (i.e., professional/student organizations, professional publications, occupational certifications, etc.).	Displays limited knowledge of career-related resources (i.e., professional/student organizations, professional publications, occupational certifications, etc.).
	Demonstrates/models occupational safety procedures.	Demonstrates/models occupational safety procedures.	Demonstrates/models occupational safety procedures.	Demonstrates/models occupational safety procedures.
	Demonstrates/models exemplary soft skills and applies professional practices in a career field related to ethical behavior and environmental and legal considerations in complex situations.	Demonstrates/models professional practices in a career field related to soft skills, ethical behavior, occupational safety, and environmental and legal considerations.	Identifies fundamental professional practices in a career field related to soft skills, ethical behavior, and environmental and legal considerations.	Has difficulty identifying fundamental professional practices in a career field related to soft skills, ethical behavior, and environmental and legal considerations.
Communication/ Literacy	Analyzes two selections for common themes and disparate elements. Communicates complex ideas and themes verbally. Constructs multiple paragraph/ page reports or texts that demonstrate a deep awareness of purpose and audience and provides supporting evidence.	Reads multiple technical materials and interprets to formulate logical, evidence-based conclusions and communicates findings in verbal, written, and visual formats.	Reads technical materials and summarizes in verbal, written, and visual formats providing some pertinent details.	Reads text and recalls in verbal, written, and visual formats with some assistance.

Tennessee Department of Education. Available at http://www.state.tn.us/education/cte/. Printed with permission.

Appendix C

Webb's Depth of Knowledge (DOK) Levels

DEPTH OF KNOWLEDGE LEVELS

(*The Depth of Knowledge is not determined by the verb, but the context in which the verb is used and the depth of thinking required.)*

Level 1: Recall and Reproduction

Requires recall of information, such as a fact, definition, term, or performance of a simple process or procedure. Answering a Level 1 item involves following a simple, well-known procedure or formula. Simple skills and abilities or recall characterize this level.

Level 1: Recall and Reproduction
Sample Activities

- ✓ Recall elements and details of story structure, such as sequence of events, character, plot and setting.
- ✓ Conduct basic mathematical calculations.
- ✓ Label locations on a map.
- ✓ Represent in words or diagrams a scientific concept or relationship.
- ✓ Perform routine procedures like measuring length or using punctuation marks correctly.
- ✓ Describe the features of a place or people.

Level 2: Skills/Concepts

Includes the engagement of some mental processing beyond recalling or reproducing a response. Items require students to make some decisions as to how to approach the question or problem. These actions imply more than one mental or cognitive process/step.

Level 2: Skills/Concepts
Sample Activities

- ✓ Identify and summarize the major events in a narrative.
- ✓ Use context cues to identify the meaning of unfamiliar words.
- ✓ Solve routine multiple-step problems.
- ✓ Describe the cause/effect of a particular event.
- ✓ Identify patterns in events or behavior.
- ✓ Formulate a routine problem given data and conditions.
- ✓ Organize, represent and interpret data.

Level 3: Strategic Thinking

Requires deep understanding as exhibited through planning, using evidence, and more demanding cognitive reasoning. The cognitive demands at this level are complex and abstract. An assessment item that has more than one possible answer and requires students to justify the response they give would most likely be a Level 3.

Level 3: Strategic Thinking
Sample Activities

- ✓ Support ideas with details and examples.
- ✓ Use voice appropriate to the purpose and audience.
- ✓ Identify research questions and design investigations for a scientific problem.
- ✓ Develop a scientific model for a complex situation.
- ✓ Determine the author's purpose and describe how it affects the interpretation of a reading selection.
- ✓ Apply a concept in other contexts.

Level 4: Extended Thinking

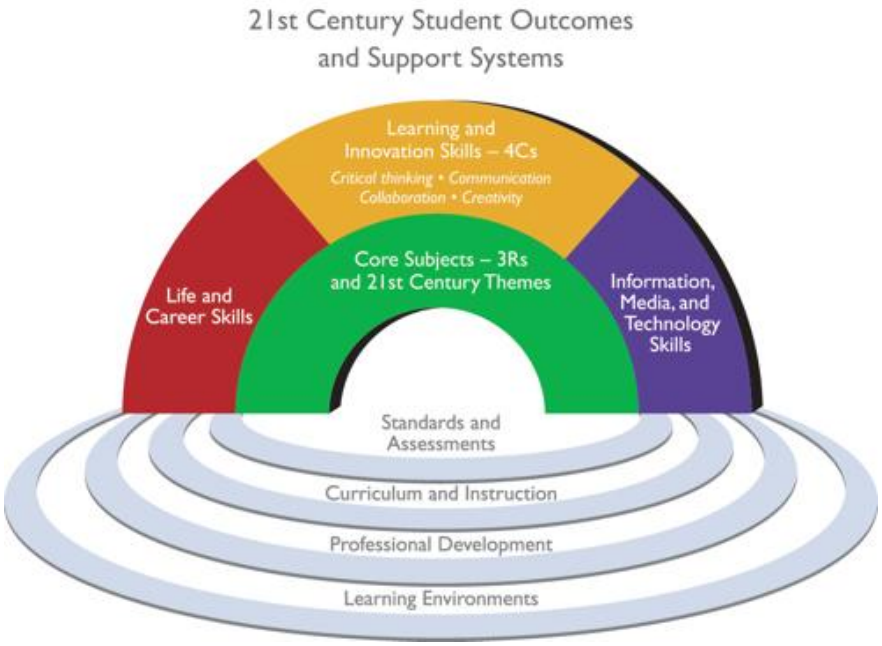
Requires high cognitive demand and is very complex. Students are expected to make connections - relate ideas within the content or among content areas – and have to select or devise one approach among many alternatives on how the situation can be solved. Due to the complexity of cognitive demand, this level often requires an extended period of time.

Level 4: Extended Thinking
Sample Activities

- ✓ Conduct a project that requires specifying a problem, designing and
- ✓ conducting an experiment, analyzing its data, and reporting results/ solutions.
- ✓ Apply mathematical model to illuminate a problem.
- ✓ Analyze and synthesize information from multiple sources.
- ✓ Describe and illustrate how common themes are found across texts from different cultures.
- ✓ Design a mathematical model to inform and solve a practical or abstract situation.

Webb, Norman L. Adapted from Webb's Depth of Knowledge (DOK) Levels. Printed with permission.

Appendix D



21ST CENTURY STUDENT OUTCOMES

Core Subjects-the 3Rs- and 21st Century Themes

- Global awareness
- Financial, economic, business and entrepreneurial literacy
- Civic literacy
- Health literacy
- Environmental literacy

Learning and Innovation Skills, including the 4 Cs:

- Critical thinking and problem solving
- Communication
- Collaboration
- Creativity and innovation

Information, Media and Technology Skills

- Information literacy
- Media literacy
- ICT (information, communications and technology) literacy

Life and Career Skills

- Flexibility and adaptability
- Initiative and self-direction
- Social and cross-cultural skills
- Productivity and accountability
- Leadership and responsibility

21ST CENTURY SUPPORT SYSTEMS

21st century standards

Assessments of 21st century skills

21st century curriculum and instruction

21st century professional development

21st century learning environment4Cs

Partnership for 21st Century Skills. Available at www.p21.org. Printed with permission.

VITA

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