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The Graduation Rates of Career and Technical Education (CTE) Concentrators in Tennessee

A dissertation

presented to

the faculty of the department of Educational Leadership and Policy Analysis

East Tennessee State University

In partial fulfillment

of the requirements for the degree

Doctor of Education

by

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May 2011

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Keywords: Career and Technical Education (CTE) Concentrators, Vocational Education,

Graduation Rates, AYP

ABSTRACT

The Graduation Rates of Career and Technical Education (CTE) Concentrators in Tennessee

by

Richard Ernest Shadden, Jr.

The purpose of this quantitative study was to compare high school graduation rates between Career and Technical Education (CTE) concentrators and non-CTE concentrators. School systems in the state of Tennessee that offered CTE courses for the 2007-2008 (120 systems) or 2008-2009 (118 systems) school years were used in this study. Fifteen northeast Tennessee systems were also examined to compare the graduation rates of CTE concentrators and non-CTE concentrators. The graduation rates of male and female CTE concentrators was also compared.

Research supported the notion that CTE concentrators could improve overall graduation rates for school systems, and female CTE concentrators on average graduate at a higher rate than male CTE concentrators. Five research questions guided this study, and data were analyzed using independent-samples *t* tests and one-samples *t* tests.

Results indicated that 12th-grade CTE concentrators had a higher graduation rate than non-CTE concentrators. The study further revealed that female CTE concentrators graduated at a significantly higher rate than male CTE concentrators. Findings suggested that CTE concentrators generally improved a school system's overall graduation rate.

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DEDICATION

This study is dedicated to my students. To my former high school students, thank you! You taught me more in 11 years than I ever taught you. I will always cherish the time that we spent together, the trips, the competitions, and the good times. Each of you hold a special place in my heart and always will. The sky is truly the limit on what you are capable of achieving.

To my future students, I am looking forward to the opportunity for us to learn together. I am sure that the experiences that we will share will be as valuable to me as my former years of teaching high school. I am looking forward to the teaching and learning opportunities.

ACKNOWLEDGEMENTS

I would first like to thank my family for the encouragement they have shown me during this process and throughout the many endeavors of my life.

I wish to express my sincere appreciation to the faculty of the Educational Leadership and Policy Analysis Department at East Tennessee State University. These individuals have inspired me to always be a lifelong learner. They have instilled within me the true value of educational leadership. They have allowed me the opportunity to learn through their commitment to the excellence of education.

I am especially appreciative of Dr. James Lampley, my dissertation chair, who continuously provided me with guidance, constructive feedback, and words of encouragement throughout this journey. He has provided great mentorship throughout this difficult process. Thank you for your patience and continuous guidance.

I also wish to express my appreciation to other members of my committee. To Dr. Pamela Scott, thank you for challenging me to think outside the box and for teaching me a new appreciation for reading. You have certainly been a pleasure to work with on every project that I have assisted you with. To Dr. Virginia Foley, thank you for sharing your wisdom as an educator and making the theory practical and useful for “real” educational settings and in helping me find my own role as an educational leader. I also wish to thank the cognate member of my committee, Dr. Jamie Kridler, who has allowed me to observe her love and passion for children of all ages, regardless of their shortfalls.

I am also grateful to my colleagues who have endeavored on the fellowship journey as well: Ginger Christian, Heather Moore, Philip Rotich, Scott Sawyer, and Lisa Speer. You are all

a great group of individuals, and I am grateful for your help. I appreciate your friendship and support, and I know that you will all accomplish many great things. The fellowship was a financial sacrifice, but well worth the lifelong friendships and experiences.

To Davina Maltsburger, our friend and fellow doctoral student who we tragically lost during this process, you are greatly missed.

Last and most importantly, I would like to thank God for many things, but in this case for allowing me the capabilities of enduring through this learning process.

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CHAPTER 1

INTRODUCTION

Increased demands are being placed on public schools throughout our nation to increase academic achievement in many areas of the educational realm. Not only are these requirements being placed on schools through state and federal mandates, but they are also being influenced by labor markets. For the past several years the demands for highly skilled workers has increased the growing importance for students to complete a high school education so that they become viable in today's competitive employment market. Without a high school diploma many young individuals are ill equipped to compete in the competitive workforce of the United States economy or to pursue a postsecondary education.

Like academic programs, Career and Technical Education (CTE) programs, formerly known as vocational education, are being challenged to include more rigorous content. CTE provides student engagement through hands-on curriculum and extracurricular activities. These extracurricular activities give students the opportunity to have a sense of belonging to the school, which may serve as an alternative to traditional academic programs in assisting systems in meeting increased graduation standards. In 2007 about one third of high school freshman failed to graduate, the U.S. ranked 10th in the world for high school completion, and U.S. leaders recognized the need for more rigorous demands to be placed on local systems to improve graduation numbers (ACTE, 2007). In an effort to improve the graduation rate of high school seniors Tennessee has set a benchmark that requires schools to meet a 90% graduation rate each year until 2014; this goal of increased graduation rates was implemented in part to meet the No

Child Left Behind (NCLB) mandates.

The accountability measure known as Adequate Yearly Progress (AYP) is a result of the federal NCLB mandate. Schools that do not meet AYP are considered at-risk and are deemed either a target or high priority district under the NCLB. According to the Tennessee Department of Education (2010a), districts not meeting the 90% graduation standard for a single year are considered target schools. If districts fail to meet AYP for a second consecutive year, they are labeled as a high priority system. Both target and high priority systems receive additional assistance from the state in an attempt to improve in the areas in which AYP was not met.

According to the U.S. Department of Education (2007) the nation's graduation rate for the past several decades has averaged 70%. Tennessee Department of Education Statistics reported that there were over 12,000 high school dropouts from the state of Tennessee in 2007 (D'Andrea, 2010). High school dropouts not only cost the individual lost wages, but also the state and nation as well. Richmond (2009) suggested that dropouts from the class of 2008 will earn \$319 billion less than graduates in wages in their lifetimes. High school dropouts are also more likely to commit crimes, be in poorer health, participate less in community and civic organizations, be absent from work more frequently, suffer more from layoffs, and require increased government assistance (Rumberger, 1987).

During the past 2 decades, there has been a shift in vocational education, in an attempt to prepare students for the workforce, to increase the rate of graduation from high school, and to increase preparedness for postsecondary education programs (Plank, DeLuca, & Estacion, 2005). Further review of the literature suggested that a high percentage of high school students are enrolled in CTE courses. In 2002 high school seniors across the nation took an average of 4.2

CTE credits, and in 2005, 96.6% of high school graduates received at least one credit in a CTE course (U.S. Department of Education National Center for Education Statistics, 2005). High enrollments in CTE suggest that high school students still show an interest in enrolling in vocational courses.

CTE is a possible solution to reducing the dropout rate. The National Research Center for Career and Technical Education reported that students who took a ratio of one CTE course for every two academic courses in 2005 were less likely to drop out of high school (The Association for Career and Technical Education, 2006). However, a 2004 study conducted by researchers at the University of Memphis suggested that high school students who are most at-risk are likely enrolled in vocational education programs (Tennessee Council on Vocational-Technical Education, March, 2004).

The purpose of this study was to compare the graduation rates between CTE concentrators and non-CTE concentrators. For the purpose of this study, a CTE concentrator is a 12th-grade student who has completed at least three vocational courses in the same area of study, in at least one of the following disciplines: agriculture, business and technology education, contextual academics, family and consumer sciences, health science education, marketing education, technology engineering education, trade or industrial education (auto body, auto mechanics, construction technology, cosmetology, drafting, or welding), or participated in work-based learning. For this study, a non-CTE concentrator is a 12th-grade student who has taken at least one vocational course but less than three vocational courses in the same area of study. The overall graduation rates used for this study were based on 3S1 graduates (the percentage of 12th-grade CTE concentrators who received a high school diploma, GED, or state certificate).

Statement of the Problem

According to the 2009 Tennessee Report Card, Tennessee's overall graduation rate was 83.2% for 2007-2008 and 82.2% for 2008-2009. Both years were below the Tennessee AYP goal of 90%. A review of literature reveals that little is known about the impact that CTE has on high school graduation rates. With the limited research available on CTE and graduation rates, this study will serve to determine if 12th-grade CTE concentrators graduate at a different rate than non-CTE concentrators. This study will also determine if 12th-grade male CTE concentrators graduate at a different rate than female CTE concentrators.

Research Questions

These research questions were addressed in this study to determine the difference between graduation rates of CTE concentrators and non-CTE concentrators. Two research questions were generated to address the difference between male and female 12th-grade CTE concentrators and their likelihood to graduate.

The following questions provide the focus for this study:

1. Is there a difference in the graduation rates of 12th-grade students between CTE concentrators and non-CTE concentrators for the 15 participating northeast Tennessee school systems for academic school years 2007-2008 and 2008-2009?
2. Is there a difference in the graduation rates of 12th-grade CTE concentrators between male and female students for the 15 participating northeast Tennessee school systems for academic school years 2007-2008 and 2008-2009?
3. Is there a difference in the graduation rates of 12th-grade CTE concentrators between male and female students in all school systems in Tennessee for academic school years

2007-2008 and 2008-2009?

4. For the 15 participating northeast Tennessee school systems, is there a difference in the graduation rates between 12th-grade CTE concentrators and the overall mean graduation rate (86.97% for 2007-2008, and 90.51% for 2008-2009) for the region?
5. For all school systems in Tennessee, is there a difference in the graduation rates between 12th-grade CTE concentrators and the state mean graduation rate (83.2% for 2007-2008, and 82.2% for 2008-2009)?

Significance of the Study

The findings of this research study may be useful to the Tennessee Department of Education as they continue to require an increase in the percentage of high school seniors who graduate. The research findings may also be helpful to high school principals, vocational directors, guidance counselors, and graduation coaches as they place students in programs that will give them the best chance to successfully complete high school graduation requirements. Results of this study may also help fill the gap that exists in the limited research that is available concerning high school graduation and CTE concentrators.

Limitations of the Study

For the purpose of this study, subjects were limited to high school students who were seniors for either the 2007-2008 or 2008-2009 academic school years and who were enrolled in a Tennessee high school that reported to the state report card. This study is specific to the systems included and may not be generalizable to other populations or other systems.

Definitions

3SI: the percentage of 12th-grade CTE concentrators who received a high school diploma, GED, or state certificate (Tennessee Department of Education, 2010a).

Career and Technical Education (CTE): secondary courses formerly known as vocational education, that are based on practical activities related to an occupation or vocation (e.g., agriculture, health occupations, building trades) (Tennessee Department of Education, 2010b).

Career and Technical Education (CTE) Concentrator: a high school student who has completed 3 credits (units) in a sequential CTE program of study (Tennessee Department of Education, 2010b).

Graduation Rates: a federally required benchmark that calculates the percent of on-time graduates receiving a high school diploma (Tennessee Department of Education, 2009).

Summary

Chapter 1 contains an introduction, including description and relevance of the study, purpose, statement of the problem, research questions, significance and limitations of the study. Chapter 2 provides a review of literature including topics such as: the history of vocational education, Career and Technical Education (CTE), Tennessee high school graduation requirements, Adequate Yearly Progress (AYP), high school dropouts, and research on CTE concentrators. Chapter 3 is a description of the research methodology including the population, research procedures, research questions, data collection methodology, and procedures for data analysis. Chapter 4 offers an analysis of the data for each research question. Chapter 5 provides the study summary, conclusions, and recommendations for practice and further research.

CHAPTER 2

REVIEW OF LITERATURE

Historically, educating children has been primarily assigned to local and state governments. However, the federal government has increased its participation in education in an effort to help fill gaps between state and local governments, “when critical national needs arise” (U.S. Department of Education, 2010a, ¶3). The federal government has played a significant role in influencing the direction of secondary vocational education since the passage of the Morrill Act in 1862 (Rojewski, 2002). The first part of the literature review lays the groundwork of historical events to show how the federal government has increasingly become involved in the education of our nation’s students, particularly in vocational education, and how these historical events have led to the most current federal policies at the time of this study.

Morrill Act of 1862 and 1890

Prior to 1862, vocational education was the simple act of a father or mother passing a family trade down to sons and daughters. However, the federal government became involved in vocational education at the collegiate level with the passage of the Morrill Act. The Morrill Act of 1862 was first introduced by a Vermont congressman, Justin Smith Morrill, in an attempt to provide all young Americans an opportunity for higher education. This Act is considered the foundation of what has developed into today’s vocational education programs. The Morrill Act provided each state 30,000 acres of land for each senator and representative in Congress according to the 1860 census. States were to use the endowed land to support and

maintain at least one land-grant college in each state. The endowed land was to be sold for \$1.25 per acre to help establish an institution or to offset operating expenses for existing institution. Sixty-nine colleges were funded by these land-grants. The leading objective for establishing land-grant colleges was to teach agriculture and mechanic arts and to promote the practical education of industrial classes (Russell, Broach, & Parker, 1938).

The land-grant system of 1862 had been effective in initiating vocational education programs at the postsecondary level across the United States, but in the South, blacks were not able to attend the original land-grant institutions. The Second Morrill Act of 1890 made legal participation possible for black students through separate institutions. This Act required that land-grant funding be equally divided in states that maintained segregated colleges for separate races (Neyland, 1990). Congress approved the Second Morrill Act for the establishment of black institutions for the teaching of agriculture and the mechanic arts. States that accepted the provision were to receive an initial \$15,000 and an annual increase of \$1,000 over the previous year for 10 consecutive years. After the 10-year period, states received \$25,000 for the years thereafter. The land-grant colleges originally started as agriculture and technical schools, and many grew into public universities, and over the years have educated millions of American citizens who otherwise might not have been able to afford college (Brunner, 1966).

In 1868 Tennessee legislature accepted provisions for the First Morrill Act, and received 300,000 acres for the incorporation of the Agricultural and Mechanical College of Tennessee as a department of East Tennessee State University and in 1879 became known as the University of Tennessee. In 1891 Tennessee accepted provisions for the Second Morrill Act, and in 1909 established the Tennessee Agricultural and Industrial State Normal School for Negroes, which

became known as Tennessee Agriculture and Industrial State University in 1958 (Brunner, 1966). In 1979 the Tennessee Agriculture and Industrial State University merged with the University of Tennessee at Nashville to form Tennessee State University (Tennessee State University, n.d.).

The Morrill Act was the first federal vocational education movement at the collegiate level, but it was not until the turn of the century that vocational education was developed at the secondary level. Secondary vocational education came about because of the highly industrialized economy and the demand for highly skilled laborers. Employers realized that in order to thrive the country needed to train individuals in agriculture, mechanical, and manufacturing industries (Calhoun & Finch, 1976).

At the turn of the 20th Century, only 4% of high school aged children were attending secondary schools, which were historically based on preparing students for economic and social leadership instead of for the workforce. Educators began to define their role in meeting the needs of industry and formed schools that were more suited for their student's agriculture and mechanical backgrounds and aspirations (Lazerson & Grubb, 1974). In 1910 about 12 million individuals were engaged in agriculture in the U.S. However, only 12,000 (less than 1%) had received training from public education on how to cultivate the land or to keep it productive (Hawkins, Prosser, & Wright, 1951).

Smith-Hughes Act of 1917

In 1911 several manufacturing, trade, and agriculture organizations, along with the National Education Association, formed the National Society for the Promotion of Industrial Education (Russell et al., 1938). This newly developed organization urged public education to provide training facilities for vocational disciplines to meet the demands of industry. The National Society for the Promotion of Industrial Education later became the National Society for Vocational Education and had a major role in gaining the public's attention regarding emerging principles of vocational education and in meeting the occupational needs of the nation (Calhoun & Finch, 1976).

It became apparent that the nation's educational system was not meeting the needs for many secondary school aged children. Industry was spending a substantial amount of money on training workers. The nation's dropout rates were also excessive (Calhoun & Finch, 1976). National leaders began to realize the need for developing citizens who could contribute to the nation rather than citizens who would become a burden on society. On January 20, 1914, the Senate unanimously adopted a resolution presented by Georgia Senator Hoke Smith, authorizing President Woodrow Wilson to appoint a nine-member commission who were charged with submitting a report to Congress that included recommendations for the distribution of federal aid to the states for vocational education (Hawkins et al., 1951).

The commission submitted their recommendations for vocational education in a 500-page document, just 60 days after the appointment of the commission. The proposed bill was sponsored by Senator Smith, chairman of the Senate Committee for Education, and by Congressman Dudley M. Hughes, chairman of the House Committee on Education (Hawkins et

al., 1951). The bill was an attempt by Congress to provide federal funding in support of vocational education (Calhoun & Finch, 1976). Sensing the pressure of the nation and pressure from the outbreak of World War I in Europe, Congress passed the Smith-Hughes Act, and on February 23, 1917, President Wilson signed the act providing federal aid to secondary vocational education (Lazerson & Grubb, 1974). The Smith-Hughes Act provided federal funds for three areas of vocational education; agriculture, trade and industry, and home economics. The act required each state board to submit an annual report showing how it planned to use the allotted funds for purchasing equipment, training qualified teachers, and improving vocational education. Funds allocated for the training and salaries of teachers had to be matched by state funds (Calhoun & Finch, 1976). Several federal legislative acts were introduced to enhance the original Smith-Hughes Act. Over the next 40 years, acts such as: the George-Reed Act, George-Ellzey Act, George-Deen Act, and the George-Barden Act would reauthorize the appropriations of federal funding for vocational education (Calhoun & Finch, 1976).

Vocational Education Act of 1963

In an effort to maintain and continue to improve vocational education programs, the federal government committed even more money to these programs by passing the Vocational Education Act of 1963. Calhoun and Finch (1976) suggested that in this legislation the needs of students were first emphasized rather than the labor needs of the nation as with previous legislation. The Vocational Education Act of 1963 increased federal appropriations to the states 150 times greater than those of the Smith-Hughes Act. Lynch (2000) suggested that the federal government pass this act to serve the economically disadvantaged youth, disabled

youth, or individuals with other disadvantages that hindered success in regular education programs. This act also allowed for federal funding to be spent on the construction of vocational education facilities to assure that quality vocational programs were offered.

In 1968 the federal government made an additional attempt to solve the nation's unemployment and underemployment problems by amending the Vocational Education Act of 1963. Calhoun and Finch (1976) stated that "this Act virtually cancelled all previous vocational education legislation except for the Smith-Hughes Act, which was retained for sentimental reasons" (p. 46).

In 1976 the second amendment to the Vocational Education Act of 1963 was passed. With this amendment, states had to pay for 50% of the administrative cost associated with vocational education at the state level, and the federal government implemented a national evaluation to determine how states and local systems were complying with the implementation of the Vocational Education Act (Hayward & Benson, 1993).

Carl D. Perkins Act

Current federal legislation is based on the Carl D. Perkins Vocational Education and Applied Technology Act of 1984. The Perkins Act was passed with objectives for improving vocational education programs and increasing the services and access offered to high school special needs students (Lynch, 2000). This act led to unprecedented enrollment of the special needs population in vocational courses because federal funding now favored these individuals within vocational programs (Wonacott, 2002). Enrollment of students from the general population who were not special needs concentrated more heavily on taking academic related courses, thus decreasing their enrollment in vocational programs (Wonacott, 2003).

The Carl D. Perkins Vocational and Applied Technology Education Act of 1990 (PL 101-392), also known as Perkins II, was designed to keep the United States from falling behind other nations in the global marketplace (Finch, 1999). Perkins II called for the integration of academics into the vocational education curriculum and implemented a closer connection between school and work (Gordon, 2003). Threton (2007) suggested that this academic emphasis placed on vocational education represented the most dramatic change in educational policy since federal involvement in secondary vocational education.

Another legislative bill that was implemented based on the needs of the U.S. economy was the School-to-Work Opportunities Act of 1994 (PL 103-239). This act allowed federal funding to be used to address America's skills deficit with hopes of helping youth make a smooth transition from school to work or from school to further educational opportunities in a specific career choice (Threton, 2007).

The Carl D. Perkins Vocational and Technical Education Act of 1998 (PL 105-332), also known as Perkins III, accounted for less than 10% of national funds spent on vocational education (Skinner & Apling, 2005). Other research suggested that this funding accounted for less than 5% of state expenditures on vocational education (Castellano, Stringfield, & Stone, 2003). Stone (2002) reported that between 1980 and 1999 funding for general education increased 177%, while vocational education funding increased by only 47%. Skinner and Apling (2005) suggested that this financial increase was minimal considering 55% of all students enrolled in the 1999-2000 academic year were majoring in vocational areas.

Perkins III continued the work set out by Perkins II, and included many improvements for vocational programs that were initially established in Perkins I (Lynch, 2000). Perkins III

set out four new core indicators for secondary vocational education which included:

- (a) student attainment of challenging, state-established academic, vocational, and technical skill proficiencies; (b) student attainment of a secondary school diploma or its recognized equivalent, a proficiency credential in conjunction with a secondary school diploma, or a postsecondary degree or credential; (c) student placement and retention in, and completion of, postsecondary education or advanced training, or placement and retention in military service or employment; and (d) student participation in and completion of vocational and technical education programs that lead to nontraditional training and employment. States not making satisfactory progress in meeting these negotiated accountability measures risked losing Perkins funding (Castellano, et al., 2003, p. 250).

No Child Left Behind Act of 2001

In 2001 legislation known as the No Child Left Behind (NCLB) mandate was passed by the U.S. Congress. NCLB legislation renamed and reauthorized the Elementary and Secondary Education Acts (ESEA) of 1965. NCLB represented the most federal involvement to date in public education (Novel, 2009). The 2001 legislation held all aspects of education more accountable, involved the federal government more than ever in public education, and placed more rigorous academic standards into vocational education coursework (Threeton, 2007).

Carl D Perkins Act of 2006

Until this point, the term vocational education has been used in this chapter to describe legislation dealing with secondary vocational programs. The Carl D. Perkins Act changed the name of from Vocational Education to Career and Technical Education (CTE). The Carl D. Perkins Career and Technical (CTE) Improvement Act (PL 109-270), or Perkins IV was passed by the U.S. Congress and signed in the fall of 2006 (Threeton, 2007). One significant change

associated with the Perkins IV law was the change from the term Vocational Education to Career and Technical Education (CTE). The law introduced more than just a name change, as it held CTE more accountable at integrating academic standards into the technical curriculum, while aligning the CTE curriculum to No Child Left Behind (NCLB) mandates (Threeton, 2007). The Perkins IV act was designed to strengthen the nation's economy as well as place more stringent standards on integrating academics to the technical standards (Threeton, 2007).

Tennessee First to the Top Act of 2010

As of 2011 the most recent mandate that affected both academic and CTE coursework was Tennessee's First to the Top Act of 2010. This new law was designed to improve the overall quality of education. The U.S. Congress approved a \$4 billion program to encourage states to lead the way in educational reform. According to the U.S. Department of Education (2010b), Race to the Top dollars were awarded to states that proposed an aggressive yet achievable educational plan of action. Forty states and the District of Columbia submitted grant proposals, but only two states, Delaware and Tennessee, were awarded funding in the first phase of the Race to the Top competition. Tennessee was allocated \$500 million over a 4-year period, between 2010-2014, to implement the state's comprehensive school reform plan.

Tennessee's First to the Top Act of 2010 concentrated on creating a unified strategy to strengthen Science, Technology, Engineering, and Mathematics (STEM) as well as improving four additional key areas:

1. Adopting higher standards and assessments to prepare students to succeed in college or the workplace.
2. Building systems that use data to measure student growth and success in a way that helps teachers and principals improve instruction in the classroom.
3. Finding, retaining and rewarding the most effective teachers and principals, including significant investments in professional development.

4. Turning around the lowest-performing schools (Tennessee Department of Education, 2010b, ¶ 4).

Defining CTE

Not only did Perkins IV change the name associated with technical education from Vocational Education to CTE, but it also redefined CTE. The Carl D. Perkins Career and Technical Education Improvement Act (2007) defines CTE as:

Organized educational activities that offer a sequence of courses that provides individuals with coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in current or emerging professions; provides technical skills proficiency, an industry-recognized credential, a certificate, or an associate degree; and may include prerequisite courses that meet the requirements of this subparagraph; and include competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of an industry, including entrepreneurship, of an individual (Section (3)5).

The Tennessee Department of Education has a specific mission for their CTE curriculum which is, “preparing today’s students for tomorrow’s opportunities” (Tennessee Department of Education, 2010b, ¶ 1).

Tennessee High School Graduation Requirements

According to the Tennessee Department of Education (2010b), freshman entering high school in the fall of 2009 and thereafter must have a minimum of 22 credit hours to graduate. However, Local Education Authorities (LEA) can vote to increase graduation credits above 22 for their local school districts. To receive a high school diploma, students must have a minimum

of the following credits in each discipline: math (4), science (3), English (4), social studies (3), physical education and wellness (1.5), personal finance (.5), foreign language (2), fine arts (1), elective focus (3), and a capstone experience. CTE courses fall under the area of elective focus. If students complete three or more courses in the same vocational area, they are considered by the state as a CTE concentrator (Tennessee Department of Education, 2010b).

In addition to 22 credit hours, students must complete a minimum of 40 hours in a capstone experience. The capstone experience can include: a senior project, community service, virtual experience, internship, externship, or service learning. Appendix A further describes specific courses that meet the required credits under the Tennessee Diploma Project (TDP) (Tennessee Department of Education, 2010b).

Tennessee's high school graduation requirements also specify certain levels of achievement that graduating seniors must score on Gateway or End of Course (EOC) exams. According to the Tennessee Department of Education (2010b) the state is dissolving the Gateway exam and transitioning totally to EOC exams. High school students who are graduating in 2011 and 2012 must pass the Gateway Exam to graduate. All students graduating in 2013 and thereafter must take the EOC exam in each of the following areas: algebra I, biology I, English II, and U.S. history (Tennessee Department of Education, 2010b). Appendix B shows the required scores a student must receive in each specified area on both the Gateway and EOC exams to graduate and for a system to meet the AYP standards.

Adequate Yearly Progress

Under No Child Left Behind (NCLB), the federal government holds public school districts in each state accountable based on students' performances. Several measures have been put in place by the federal government for the nation to meet goals of having every student proficient at grade level in math and reading at the close of the 2014 school year (North Carolina Department of Education, n.d.). This accountability measure is known as Adequate Yearly Progress (AYP). Through AYP, benchmarks are placed on schools at the secondary level in the areas of math, English, and graduation rate (Tennessee Department of Education, 2010b). It is also important to note that states create their own individualized tests to determine student achievement in the areas of math and English.

Systems that do not meet AYP standards for 2 consecutive years in one of the three areas are considered at-risk and are deemed a high priority district under NCLB (Tennessee Department of Education, 2010b). To be removed from the high priority list, the district must meet AYP in the high priority area for 2 consecutive years (Tennessee Department of Education, 2010b). Systems that are considered at-risk receive additional financial support from the state in an attempt to keep that district from being labeled as high priority under the NCLB mandate. If a school does not meet AYP standards for a single year in any one of the three areas, it is labeled as a target school (Tennessee Department of Education, 2010b).

NCLB holds systems accountable for AYP in several subgroup areas. Systems are responsible for the progress of students in the following subgroups: (1) the school as a whole; (2) white; (3) black; (4) Hispanic; (5) Native American; (6) Asian; (7) multiracial; (8) economically disadvantaged students; (9) limited English proficient students; and (10) students with

disabilities (Tennessee Department of Education, 2010b). It is possible for the same student to be counted in up to five subgroups. School districts in Tennessee that have 45 or more students across all tested grade levels must meet AYP in the previously mentioned subgroups. The minimum number of students required for a district to meet AYP in that subgroup area varies per state. According to the Tennessee Department of Education (2010b), for a secondary school (grades 9-12), to meet target goals set forth by NCLB, each school that has 45 or more individuals in a subgroup must meet the 83% target goal of either proficient or advanced in order to meet AYP in that subgroup.

According to the Tennessee State Department of Education 2009 Report Card (2010a), 1,661 elementary, middle, and high schools were included in AYP testing for the 2008-2009 school year. One hundred forty-four schools (8.6%) were considered high priority. However, 118 (81.9%) of these high priority schools met federal standards in areas where benchmarks were missed the previous year. If these schools continue to improve during the 2009-2010 school year and do not drop below the benchmark in another area for 2 consecutive years, these districts will be removed from the high priority list. Of the 1,661 schools tested, 199 (11.9%) were considered target schools (Tennessee Department of Education, 2009).

State Levels of Performance for CTE under Perkins IV and AYP

In an effort to continue the improvement of the educational system and to receive Perkins IV funding, Tennessee placed eight core indicators that evaluate performance levels of secondary CTE programs. Each of these core indicators is part of the CTE information found on the Tennessee Report Card. The CTE concentrators calculated in these core indicators were also included in the computation of AYP and only included students who left secondary education in

the reporting year with a diploma, General Education Diploma (GED), or a state certificate (Tennessee Department of Education, 2009).

According to David Boreing, First Tennessee Career and Technical Consultant with the Tennessee State Department of Education (personal communication, September 24, 2010), the eight performance indicators are as follows: (1S1) the percentage of 12th-grade CTE concentrators who have met the proficient or advanced level on the statewide reading and language arts assessment administered by the state; (1S2) the percentage of 12th-grade CTE concentrators who have met the proficient or advanced level on the statewide mathematics assessment administered by the state; (2S1) the percentage of 12th-grade CTE concentrators who have mastered industry validated proficiency standards; (3S1) the percentage of 12th-grade CTE concentrators who received either a high school diploma, a GED, or a state certificate; (4S1) the percentage of CTE concentrators who were included in the state's AYP computation as described in Section 111(b)(2)(C)(vi) of the Elementary and Secondary Education Act (ESEA), later reauthorized under NCLB; (5S1) the percentage of 12th-grade concentrators who graduated and were placed in employment, advanced vocational training, or military within 1 year of high school graduation; (6S1) the number of CTE students who were from an underrepresented gender group who participated in a course that lead to employment in a nontraditional occupation. Examples of nontraditional students would be a male enrolled or employed in cosmetology or a female student enrolled or employed in welding; and (6S2) the percentage of CTE concentrators from underrepresented gender groups who participated in a course that lead to employment in a nontraditional occupation.

It is important to note that CTE students calculated under 3S1 who received a state

certificate or a GED do not count as a graduated CTE concentrator under 4S1. Performance indicator 4S1 only includes students who received a Tennessee high school diploma. Students who receive a state certificate or GED do not count in the schools overall graduation rate for AYP reporting. The U.S. Department of Education National Center for Education Statistics reported that 57.8% of males who were public high school graduates in 2005 were CTE concentrators (Silverberg, Warner, Fong, & Goodwin, 2004).

Calculating Graduation Rate

In 2008 federal regulations changed NCLB's requirements related to the calculation of graduation rates. In an effort to create more consistency in the calculation of graduation rates across the nation, NCLB created a 4-year adjusted cohort rate for all school districts to meet federal accountability in AYP. States have until the 2011-2012 academic year to implement this new regulation. This consistency will allow for the comparison of graduation rates between states, districts, and systems (Tennessee Department of Education, 2010b).

According to Richmond (2009) the 4-year adjusted cohort members are first time ninth graders including school transfers into the cohort group minus cohort members who are deceased, transferred out of the cohort, or emigrated. To calculate the graduation rate, the number of adjusted cohort members was divided into the number of adjusted cohort members who earned a regular diploma between August 16th of the cohort's senior year and August 15th of the following summer. Only students who receive a regular high school diploma are counted, any student with disabilities who received an alternate state awarded certificate of attendance or an Individual Education Plan (IEP) diploma was not counted as graduating. Any student within the cohort who dropped out to receive a GED or enrolls in a college or university was not

counted as graduating in the cohort calculations (Richmond, 2009). New regulations allow states to report a 5-year and 6-year cohort rate to give credit to students who need longer than four years to graduate.

According to the 2009 Tennessee State Report Card, the graduation rates of CTE concentrators (4S1) were calculated by dividing the actual numerator and actual denominator. The actual numerator was defined as the number of CTE concentrators who graduated with a regular diploma on time during the reporting year. The actual denominator is defined as the number of CTE concentrators who were included in the state's calculation of its graduation rate including students who graduated in the reporting year with a regular diploma, special education diploma, certificate of attendance, or GED. Dropouts were also included in the actual denominator (Tennessee Department of Education, 2010b). The actual performance level for CTE concentrators was the actual numerator divided by the actual denominator and is reported as a percentage.

CTE Enrollment Statistics

According to the U.S. Department of Education National Center for Education Statistics (NCES) (2007), 96.6% of 2005 high school graduates earned at least one credit in a CTE course, and 61.5% of these graduates earned 3 or more CTE credits. The research also revealed that high school graduates from 2005 received an average of 4.01 CTE credits. The NCES also reported that high school students took over 1.5 billion hours in CTE courses and averaged 4.2 CTE credits out of a total of 26 credits (Walker, Hare, & Mulvihill, n.d.).

According to the National Assessment of Vocational Education (NAVE) Final Report to Congress (2004), CTE students over the past decade have increased the number of academic

courses they are taking. By increasing their academic courses, CTE students may be better prepared for both college and careers than their peers from the past have been.

School systems in the state of Tennessee receive more state funding for students enrolled in a CTE course than for non-CTE students. This additional funding for CTE students is calculated for systems to offset the increased expense associated with CTE supplies and equipment. According to the Association for Career and Technical Education (n.d.), Tennessee school systems are funded based on their average daily attendance. The state of Tennessee provides partial funding for one non-CTE teacher for every 26 students, and one CTE teacher for every 20 students. For each student enrolled, Tennessee systems receive \$27 for each non-CTE student for supplies, and \$20 for each non-CTE student for equipment expenses. Based on the average daily attendance, systems receive \$101 for each CTE student for supplies, and \$62 for each CTE student for equipment. Local school systems control how these monies are spent within their systems.

High School Dropouts

There are many factors that determine a student's success at obtaining a high school diploma, and some may be beyond the school district or student's control. According to Castellano, Stringfield, and Stone (2002) to understand high school dropouts it is important to understand possible risk factors. Several risk factors associated with increased dropout rates are: low self-esteem, high absenteeism, ethnicity, limited English proficiency, poverty, mothers' education level, single parent families, large high schools, large class sizes, and students from urban schools.

The Association for Career and Technical Education (ACTE) (2007) suggested that

roughly one third of students who begin the ninth grade fail to graduate or complete high school requirements within 4 years. The ACTE (2007) also suggested that the United States has dropped to 10th place in the world for high school graduation rates. For the past several decades, the graduation rate of our nation averaged about 70% (U.S. Department of Education, 2007). According to D'Andrea (2010), the 2007 U.S. Census Data, Tennessee has 776,954 high school dropouts age 24 or older. Tennessee Department of Education Statistics reported that there were over 12,000 high school dropouts in 2007 alone (D'Andrea, 2010). State, federal, and national efforts have acknowledged the need for improving the graduation rate of American high school students (Richmond, 2009).

The state of Tennessee has slightly improved the graduation rate of both male and female students over the past 2 years. According to the Tennessee Department of Education Report Card (2009, 2010a), males had a 78.9% graduation rate, an increase of 0.7% from the previous year. Swanson (2004) found that in the U.S. males graduate from high school at a rate 8% lower than female students. The Tennessee Report Card also indicated that females on average have graduated at a higher rate than males. According to the 2010 Report Card, 85.6% of females in the state graduated which was an increase of 0.1% from the previous year, and 6.7% higher than the state's male graduates. The state's graduation rate averaged 82.2% on the 2009 Report Card, an increase of 0.4% from the previous year. The state's AYP graduation goal is set at 90%. It is important to note that in Tennessee the prior year's graduation rate is used for the current year's AYP reporting.

Economic Impact of High School Dropouts

Students who do not complete high school penalize themselves and cost the state and nation as well. Richmond (2009) suggested that dropouts from the class of 2008 will combine for more than \$319 billion in lost wages in their lifetimes. D'Andrea (2010) suggested that each dropout in the state of Tennessee will cost an average of \$750 in lost state tax revenue per year, \$1,100 in Medicaid services per year, and \$950 in incarceration services per year. With these figures, dropouts cost the state more than \$2.1 billion each year. According to Rumberger (1987) individuals who fail to graduate are more likely to commit crimes, be in poorer health, participate less in community and civic organizations, miss work more frequently, suffer more layoffs, and require increased government assistance.

Harrison (2004a) reported that as individuals increased their level of educational attainment they also increased their average annual earnings. Data from the past 25 years of U.S. Census Bureaus determined that workers between the ages of 25-64, working full time without a high school diploma averaged \$23,400 per year in wages, whereas high school graduates working full time earned, on average an additional \$7,000 each year (Harrison, 2004a). A college graduate with a bachelor's degree working full time earned an average of \$52,200. This represents increased earnings of \$28,800 per year over high school dropouts. The research also suggested that individuals with a 2-year vocational degree had average annual earnings of \$36,833, an increased average annual income of \$15,519, and a 40 year gain of \$620,758 over the earnings of individuals with no high school diploma. Harrison also reported that the average yearly income for full time workers who graduated from high school was 30% higher than the average yearly income for individuals who did not receive a high school diploma.

Bishop and Mane (2004) suggested that CTE students are more employable and earned more than students who took no CTE courses. They also found that students who took five more CTE courses and three less academic courses made 7.5% more per hour when compared to other CTE students, and 20% more per hour than those students who took no CTE courses.

The Position of CTE in High School Dropouts

Historically vocational education programs were designed to teach students job related skills to prepare them for the workforce upon completion of high school. During the past 2 decades there has been a shift in vocational education in an attempt to not only prepare students for the workforce but to also increase the rate at which they graduate from high school and to increase their preparedness for completing postsecondary programs (Plank et al., 2005).

Cavanagh (2005) suggested that with difficult economic times for many school systems as well as the federal government and increased emphasis being placed on testing and the academic curriculum, that the value of CTE may be in question. Walker et al. (n.d.) reported that CTE's role in providing students with academic improvements has received "a fair amount of criticism over the years" (p. 1). Maxwell and Rubin (2000) concluded from their studies of career academies that CTE does have a place in reducing dropout rates. Research conducted in a 1998 study by Bates (n.d.) at The University of Michigan found that at-risk students are 8 to 10 times less likely to drop out in the 11th and 12th grades if they enroll in a career and technical program instead of a general program. Conversely, Walker et al. (n.d.) reported that CTE students were 11% more likely to attend college, and graduated with a bachelor's or associate's degree at a 5% higher rate than non-CTE students, and that 83% of CTE concentrators were completing an academic concentration as well.

Evans and Burck (1992) concluded in their meta-analysis study that the intervention of career education showed a “quantifiable positive effect magnitude of .16” (p. 67) on the performance of students when incorporated with academic achievement. These results statistically support the value of integrating career and technical education as a means of improving academic achievement (Evans & Burck, 1992). These findings suggested that there is no one combination that causes high school failure or ensures success.

Harrison (2004b) listed several recommendations for school districts on decreasing high school dropout rates, one of which was to “produce a plan to expand the students’ view of career and technical potential” (p.33). Harrison (2004b) also suggested that vocational education has a place in the current educational environment as a strategy to reducing dropout rates. Meer (2007) stated that there would be more at-risk students dropping out of high school without CTE courses. Pundt, Beiter, and Dolak (2007) agreed by stating that CTE has historically been “underestimated in its ability to help students achieve academic success” (p. 28). Plank (2002) found that a high school student was at lower risk for dropping out when approximately 40% of their coursework was CTE related. Kulik (1998) concluded that vocational education increased the graduation rate by nearly 6% for high school students who were not considered college bound. In 1998 University of Michigan researchers also reported that quality CTE programs can reduce a systems’ dropout rate by at least 6% (ACTE, 2007). Mertens, Seitz, and Cox (1982) found that CTE had a small but statistically significant effect in reducing dropout rates of at-risk students. Perlmutter (1982) compared retention rates of secondary students and determined that students who were admitted to a vocational high school had a retention rate 5% higher than the academic high schools. Perlmutter (1982) also found that academic students had higher retention

rates when vocational courses were integrated into their curriculum. In more recent studies Brown (2000) compared tech prep students to nontech prep students (N = 247,778), and determined that tech prep students had a consistently lower dropout rate than nontech prep students. Boesel, Hudson, Deich, and Masten (1994) found that CTE appeared to reduce the likelihood of dropping out of high school. Plank (2002) concluded that for students who were older than normal (old for their grade) when entering high school, that they had enormous risk factors and challenges they faced, and that the 1-to-2 ratio of CTE to academic courses did not seem to have noticeable affects on their high school completion rates.

Harrison (2004b) reported that the evidence was still out on the vocational focus. Harrison even suggested that vocational education was held responsible for the scientific embarrassment over the 1957 Soviet Union's successful launching of the Sputnik I. Lazerson and Grubb (1974) suggested that vocational education has often lost in the competition for prestige against academics, and that it has often been considered as a second-class education. Cohen and Besharov (2002) reported that CTE has an image problem due to the perception that it provides poor quality education for the lowest performing students.

A study of roughly 30,000 tenth grade high school students conducted by Weber (1986) indicated that vocational education promoted high school retention and had potential for preventing high school dropouts. The National Research Center for Career and Technical Education reported that students who took one CTE course for every two academic courses minimized the risk for dropping out of high school (Association for Career and Technical Education, 2006). However, there is evidence that CTE can become a "dumping ground" for low achievers. Participants of a focus group study conducted by the University of Memphis

suggested that high school students who are at-risk for dropping out were more likely to be in vocational education programs (Tennessee Council on Vocational-Technical Education (TCOVE), 2004). Findings from this University of Memphis qualitative study revealed that participants from the Teacher and Counselor Group stated the following about characteristics of at-risk high school dropouts: “Most dropouts are in vocational education; low achievers are in vocational education; it’s a place of last resort for the kids” (TCOVE, 2004, p. 21). Some participants in the study argued, however, that at-risk students experienced success in vocational education programs. When asked to comment about the barriers teachers and counselors face when addressing the dropout problem participants had the following responses:

We’ve had students in building trades and some of these shop classes that had they stayed in academic classes would have just been frustrated. They go into vocational education classes and get hands on experience and take interest in a project; Sometimes vocational education can turn a student around because it is so hands on; If you can’t be a brain surgeon its okay. Be a plumber, carpenter, or electrician; A lot of them don’t see a need to learn math and measurements in a classroom, but take them out here and put them in a vocational class and they have to learn how to measure a 2x4 to cut it right to make it fit the wall, and they’ll do it and remember how to do it (TCOVE 2004 p. 42- 44).

Despite these comments from teachers and counselors advocating vocational education, the National Assessment of Vocational Education’s (NAVE) Final Report to Congress (2004) suggested that there is currently positive change occurring in high schools at the secondary level, but that vocational education “itself is not likely to be a widely effective strategy for improving academic achievement or college attendance without substantial modifications to policy, curriculum, and teacher training” (Silverberg et al., 2004, p. 2).

Career and Technical Education Concentrators

According to the 2005 National Center for Education Statistics, there were 514,000 public high school graduates across the United States who received at least three credits in a CTE program and were considered CTE concentrators (Laird, Chen, & Levesque, 2006). Male CTE concentrators averaged 4.35 CTE credits, .67 credits above the female average of 3.68. Combined, male and female CTE concentrators averaged 4.01 CTE credits during 4 years of high school. For all high school graduates nationally, 96.6% took at least one CTE course and 20.8% (down 1% from 2000) were CTE concentrators.

Castellano, James, Stringfield, Farley, and Wayman, (2004) reported that students who concentrated in a CTE course of study were more economically disadvantaged and lower achieving academically than those students who were non-CTE concentrators. Laird, et al., (2006) also reported that high school CTE concentrators come from a lower socioeconomic family than both general education and academic students. Palmer and Gaunt's (2007) findings were similar to previous research in that the typical CTE student performs somewhat lower academically and was more economically disadvantaged than non-CTE students. Similarly, Levesque and Hudson (2003) found that students from the highest academic achievement groups were less likely to be in a CTE concentration, and Palmer and Gaunt (2007) found that there was a significant difference ($p = .047$) when comparing the family financial status of non-CTE students with CTE students ($N = 451$); CTE students were from lower financially economic households than non-CTE students.

Researchers at the National Center for Education Statistics (2000) found that CTE concentrators were more likely to be employed while they were in school and were more likely

than non-CTE concentrators to obtain a college degree or certificate within a 2-year period after high school graduation. The National Assessment of Vocational Education Final Report to Congress (2004) found that CTE students had increased earnings of nearly 2% for each additional CTE course they took.

Some students who concentrate in a CTE course of study start high school with a lower socioeconomic status and have lower levels of achievement that could put these students at a higher risk for becoming a dropout (Castellano et al., 2004). However, Illinois school statistics for Fiscal Year 2003 showed that students who concentrated in a CTE program averaged a 95% graduation rate which exceeded federal expectations (Illinois Office of Educational Services, 2010). Plank (2002) found that high school students were at the lowest risk for dropping out when their courses were 40% related to a CTE area of study. The U.S. Department of Education reported that only 13% of high school graduates mixed their course work between both academic and CTE curriculums, and these students are as well prepared for college as students who only took the academic curriculum and are far better prepared than the students who only took the CTE concentration (Silverburg et al., 2004).

High School Student Retention

According to DeWitt (2008), many students lose motivation and interest in school because the curriculum does not have real world application. Plank et al. (2005) suggested that a combination of CTE and academic courses lowers the dropout rate because this mix of courses offers students the opportunity to identify theory and its application in real world situations. Researchers at the Bill and Melinda Gates Foundation reported that 81% of students who dropped out said that more real world application in their coursework may have influenced them

to graduate (ACTE, 2006). The National Dropout Prevention Center identified CTE as one of its 15 strategies that have the most positive impact on student graduation rates (Association for Career and Technical Education, 2007). A 2003 report released by the Advisory Committee for the National Assessment of Vocational Education stated that CTE empowers students by providing learning opportunities that targets diverse learning styles (ACTE, 2007). The report also suggested that CTE makes learning related to real world applications, which makes classes more interesting, motivating and more educationally powerful than the regular academic classroom (ACTE, 2007).

CHAPTER 3

RESEARCH METHODOLOGY

This chapter describes the methodology used in this study including the research design and an explanation of the population. The next section describes the data collection procedures and the research questions along with the null hypotheses. This chapter concludes with the specific steps that were used in the data analysis process.

Research Design

Limited research has been completed on Career and Technical Education (CTE), and even less research has been completed on the graduation rates of CTE concentrators (12th-grade students who have completed at least three vocational courses in the same area of study). The purpose of this study was to examine the association between the graduation rates of CTE concentrators and non-CTE concentrators (12th-grade students who did not concentrate in a specific vocational area). The research design of this study was a nonexperimental quantitative study using secondary data analysis (McMillian & Schumacher, 2006). Research questions 1, 2, and 4 evaluated 15 participating school systems located in northeast Tennessee. Of these 15 participating school systems, a total of 4,100 12th-grade CTE concentrators and 5,270 non-CTE concentrators were evaluated over a 2-year period. Research questions 3 and 5 evaluated 120 school systems in Tennessee for 2007-2008 and 118 school systems for 2008-2009 that offered CTE courses.

Population

The population of this study was limited to 12th-grade students enrolled in a Tennessee school system for the years of 2007-2008 and 2008-2009. The present study also evaluated 15 participating school systems located in northeast Tennessee. According to the 2009 Tennessee Department of Education Report Card (2010a), the total PK-12 enrollments of these 15 participating school systems ranged from 2,400 to 12,000 students with varied levels of academic success. This population included both male and female CTE concentrators from 27 high schools within the 15 participating school systems with secondary enrollments ranging from 319 to 4,107. Secondary CTE enrollments for the 15 systems included in this study ranged from 245 to 2,914 with 12th-grade CTE enrollments specifically ranging from 66 to 672. The total number of 12th-grade CTE concentrators from the 15 systems total 2,459 for 2007-2008, and 2,367 for 2008-2009. The graduation percentages for the 15 participating systems in this study ranged from 76.20% to 96.90% for 2007-2008 and from 78.8% to 97.10 for 2008-2009 with averages of 86.97% for 2007-2008 and 90.51% for 2008-2009.

Data Collection Procedures

Appendix C contains a letter of permission that was sent to the CTE Director of each of the 15 participating school systems requesting approval for his or her system to be included in this study. Approvals to collect data were granted by the appropriate individual from each of the 15 participating school systems and the Institutional Review Board (IRB) at East Tennessee State University.

After receiving approval from each system and the IRB, the Tennessee State Department of Education's 2009 and 2010 report cards were accessed to collect the following information on

each of the 15 participating school systems included in this study for 2007-2008 and 2008-2009: (1) systems overall graduation rates; (2) number of 12th-grade CTE students; (3) number of 12th-grade CTE concentrators; (4) number of 12th-grade CTE concentrators who graduated under 3S1 (the percentage of 12th-grade CTE concentrators who received either a high school diploma, GED, or a state certificate) on the state CTE levels of performance; (5) percentage of 12th-grade CTE male concentrators who graduated under 3S1; (6) percentage of 12th-grade CTE female concentrators who graduated under 3S1; (7) graduation percentages of 3S1 actual performance including both males and females.

The researcher contacted Tennessee Department of Education offices to collect the following data for each Tennessee school system for the 2007-2008 and 2008-2009 school years: (1) total number of 12th-grade students; (2) total number of 12th-grade graduates; (3) total number of 12th-grade non-CTE concentrators (students who took at least one CTE course but did not concentrate in a specific area) who received a diploma; (3) total number of male 12th-grade CTE concentrators who received a diploma; (4) total number of female 12th-grade CTE concentrators who received a diploma. The data were then analyzed to determine if differences existed between the groups for each of the hypotheses to be tested.

Research Questions and Null Hypotheses

The following research questions were included in this study:

1. Is there a significant difference in the graduation rates of 12th-grade students between CTE concentrators and non-CTE students for the 15 participating northeast Tennessee school systems for academic school years 2007-2008 and 2008-2009?

H_{01} : There is no significant difference in the graduation rates of 12th-grade students and

type of concentration for the 15 participating northeast Tennessee school systems for the 2007-2008 academic school year.

Ho1₂: There is no significant difference in the graduation rates of 12th-grade students and type of concentration for the 15 participating northeast Tennessee school systems in 2008-2009 academic school year.

2. Is there a significant difference in the graduation rates of 12th-grade CTE concentrators between male and female students for the 15 participating northeast Tennessee school systems for academic school years 2007-2008 and 2008-2009?

Ho2₁: There is no significant difference in the graduation rates of 12th-grade CTE concentrators between male and female students for the 15 participating northeast Tennessee school systems for the 2007-2008 academic school year.

Ho2₂: There is no significant difference in the graduation rates of 12th-grade CTE concentrators between male and female students for the 15 participating northeast Tennessee school systems for the 2008-2009 academic school year.

3. Is there a significant difference in the graduation rates of 12th-grade CTE concentrators between male and female students in all school systems in Tennessee for academic school years 2007-2008 and 2008-2009?

Ho3₁: There is no significant difference in the graduation rates of 12th-grade CTE concentrators between male and female students in all school systems in Tennessee for the 2007-2008 academic school year.

Ho3₂: There is no significant difference in the graduation rates of 12th-grade CTE concentrators between male and female students in all school systems in Tennessee

for the 2008-2009 academic school year.

4. For the 15 participating northeast Tennessee school systems, is there a significant difference in the graduation rates between 12th-grade CTE concentrators and the overall mean graduation rate (86.97% for 2007-2008 and 90.51% for 2008-2009) for the region?

Ho4₁: There is no significant difference in the graduation rates of 12th-grade CTE concentrators and the overall mean graduation rate of 86.97% for the 15 participating northeast Tennessee school systems for the 2007-2008 academic school year.

Ho4₂: There is no significant difference in the graduation rates of 12th-grade CTE concentrators and the overall mean graduation rate of 90.51% for the 15 participating northeast Tennessee school systems for the 2008-2009 academic school year.

5. For all school systems in Tennessee, is there a significant difference in the graduation rates between 12th-grade CTE concentrators and the state mean graduation rate of (83.2% for 2007-2008, and 82.2% for 2008-2009)?

Ho5₁: For all school systems in Tennessee, there is no significant difference in the graduation rates of the 12th-grade CTE concentrators and the state mean graduation rate of 83.2% for the 2007-2008 academic school year.

Ho5₂: For all school systems in Tennessee, there is no significant difference in the graduation rates of 12th-grade CTE concentrators and the state mean graduation rate of 82.2% for the 2008-2009 academic school year.

Data Analysis

Version 18.0 of SPSS was used to analyze statistical data in this study. Data for each of the 15 participating school systems and for each system in Tennessee were organized into a SPSS data file. The data were then analyzed using an independent t test for questions 1, 2, and 3. A one-sample t test was used to test research questions 4 and 5. The .05 level of significance was used as the alpha level to test the hypotheses.

Sources of Data

The first phase of data collection for this study was obtaining information from the 2009 and 2010 Tennessee State Department of Education Report Cards as reported by the 120 school systems evaluated for 2007-2008, and 118 systems for 2008-2009. The second phase consisted of the collection of additional information from the 15 participating school systems in this study. The third phase consisted of contacting the Tennessee Department of Education offices to obtain additional data not provided on the Tennessee Report Cards.

Summary

Chapter 1 provides the introduction of the study and background information presented the statement of the problem, four research questions to be analyzed, described the significance of the study, and stated limitations of the study. Chapter 2 provides a literature review including historical events in education, particularly vocational education, and a pertinent review of the literature related to the study. Chapter 3 describes the research design, population that was studied, data collection procedures, research questions and null hypotheses tested, and the methodology for data analysis. Chapter 4 contains the results, analysis, and interpretation of data for the five research questions. Chapter 5 concludes the study with the summary, research

conclusions, implications, and recommendations for practice and further study.

CHAPTER 4

RESULTS AND ANALYSIS OF DATA

Increased demands are being placed on school systems in Tennessee to improve many areas of education. One area of particular concern is the overall graduation rate of secondary schools. This study was designed to compare graduation rates of 12th-grade Career and Technical Education (CTE) concentrators and non-CTE concentrators from Tennessee for the academic years 2007-2008 and 2008-2009. Archival data were collected on the above indicators using the 2008 and 2009 Tennessee Department of Education Report Cards and data provided by the Tennessee Department of Education office. It is important to note that graduation rates reported on the current year's Tennessee Report Card are from the previous year's AYP reporting.

This study also examined graduation rates of both male and female CTE concentrators. According to the Tennessee State Report Card (2010a) the ratio of males to females enrolled in CTE courses is relatively equal. In 2007-2008, 50.94% of all students enrolled in a Tennessee CTE course were male. These numbers were relatively consistent at the completion of the 2008-2009 year with 51.17% of CTE students being male.

For the 15 participating school systems studied, the ratio of males to females enrolled in a CTE course was consistent with state averages. In 2007-2008, 53.00% of students from these 15 systems enrolled in a CTE course were males. In 2008-2009, 52.74% of students from these 15 systems enrolled in a CTE course were males. Males participated in CTE courses at a slightly higher average from these 15 participating school systems when compared to the state average.

Table 1 shows the percentage of 12th-grade male and female CTE concentrators who received a high school diploma, state certificate, or GED from the state of Tennessee (3S1) and the percentage of CTE concentrators who were included in the state’s AYP computation authorized under NCLB (4S1). For both the 2007-2008 and 2008-2009 school years, female 12th-grade CTE concentrators received a high school diploma, state certificate, or GED, at a higher rate than male CTE 12th-grade concentrators. The graduation rates for CTE concentrators used in this study were based on the (3S1) percentages provided by the 2008 and 2009 Tennessee Department of Education Report Card.

Table 1

12th-Grade CTE Concentrators Receiving a Diploma, State Certificate, or GED by Gender

Performance Indicator	Year	Total Male and Female CTE Graduates N	Graduation Percentage Male	Graduation Percentage Female
3S1	2007-2008	20,978	82.71	87.42
4S1	2007-2008	20,845	82.08	86.97
3S1	2008-2009	20,091	89.80	93.75
4S1	2008-2009	20,015	89.41	93.28

This study included CTE concentrators from 15 participating northeast Tennessee school systems. Total 9th-12th grade enrollment for these systems averaged 1,973 (2007-2008) and 1,818 (2008-2009). Total 9th-12th grade enrollment ranged from 744 to 4,107 (2007-2008) and 745 to 3,843 (2008-2009). These 15 participating systems had an average of 61.88% (2007-2008) and 68.42% (2008-2009) of their total 9th-12th grade students enrolled in CTE courses and had a total student CTE enrollment of 18,385 (2007-2008) and 18,357 (2008-2009). The percentage of students enrolled in CTE courses for the state of Tennessee was 58.79% (2007-2008) and 65.60% (2008-2009). The 15 participating systems in this study had 3.09% higher CTE enrollment than the state mean for the 2007-2008 academic year and a 2.82% higher CTE enrollment than the state mean for the 2008-2009 academic year. Table 2 displays the comparison of 9th-12th grade CTE students to the total number of 9th-12th grade students for the 15 participating systems (Tennessee Department of Education Report Card, 2009 & 2010a).

Table 2

Comparison of 9th-12th Grade CTE Students to Total 9th-12th Grade Students for 15 Northeast

Tennessee School Systems

System	CTE Secondary 2007-2008 N	Total Secondary 2007-2008 N	CTE Percentage for System	CTE Secondary 2008-2009 N	Total Secondary 2008-2009 N	CTE Percentage for System
A	828	1,368	60.53	694	1,327	52.30
B	1,514	1,869	81.01	1,429	1,737	82.27
C	1,307	1,844	70.88	1,319	1,821	72.43
D	520	744	69.89	635	759	83.66
E	1,630	2,888	56.44	1,665	2,380	69.96
F	484	905	53.48	494	918	53.81
G	2,066	2,998	68.91	2,109	2,958	71.30
H	272	567	47.97	245	319	76.80
I	1,235	2,663	46.38	1,338	2,522	53.05
J	1,353	2,619	51.66	1,348	2,186	61.67
K	575	745	77.18	670	745	89.93
L	919	1,920	47.87	989	1,974	50.10
M	2,914	4,107	70.95	2,801	3,843	72.89
N	566	934	60.60	496	752	65.96
O	2,202	3,417	64.44	2,125	3,031	70.11

Students from the 15 participating school systems averaged 1.39 (2007-2008) and 1.54 (2009-2009) CTE courses each during 9th-12th grades. The average number of CTE courses during 9th-12th grade for Tennessee students was 1.25 (2007-2008) and 1.41 (2008-2009). Students from these 15 participating school systems enrolled in more CTE courses than the state average, a difference of .14 (2007-2008) and .13 (2008-2009), for both years. The total number of 9th-12th grade students enrolled in CTE courses across the state was 302,508 (2007-2008) and 287,399 (2008-2009). There were fewer 9th-12th grade students enrolled in Tennessee secondary schools for the 2008-2009 academic school year as compared to the 2007-2008 academic school year. State 9th-12th grade CTE enrollments totaled 377,634 (2007-2008), and increased to 404,128 (2008-2009). The CTE enrollment totals are higher than the state 9th-12th total enrollments because the CTE totals include students enrolled in more than one CTE course for that academic year. Table 3 shows the state's 9th-12th grade total CTE student enrollments by grade for the 2007-2008 and 2008-2009 academic years.

Table 3

Tennessee CTE Student Enrollment by Grade

Grade	2007-2008	Percentage of 9th-12th CTE Enrollment	2008-2009	Percentage of 9th-12th CTE Enrollment
	CTE Students N		CTE Students N	
12	41,659	19.80	45,212	20.58
11	42,627	20.26	45,088	20.53
10	47,813	22.73	51,339	23.37
9	45,733	21.74	46,902	21.35
Total	177,832		188,541	

Note: Percentages do not equal 100% because 7th and 8th grade CTE students are not included in this study.

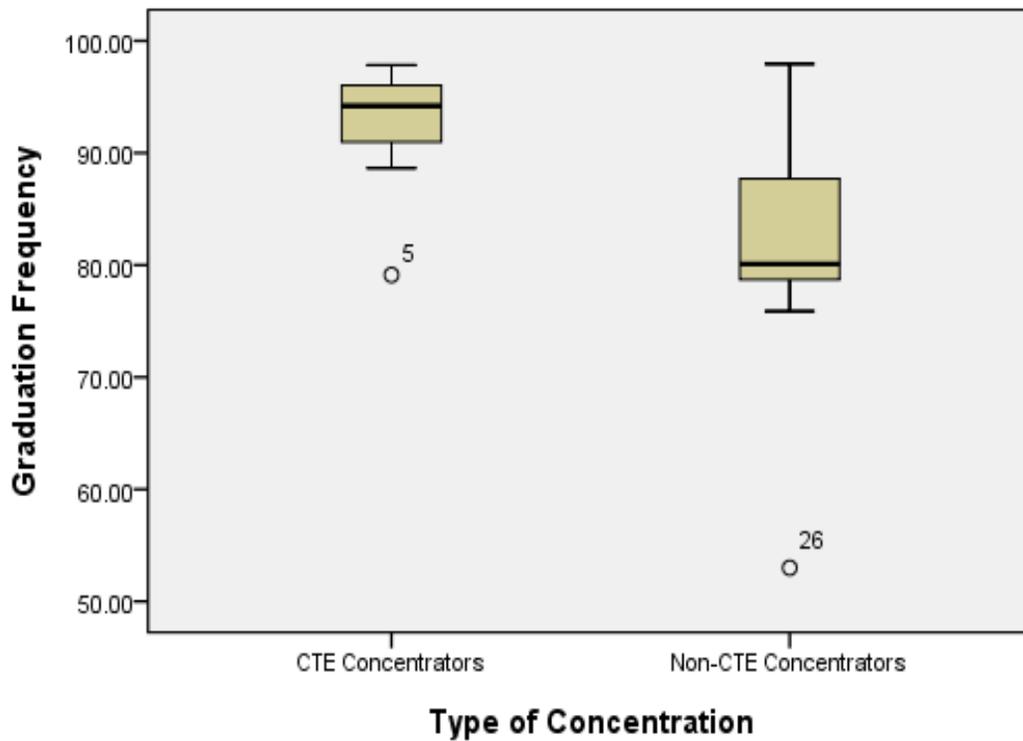
Research Question 1

Is there a significant difference in the graduation rates of 12th-grade students between CTE concentrators and non-CTE concentrators for the 15 participating northeast Tennessee school systems for academic school years 2007-2008 and 2008-2009?

Ho₁: There is no significant difference in the graduation rates of 12th-grade students and type of concentration for the 15 participating northeast Tennessee school systems for the 2007-2008 academic school year.

An independent-samples *t* test was conducted to evaluate the null hypothesis that there is

no difference between graduation rates of 12th-grade students and type of concentration for the 15 participating school systems for the 2007-2008 academic school year. The test was significant, $t(28) = 3.87, p = .001$. Therefore the null hypothesis H_{01} was rejected. CTE concentrators ($M = 92.93, SD = 4.73$) graduated at a higher rate than non-CTE concentrators ($M = 81.79, SD = 10.08$). The 95% confidence interval for the difference in means ranged from 5.25 to 17.03. The η^2 index of .35 indicated a large effect size. Figure 1 shows the distributions for the two groups.



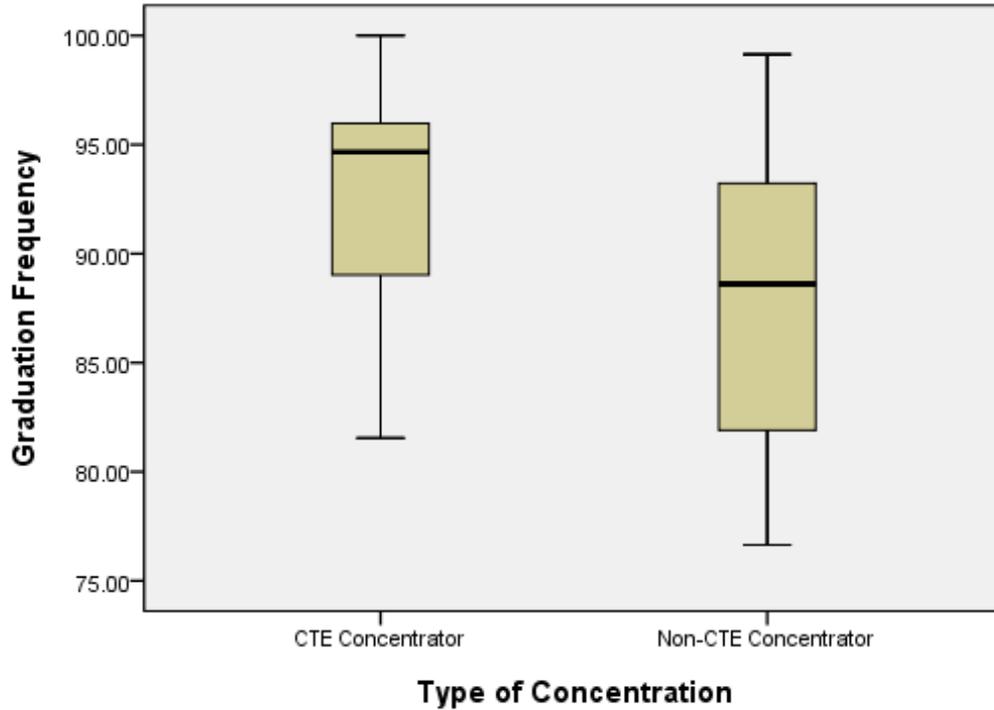
o = an observation between 1.5 and 3.0 times the interquartile range

Note: CTE Concentrators = 2,213, Non-CTE Concentrators = 3,281

Figure 1. Distributions of the 2007-2008 Graduation Rates of 12th-Grade CTE Concentrators and Academic Students for the 15 Participating School Systems

Ho₁₂: There is no significant difference in the graduation rates of 12th-grade students and type of concentration for the 15 participating northeast Tennessee school systems for the 2008-2009 academic school year.

An independent-samples *t* test was conducted to evaluate the null hypothesis that there is no difference in the graduation rates of 12th-grade students and between type of concentration for the 15 participating school systems for the 2008-2009 academic school year. The test was not significant, $t(28) = 1.77, p = .088$. Therefore the null hypothesis Ho₁₂ was retained. There is no statistical difference between the graduation rates of CTE concentrators and non-CTE concentrators for the 2008-2009 academic year. CTE concentrators ($M = 92.26, SD = 5.40$) on average graduated at the same rate as non-CTE students ($M = 88.02, SD = 7.57$). The 95% confidence interval for the difference in means ranged from -.67 to 9.17. The η^2 index of .11 indicated a medium effect size. Figure 2 shows the distributions for the two groups.



Note: CTE Concentrators = 2,148, Non-CTE Concentrators = 3,705

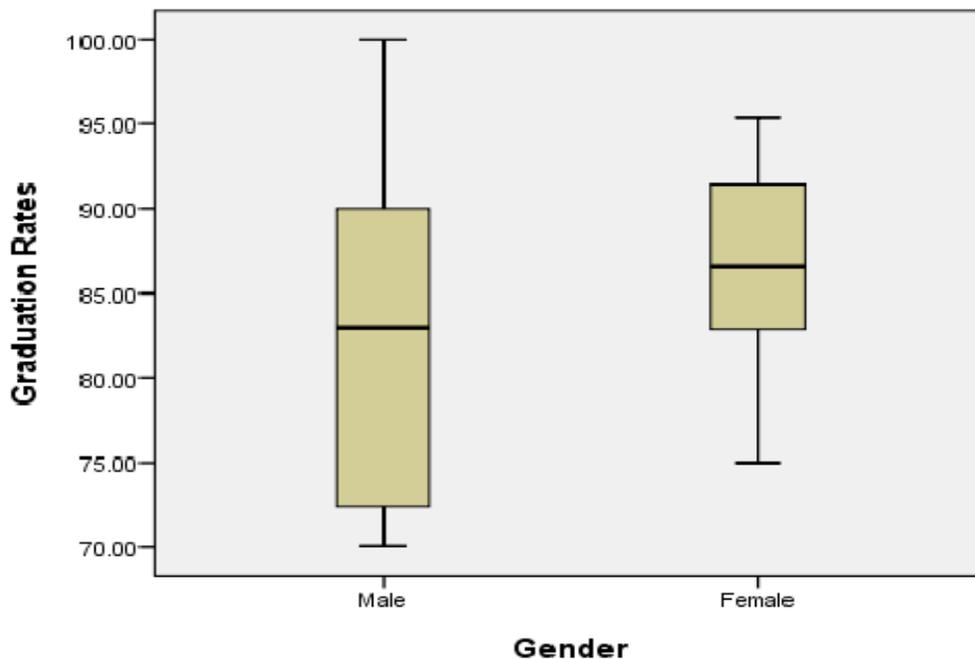
Figure 2. Distributions of the 2008-2009 Graduation Rates of 12th-Grade CTE Concentrators and Academic Students for the 15 Participating School Systems

Research Question 2

Is there a significant difference in the graduation rates of 12th-grade CTE concentrators between male and female students for the 15 participating northeast Tennessee school systems for academic school years 2007-2008 and 2008-2009?

Ho₂₁: There is no significant difference in the graduation rates of 12th-grade CTE concentrators between male and female students for the 15 participating northeast Tennessee school systems for the 2007-2008 academic school year.

An independent-samples t test was conducted to evaluate the hypothesis that there is a difference between the graduation rates of male and female 12th-grade CTE concentrators for the 15 participating school systems for the 2007-2008 academic school year. The test was significant, $t(28) = 1.28, p = .004$. Therefore the null hypothesis H_{02_1} was rejected. Females ($M = 86.73, SD = 5.70$) graduated at a higher rate than males ($M = 82.81, SD = 10.41$). The 95% confidence interval for the difference in means ranged from -10.20 to 2.36. The η^2 index of 0.06 indicated a medium effect size. Figure 3 shows the distributions for the two groups.

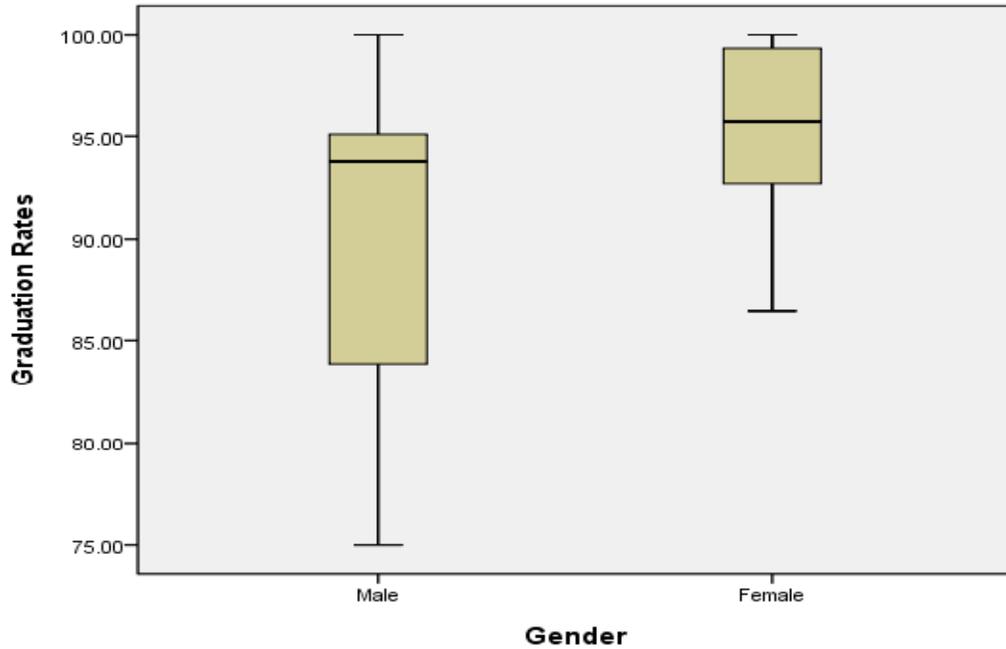


Note: Males = 1,173, Females = 1,040

Figure 3. Distributions of the 2007-2008 Graduation Rates of Male and Female 12th-Grade CTE Concentrators for the 15 Participating School Systems

Ho₂: There is no significant difference in the graduation rates of 12th-grade CTE concentrators between male and female students for the 15 participating northeast Tennessee school systems for the 2008-2009 academic school year.

An independent-samples *t* test was conducted to evaluate the null hypothesis that there is no difference between the graduation rates of male and female 12th-grade CTE concentrators for the 15 participating school systems for the 2008-2009 academic school year. The test was significant, $t(28) = 2.13, p = .007$. Therefore the null hypothesis Ho₂ was rejected. Females ($M = 94.96, SD = 4.44$) on average graduated at a higher rate than males ($M = 89.66, SD = 8.57$). The 95% confidence interval for the difference in means ranged from -10.41 to -.20. The η^2 index of .14 indicated a large effect size. Figure 4 shows the distributions for the two groups.



Note: Males = 1,133, Females = 1,015

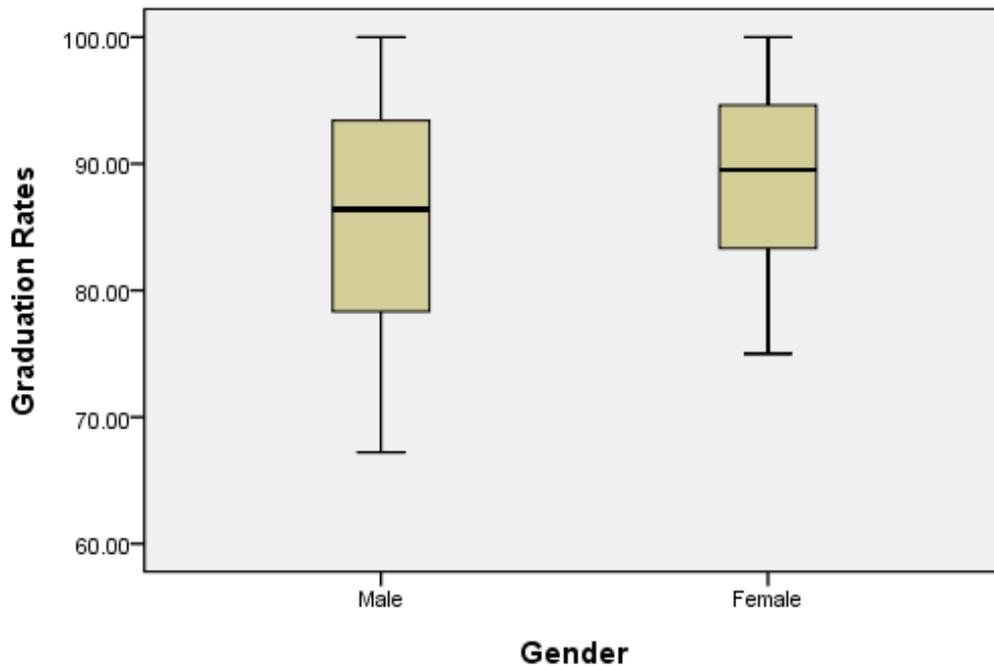
Figure 4. Distributions of the 2008-2009 Graduation Rates of Male and Female 12th-Grade CTE Concentrators for the 15 Participating School Systems

Research Question 3

Is there a significant difference in the graduation rates of 12th-grade CTE concentrators between male and female students in all school systems in Tennessee for academic school years 2007-2008 and 2008-2009?

Ho3₁: There is no significant difference in the graduation rates of 12th-grade CTE concentrators between male and female students in all school systems in Tennessee for the 2007-2008 academic school year.

An independent-samples t test was conducted to evaluate the hypothesis that there is a difference between the graduation rates of male and female 12th-grade CTE concentrators for all school systems in Tennessee for the 2007-2008 academic school year. The test was significant, $t(238) = 3.28, p < .001$. Therefore the null hypothesis H_{03_1} was rejected. Females ($M = 89.30, SD = 6.82$) on average graduated at a higher rate than males ($M = 85.88, SD = 9.18$). The 95% confidence interval for the difference in means ranged from -5.48 to -1.37. The η^2 index of .04 indicated a small effect size. Figure 5 shows the distributions for the two groups.

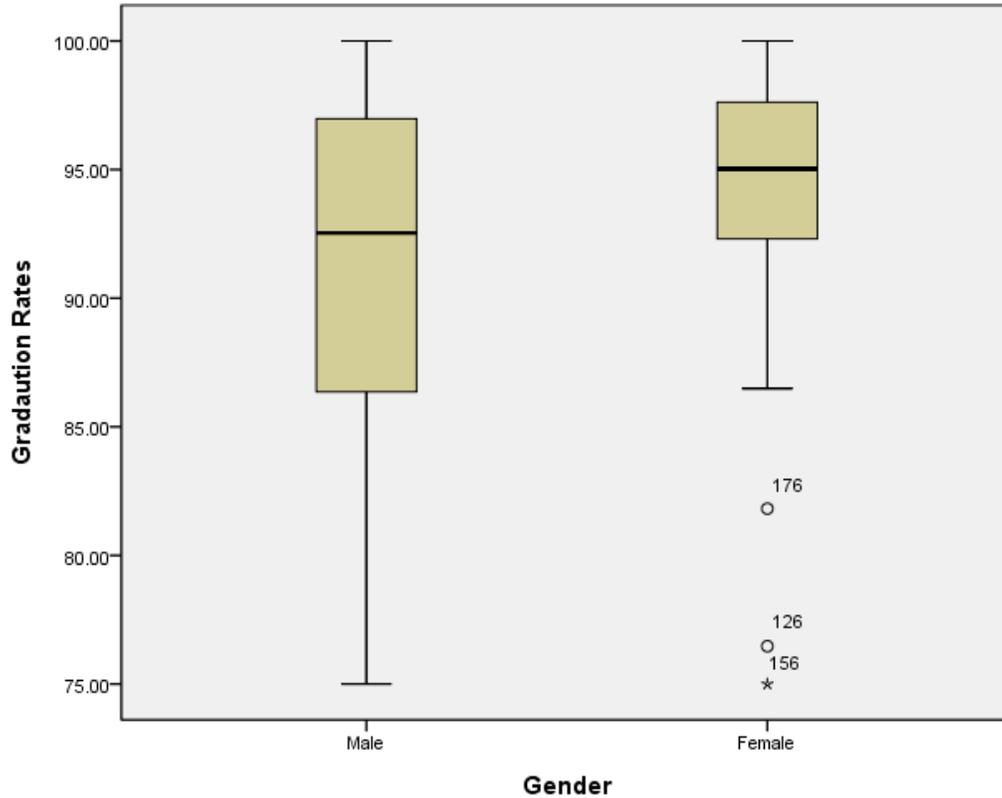


Note: Males = 10,686, Females = 10,292

Figure 5. Distributions of the 2007-2008 Graduation Rates of Male and Female 12th-Grade CTE Concentrators for all School Systems in Tennessee

Ho3₂: There is no significant difference in the graduation rates of 12th-grade CTE concentrators between male and female students in all school systems in Tennessee for the 2008-2009 academic school year.

An independent-samples *t* test was conducted to evaluate the null hypothesis that there is no difference between the graduation rates of male and female 12th-grade CTE concentrators for all school systems in Tennessee for the 2008-2009 academic school year. The test was significant, $t(232) = 4.158, p < .001$. Therefore the null hypothesis Ho3₂ was rejected. Females ($M = 94.56, SD = 4.58$) on average graduated at a higher rate than males ($M = 91.42, SD = 6.76$). The 95% confidence interval for the difference in means ranged from -4.63 to -1.65. The η^2 index of .07 indicated a medium effect size. Figure 6 shows the distributions for the two groups.



o = an observation between 1.5 to 3.0 times the interquartile range

* = an observation which is more than 3.0 times the interquartile range

Note: Males = 10,281, Females = 9,810

Figure 6. Distributions of the 2008-2009 Graduation Rates of Male and Female 12th-Grade CTE Concentrators for all School Systems in Tennessee

Research Question 4

For the 15 participating northeast Tennessee school systems, is there a significant difference in the graduation rates between 12th-grade CTE concentrators and the overall mean graduation rate (86.97% for 2007-2008 and 90.51% for 2008-2009) for the region?

Ho4₁: There is no significant difference in the graduation rates of 12th-grade CTE concentrators and the overall mean graduation rate of 86.97% for the 15 participating northeast Tennessee school systems for the 2007-2008 academic school year.

A one-sample *t* test was conducted on the graduation rates of 12th-grade CTE concentrators for the 15 participating northeast Tennessee school systems for the academic year 2007-2008 to evaluate whether their mean score was significantly different from the region's mean score of 86.97%. The sample mean of 92.94 (*SD* = 4.73) was significantly different from 86.97, $t(14) = 4.88$, $p < .001$. Therefore the null hypothesis Ho4₁ was rejected. The 95% confidence interval for the 15 participating northeast Tennessee school systems mean ranged from 90.32 to 95.55. The strength of the relationship between the 15 participating northeast Tennessee school systems and the region mean score effect size *d* of 1.26 indicates a large effect. The results indicate that 12th-grade CTE concentrators for the 15 participating northeast Tennessee school systems for the academic year 2007-2008 graduated at a higher rate than the regions overall graduation average. Figure 7 shows the distributions of the CTE concentrator's graduation rates for the 15 participating school systems.

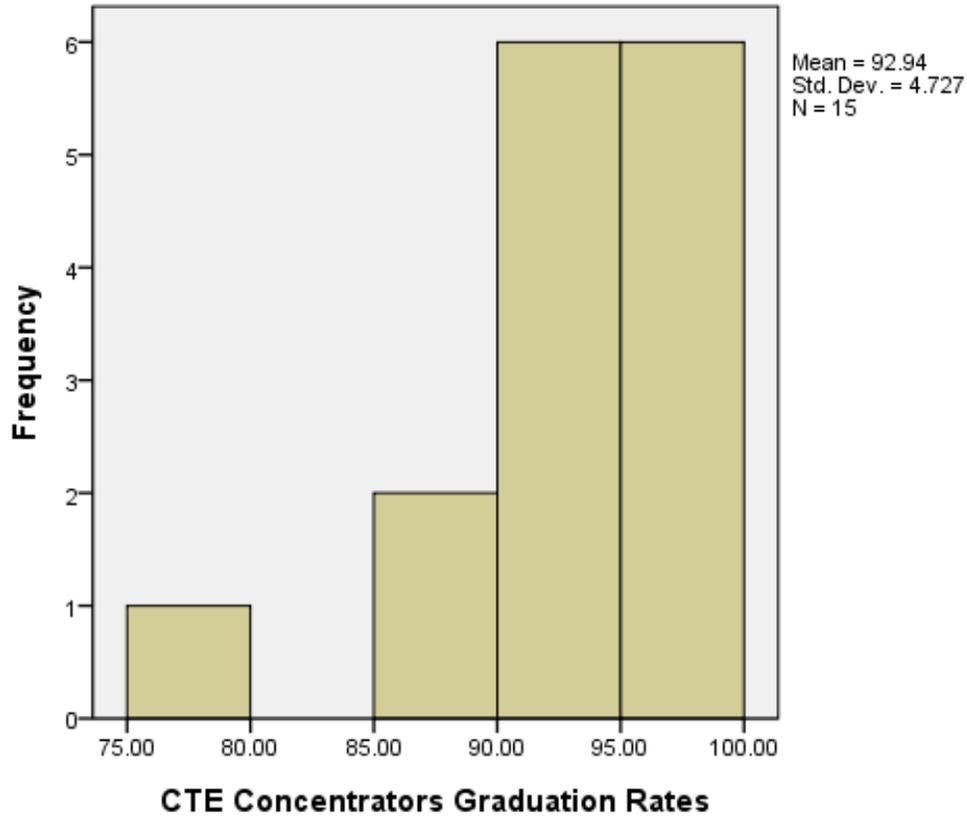


Figure 7. Distributions of the 2007-2008 12th-Grade CTE Concentrators Graduation Rates for the 15 Participating Tennessee School Systems

Ho₄₂: There is no significant difference in the graduation rates of 12th-grade CTE concentrators and the overall mean graduation rate of 90.51% for the 15 participating northeast Tennessee school systems for the 2008-2009 academic school year.

A one-sample *t* test was conducted on the graduation rates of 12th-grade CTE concentrators for the 15 participating northeast Tennessee school systems for the 2008-2009

academic school year to evaluate whether their mean score was significantly different from the region's mean score of 90.51%. The sample mean of 92.26 ($SD = 5.40$) was not significantly different from 90.51, $t(14) = 1.26$, $p = .229$. Therefore null hypothesis H_{04_2} was retained. The 95% confidence interval for the 15 participating northeast Tennessee school systems mean ranged from 89.27 to 95.26. The strength of the relationship between the 15 participating northeast Tennessee school systems and the region mean score effect size d of .32 indicates a small effect. The results indicate that 12th-grade CTE concentrators for the 15 participating northeast Tennessee school systems for the 2008-2009 academic school year did not graduate at a statistically significant higher rate than the region's overall graduation average. Figure 8 shows the distributions of the graduation rates for the 15 participating school systems.

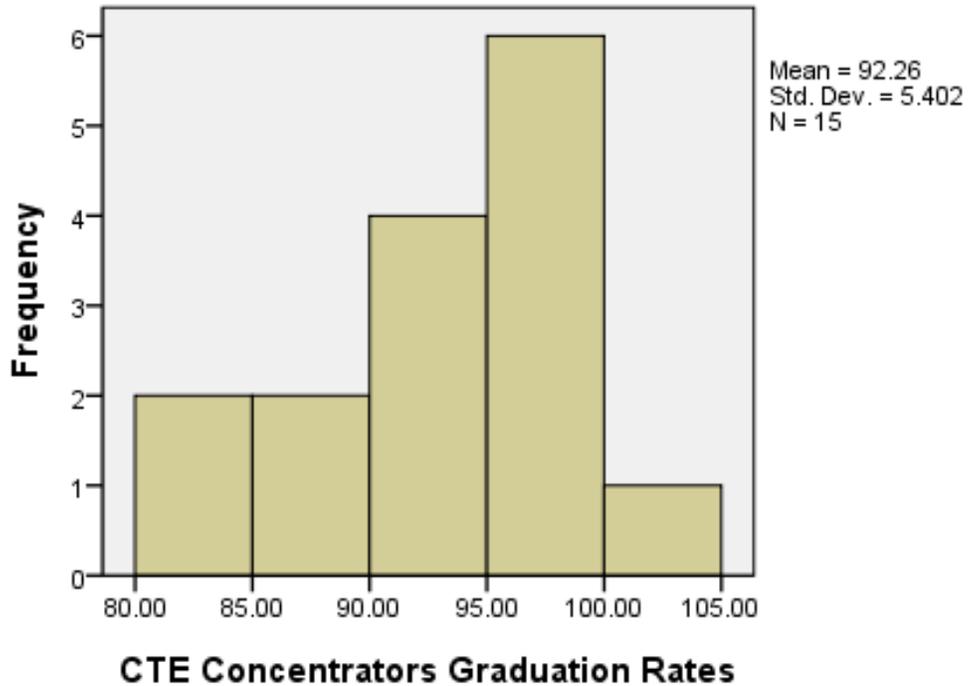


Figure 8. Distributions of the 2008-2009 12th-Grade CTE Concentrators Graduation Rates for the 15 Participating Tennessee School Systems

Research Question 5

For all school systems in Tennessee, is there a significant difference in the graduation rates between 12th-grade CTE concentrators and the state mean graduation rate of (83.2% for 2007-2008, and 82.2% for 2008-2009)?

Ho5₁: For all school systems in Tennessee, there is no significant difference in the graduation rates of the 12th-grade CTE concentrators and the state mean graduation rate of 83.2% for the 2007-2008 academic school year.

A one-sample *t* test was conducted on graduation rates of 12th-grade CTE concentrators for all school systems in Tennessee, to evaluate whether their mean score was significantly different from the state mean score of 83.2%. The sample mean of 92.05 (*SD* = 6.10) was significantly different from 83.2, $t(119) = 15.88, p < .001$. The 95% confidence interval mean for all school systems in Tennessee ranged from 90.94 to 93.15. The strength of the relationship between all Tennessee school systems and the state mean score effect size *d* of 1.45 indicates a large effect. Figure 9 shows the distributions of the 2007-2008 12th-grade CTE concentrators graduation rates for all school systems in Tennessee.

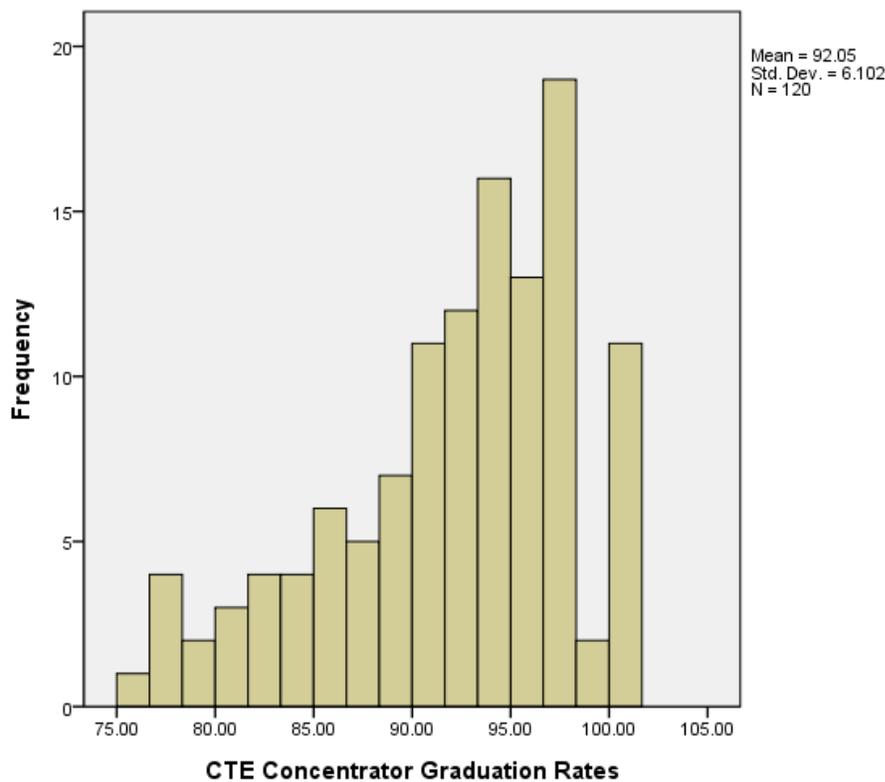


Figure 9. Distributions of the 2007-2008 12th-Grade CTE Concentrators Graduation Rates for all School Systems in Tennessee

Ho5₂: For all school systems in Tennessee, there is no significant difference in the graduation rates of the 12th-grade CTE concentrators and the state mean graduation rate of 82.2% for the 2008-2009 academic school year.

A one-sample *t* test was conducted on the graduation rates of 12th-grade CTE concentrators for all school systems in Tennessee, to evaluate whether their mean score was significantly different from the state mean score of 82.2%. The sample mean of 92.98 (*SD* = 4.75) was significantly different from 82.2, $t(117) = 24.68, p < .001$. The 95% confidence interval mean for all school systems in Tennessee ranged from 92.12 to 93.85. The strength of the relationship between all Tennessee school systems and the state mean score effect size *d* of 2.24 indicates a large effect, therefore the hypothesis was rejected. Figure 10 shows the distributions of 2008-2009 12th-grade CTE concentrators graduation rates for all school systems in Tennessee. Appendix E shows a comparison of Tennessee's overall graduation rates and CTE concentrators graduation rates for the 2007-2008 and 2008-2009 school years.

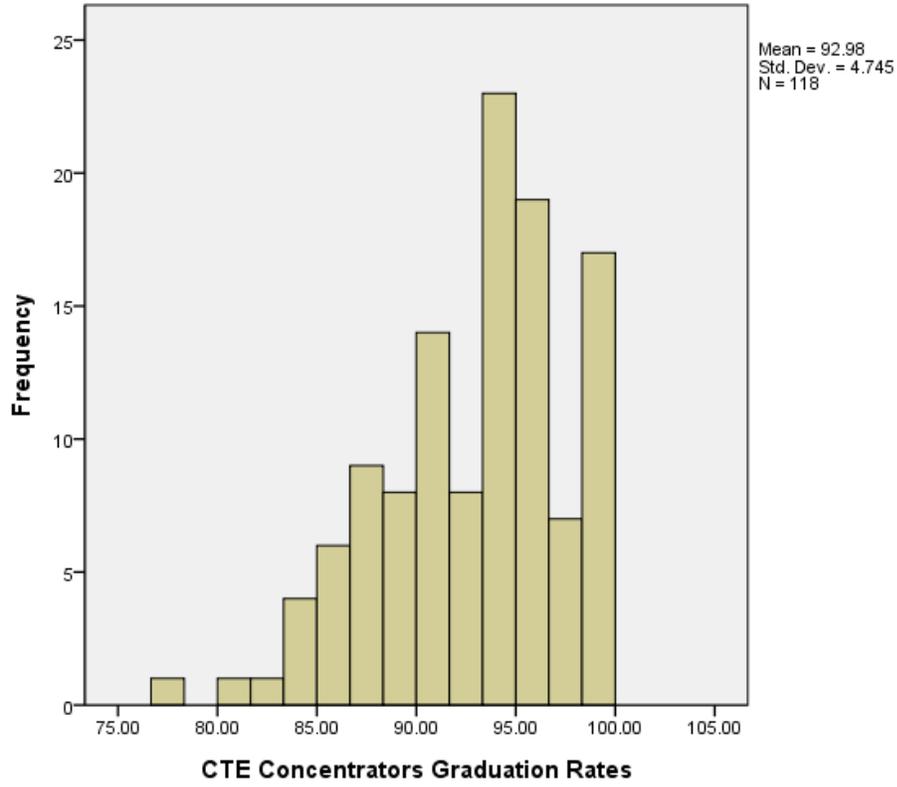


Figure 10. Distributions of the 2008-2009 12th-Grade CTE Concentrators Graduation Rates for all School Systems in Tennessee

CHAPTER 5

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

Chapter 5 contains the findings, conclusions, and recommendations for readers who may use the results as a resource when considering or encouraging a Career and Technical Education (CTE) program of study within a school system or in the planning of a high school senior's career path. The purpose of this study was to compare graduation rates between CTE concentrators (12th-grade students who completed at least three vocational courses in the same area of study) and non-CTE concentrators. The analyses for research questions 3 and 5 were conducted on all 12th-grade students enrolled in Tennessee school systems for the 2007-2008 and 2008-2009 academic years. Fifteen participating school systems were more closely examined in questions 1, 2, and 4 to study graduation rates of CTE concentrators in northeast Tennessee. Additional analysis was conducted on graduation rates between male and female 12th-grade CTE concentrators for the entire state. Differences in gender were also analyzed for the 15 participating northeast Tennessee school systems.

For many years there has been no common equation for determining high school graduation rate data among states. Inconsistency makes it difficult to compare graduation rates among states; therefore, Tennessee was the only state evaluated in this study. However, with increased federal involvement in public education through No Child Left Behind (NCLB), the equations used among states to figure 12th-grade graduation rates are becoming more consistent. NCLB created a 4-year adjusted cohort rate for all school systems to meet federal accountability

in AYP. States have until the 2011-2012 academic year to implement this new regulation. This consistency will allow for the comparison of graduation rates between states, districts and systems (Tennessee Department of Education, 2010b). No matter how individual states calculate graduation rate, the value of a high school diploma and reducing the dropout rate are evident.

CTE concentrators from the 2007-2008 and 2008-2009 school years were selected for this study because of the consistency found as to how the state of Tennessee defined a CTE concentrator. For the 2007-2008 and 2008-2009 academic years, a CTE concentrator was defined by the state as a student who has completed three vocational courses in the same area of study. The researcher found inconsistency in previous years as to how the state of Tennessee defined a CTE concentrator; therefore, only the 2007-2008 and 2008-2009 academic school years were used in this study.

The Office of Vocational and Adult Education (2005) reported that the number of students enrolled in CTE programs rose 157% from 1999 to 2004. According to the Association for Career and Technical Education (2006), CTE was reported to be a “major enterprise within the United States’ P-16 educational system” (Dare, 2006, p.73). According to the Tennessee Department of Education Report Card (2008), there were 302,508 9th-12th grade students enrolled in Tennessee schools. From these students, 177,832 (58.79%) were enrolled in 125 school systems that offered CTE courses. These students averaged 1.25 CTE courses each for the 2007-2008 school year. The Tennessee Department of Education Report Card (2009) reported that there were 287,399 9th-12th grade students enrolled in Tennessee schools. From these students, 188,541 (65.60%) were enrolled in 123 school systems that offered CTE courses. Appendix D shows the total number of CTE students by grade for both the 2007-2008 and 2008-

2009 school years.

According to the Tennessee State Department of Education Report Card (2009, 2010a), there were more males enrolled in CTE courses for both years. There were also more males than females enrolled in secondary education across the state for both years. Out of 177,832 CTE students enrolled in 2007-2008, 90,593 (50.94%) were males, and out of 188,541 CTE students enrolled in 2008-2009, 96,484 (51.17%) were males.

Summary of Findings

The statistical analyses reported in this study were governed by the research questions presented in Chapter 1 and clarified in Chapter 3. In Chapter 3, 10 null hypotheses were presented for the five research questions included in this study. The dependent variable for each analysis was the overall graduation rates of 12th-grade CTE concentrators. The independent variables were the type of concentration (CTE or non-CTE) students were enrolled in during 9th-12th grade and gender (male and female). The type of concentration and gender were obtained from the Tennessee Department of Education and the 2007-2008 and 2008-2009 Tennessee Report Cards. Overall graduation rates used for CTE concentrators in this study were based on 3S1 graduates (the percentage of 12th-grade CTE concentrators who received a high school diploma, GED, or state certificate). An independent-samples *t* test was conducted to answer three research questions, and a one-sample *t* test was conducted to answer the remaining two research questions. The .05 level of significance was used to test all five research questions.

Conclusions

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

1. A significant difference was found between the graduation rates of 12th-grade CTE concentrators and non-CTE concentrators for the 15 participating northeast Tennessee school systems for the 2007-2008 academic school year. CTE concentrators had a mean graduation rate of 92.93% compared to the mean graduation rate of 81.79% for non-CTE concentrators. These findings indicated that CTE concentrators from the 15 participating systems graduated at a higher rate (11.14%) than non-CTE concentrators for the 2007-2008 academic year. The CTE concentrators graduation rate of 92.93%, exceeds the state AYP goal of 90%. The findings of this study coincided with published research. Illinois school statistics for Fiscal Year 2003 showed that students who concentrated in a CTE program averaged a 95% graduation rate which exceeded federal expectations (Illinois Office of Educational Services, 2010). Kulik (1998) concluded that vocational education increased the graduation rate by nearly 6% for high school students who were not considered college bound. Research conducted in 1998 at the University of Michigan agreed by reporting that quality CTE programs can reduce a systems dropout rate by at least 6% (ACTE, 2007). In a similar study where tech-prep students were compared to non tech-prep students (N = 247,778), tech-prep students had a consistently lower dropout rate than non tech-prep students.

However, for the 2008-2009 academic year, there was no significant difference found in the graduation rates between CTE concentrators and non-CTE concentrators.

CTE concentrators had an average graduation rate of 92.26% compared to the mean graduation rate of 88.02% for non-CTE concentrators. The 4.24% increased graduation rate of CTE concentrators over non-CTE concentrators for the 2008-2009 academic year showed no significant difference and coincides with Harrison's (2004b) claim that the evidence was still out on the influence that the vocational focus has on high school students.

2. A significant difference was found in the graduation rates of 12th-grade CTE concentrators between male and female students for both the 2007-2008 and 2008-2009 academic school years for the 15 participating northeast Tennessee school systems. Female CTE concentrators graduated on average at a higher rate than male CTE concentrators. For 2007-2008, females had a mean graduation rate of 86.73% compared to the mean graduation rate of 82.21% for males. For 2008-2009, both males and females increased their overall mean graduation rate compared to the 2007-2008 academic year. For 2008-2009 females had a mean graduation rate of 94.96%, averaging higher than the male mean graduation rate of 89.66%. The findings of this study coincided with Swanson (2004), who reported that female high school students in the U.S. graduate at an 8% higher rate than males. The Tennessee Report Card (2010a) also indicated that females on average graduate at a higher rate than males.
3. A significant difference was found in the graduation rates of 12th-grade CTE concentrators between male and female students in all school systems in Tennessee for both academic school years 2007-2008 and 2008-2009. Female CTE concentrators on average graduated at a significantly higher rate than male CTE

concentrators. For 2007-2008 females had a mean graduation rate of 89.30% compared to the mean graduation rate of 85.88% for males. For 2008-2009 males increased their overall mean graduation rate by 5.54% compared to the 2007-2008 academic year. For 2008-2009 females had a mean graduation rate of 94.56%, averaging higher than the male mean graduation rate of 91.42%. The Tennessee Department of Education Report Card (2010a) reported that females across the state have a 6.7% higher overall graduation rate than males.

4. A significant difference was found in the graduation rates between 12th-grade CTE concentrators and the region's overall mean graduation rate of 86.97% for the 2007-2008 academic year. This study concluded that, from the 15 participating northeast Tennessee systems, 12th-grade CTE concentrators mean graduation rate of 92.94% was higher than the region's overall mean graduation rate of 86.97%. Research from Maxwell and Rubin's (2000) career academies suggested that CTE does have a place in reducing high school dropout rates, which coincides with the findings of the 2007-2008 academic year in this study. No significant difference was found between the region's 12th-grade CTE concentrators graduation rate (92.26%) and the regions overall graduation rate (90.51%) for the 2008-2009 academic year.
5. A significant difference was found in the graduation rates between 12th-grade CTE concentrators and the state mean graduation rates for both the 2007-2008 and 2008-2009 academic school years. It was concluded that 12th-grade CTE concentrators mean graduation rate of 92.05% was higher than the state's overall mean graduation rate of 83.2% for the 2007-2008 academic year. For the 2008-2009 academic year it

was concluded that 12th-grade CTE concentrators mean graduation rate of 92.98% was higher than the state's overall mean graduation rate of 82.2%. Results from this study agree with research by Evans and Burck (1992) who statistically support the values of integrating career and technical education as a means of improving academic achievement. A University of Michigan study conducted by Bates (n.d.), also coincided with this research and found that at-risk students are 8 to 10 times less likely to drop out in the 11th and 12th grades if they enroll in a career and technical program.

Recommendations for Practice

Results of the present study indicate that a Career and Technical Education concentration is an effective program of study for graduating high school seniors and may be effective at increasing a system's overall graduation rate. With school systems facing increased demands from both state and federal mandates and limited budgets in place to implement these mandates, administrators should examine the overall effectiveness of their CTE program before cuts are made. Leaders of local school districts, principals, teachers, and guidance counselors who work with high school students, can help increase the number of students graduating from high school by enrolling them in program areas where they have an interest and are likely to succeed, such as CTE courses.

Recommendations for Further Research

Results of this study indicate that Career and Technical Education may increase a system's overall graduation rate. Additional research needs to be conducted to clarify the effectiveness of a CTE program of improving a system's overall graduation rate. Recommendations for future

research include a replication of this study and expanding the research into three types of concentrations: CTE concentrators, non-CTE concentrators, and academic students (students who did not take a CTE course during 9th-12th grade).

With increased accountability measures through NCLB to more consistently figure graduation rates between states, this study could be replicated and expanded to compare graduation rates of 12th-grade CTE concentrators in other states. This study should also be replicated at the national level using graduation data from each state to determine how 12th-grade CTE concentrators compare to the overall national graduation rate. This research could be replicated and expanded by including a qualitative study that could survey students, teachers, and community members to gather their perceptions about CTE programs of study.

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APPENDICES

APPENDIX A

Tennessee Required Graduation Credits

Requirements for Students Beginning High School in Fall 2009		
Total Credits Required: 22		
Discipline	Credits Required	Description
Math	4	Algebra I, II, Geometry and a fourth higher level math course
Science	3	Biology, Chemistry or Physics, and a third lab course
English	4	English I, II, III, IV
Social Studies	3	World Geography, United States History, Economics, Government,
Physical Education and Wellness	1.5	
Personal Finance	.5	
Foreign Language	2	
Fine Arts	1	
Elective Focus	3	Math and Science, Career and Technical Education, Fine Arts, Humanities, Advanced Placement (AP) or International Baccalaureate (IB)
Capstone Experience		Requirements to be determined by the local Board of Education

APPENDIX B

2013 Tennessee Graduation Requirements

Tennessee's Required Gateway and End of Course Exam Scores

Summer 2009 – Gateway Cut Scores			
Gateway Examinations Scores for Proficient and Advanced Levels			
	Mathematics (Algebra I)	Science (Bio I)	Language Arts (Eng. II)
Advanced	41	37	39
Proficient	30	20	25

Summer 2009 – End of Course Examination Scores for Proficient and Advanced Levels		
	English I	U.S. History
Advanced	39	38
Proficient	23	21

APPENDIX C

Permission to Use Data Letter

Mr. XXXXXXXX, CTE Director
XXXXXXX School System
XXXXXXX, TN

Dear XXXXXXX,

I am a student at East Tennessee State University in the Educational Leadership and Policy Analysis doctoral program. I am interested in determining the graduation rates of 12th-grade CTE concentrators. The purpose of this study is to compare the graduation rates of CTE concentrators to non-CTE concentrators (students who have taken CTE courses but have not concentrated in a specific program). I am interested in examining high school seniors for the 2007-2008 and 2008-2009 school years.

I would like to request permission to obtain and analyze data on high school seniors in your school system for the years of 2007-2008 and 2008-2009. The names of participating school systems will be coded to protect their identity. Identifying information on individual students will not be collected.

With the increased demands being placed on systems through federal and state mandates on graduation rates, I trust that findings from this study may be beneficial to your school systems.

Sincerely,

Richard "Bo" Shadden

Permission is granted to Richard "Bo" Shadden to obtain and analyze data on the graduation rates of XXXXXX systems CTE concentrators and non-CTE concentrators for the year 2007-2008 and 2008-2009 school years.

Signature

Date

APPENDIX D

Tennessee CTE Student Enrollment by Grade

Grade	CTE Enrollment 2007-2008	CTE Enrollment 2008-2009
12	41,659	45,212
11	42,627	45,088
10	47,813	51,339
9	45,733	46,902
Total CTE Enrollment	177,832	188,541

APPENDIX E

Tennessee Systems Overall and CTE Concentrators Graduation Rates for

2007-2008 and 2008-2009

System	Overall Graduation Rate Percentage 2007-2008	CTE Concentrator Graduation Rate Percentage 2007-2008	Overall Graduation Rate Percentage 2008-2009	CTE Concentrator Graduation Rate Percentage 2008-2009
Alamo	NR	NR	NR	NR
Alcoa	90.50	97.06	95.90	100
Alvin C. York	91.90	100	91.70	94.87
Anderson Co.	84.30	93.40	85.60	93.80
Athens	NR	NR	NR	NR
Bedford Co.	87.50	86.35	84.50	90.10
Bells	NR	NR	NR	NR
Benton Co.	92.60	98.18	93.00	93.85
Bledsoe Co.	85.40	93.44	84.20	93.75
Blount Co.	82.30	92.80	86.20	92.31
Bradford	92.90	94.74	98.00	100
Bradley Co.	83.40	90.30	87.70	91.16
Bristol	87.10	91.30	88.40	83.33
Campbell Co.	81.80	94.97	89.00	86.64
Cannon Co.	83.50	100	72.70	91.43
Carroll Co.	NR	100	NR	100
Carter Co.	89.00	97.30	90.50	97.70
Cheatham Co.	92.20	92.68	91.70	84.40
Chester Co.	88.10	90.22	93.10	93.98
Claiborne Co.	83.30	87.85	83.20	88.62
Clay Co.	85.90	100	97.70	100
Cleveland	81.80	96.93	89.30	94.51
Clinton	NR	NR	NR	NR
Cocke Co.	79.40	79.13	83.70	90.04
Coffee Co.	82.90	85.22	86.30	93.18
Crockett Co.	92.10	82.14	96.50	98.70
Cumberland Co.	80.60	95.68	88.20	84.13
Davidson Co.	72.60	90.61	73.10	92.45
Dayton	NR	NR	NR	NR
Decatur Co.	75.70	87.78	84.80	97.85

DeKalb Co.	83.40	98.98	91.30	95.65
Dickson Co.	82.60	93.10	81.20	94.76
Dyer Co.	91.90	97.14	91.10	96.43
Dyersburg	89.20	100	89.00	98.91
Elizabethton	87.90	94.20	90.00	95.35
Etowah	NR	NR	NR	NR
Fayette Co.	85.30	82.65	84.60	93.99
Fayetteville	NR	NR	NR	NR
Fentress Co.	95.40	89.74	98.40	100
Franklin	NR	NR	NR	NR
Franklin Co.	84.90	91.79	88.90	93.66
Gibson Co. Spec.	92.30	93.33	90.50	93.83
Giles Co.	82.00	83.67	86.60	88.89
Grainger Co.	86.20	100	89.40	95.58
Greene Co.	92.10	96.28	93.40	91.88
Greeneville	96.90	90.63	97.10	95.83
Grundy Co.	83.70	98.21	93.30	95
Hamblen Co.	86.60	95.82	93.40	94.66
Hamilton Co.	72.60	78.45	70.90	85.93
Hancock Co.	88.90	97.83	91.50	96.72
Hardeman Co.	80.80	88.03	84.30	88.82
Hardin Co.	87.00	95.87	90.80	95.46
Hawkins Co.	81.20	94.97	87.50	86.84
Haywood Co.	73.50	88.29	74.20	95.97
Henderson Co.	88.00	98.59	88.50	93.48
Henry Co.	81.80	91.43	86.90	91.96
Hickman Co.	91.60	90.97	90.60	94.08
Hollow Rock Bruceton	100	100	98.30	96.15
Houston Co.	87.10	95.12	90.60	85.48
Humboldt	79.20	76.32	84.10	86.08
Humphreys Co.	85.40	92.19	88.20	96.39
Huntingdon	89.00	95.65	95.80	91.53
Jackson Co.	92.40	94.44	86.40	96.49
Jefferson Co.	85.40	97.72	88.30	98.35
Johnson City	93.30	96.26	94.90	90.95
Johnson Co.	90.30	92.37	90.50	100
Kingsport	90.00	95.24	93.10	95.00
Knox Co.	79.30	89.10	81.40	88.99
Lake Co.	77.20	84.00	80.00	87.50
Lauderdale Co.	77.50	95.20	82.90	90.44
Lawrence Co.	81.90	89.55	83.60	87.44

Lebanon	NR	NR	NR	NR
Lenoir City	93.10	100	88.70	95.59
Lewis Co.	92.40	84.38	88.00	92.31
Lexington	NR	NR	NR	NR
Lincoln Co.	85.70	98.29	86.60	95.89
Loudon Co.	88.50	85.11	88.40	98.49
Macon Co.	83.30	90.00	86.60	91.35
Madison Co.	81.70	92.10	83.80	94.03
Manchester	NR	NR	NR	NR
Marion Co.	90.80	96.61	84.60	96.18
Marshall Co.	88.20	77.89	91.40	91.67
Maryville	93.20	98.34	93.00	95.59
Maury Co.	74.40	81.63	79.90	87.10
McKenzie	100	97.96	96.10	93.33
McMinn Co.	89.20	94.44	90.80	90.43
McNairy Co.	92.50	94.55	94.30	93.51
Meigs Co.	90.40	90.77	96.00	97.96
Memphis	66.90	78.99	62.10	85.34
M. TN. Hlth. Inst.	NR	NR	NR	NR
Milan	95.50	92.05	97.10	93.42
Monroe Co.	78.60	77.94	84.60	76.80
Montgomery Co.	88.30	94.32	90.80	88.28
Moore Co.	90.00	94.60	86.30	100
Morgan Co.	94.70	95.87	94.90	89.51
Murfreesboro	NR	NR	NR	NR
Newport	NR	NR	NR	NR
Oak Ridge	89.40	100	92.10	98.97
Obion Co.	87.20	91.52	88	93.75
Oneida	92.20	100	87.80	0
Overton Co.	89.00	96.00	91.70	88.53
Paris	NR	NR	NR	NR
Perry Co.	90.80	90.39	94.00	98.31
Pickett Co.	96.20	96.67	97.80	95.83
Polk Co.	82.40	88.42	88.70	91.21
Putnam Co.	86.50	94.87	91.50	83.96
Rhea Co.	83.40	86.67	82.20	87.77
Richard City	NR	NR	NR	NR
Roane Co.	87.20	94.61	79.80	89.74
Robertson Co.	89.80	81.26	92.50	90.91
Rogersville	NR	NR	NR	NR
Rutherford Co.	88.00	95.65	91.30	93.57
Scott Co.	79.10	81.82	87.30	88.57

Sequatchie Co.	83.30	97.30	79.90	100
Sevier Co.	87.60	98.18	87.50	88.24
Shelby Co.	96.10	91.29	96.30	94.32
Smith Co.	95.40	90.70	94.60	92.31
South Carroll	96.90	96.77	97.40	100
Stewart Co.	96.30	93.10	93.50	96.18
Sullivan Co.	76.20	88.64	78.80	81.55
Sumner Co.	88.10	89.71	88.70	91.14
Sweetwater	NR	NR	NR	NR
Tenn. School for Blinds	NR	NR	NR	NR
Tenn. School for Deaf	NR	NR	NR	NR
Tipton Co.	90.00	98.74	93.50	96.85
Trenton	96.30	93.33	91.30	100
Trousdale Co.	92.20	98.59	96.20	98.41
Tullahoma	89.30	89.55	92.20	94.81
Unicoi Co.	85.00	89.89	93.90	88.00
Union City	84.50	95.83	86.10	96.43
Union Co.	77.00	79.87	72.60	88.64
Van Buren Co.	93.50	100	81.50	100
Warren Co.	81.60	99.57	84.40	95.67
Washington Co.	80.70	94.17	90.90	96.12
Wayne Co.	88.60	84.04	95.30	98.94
Weakley Co.	89.80	97.84	86.40	95.71
West Carroll	94.90	100	95.30	100
W.TN School for Deaf	NR	NR	NR	NR
White Co.	80.10	100	88.50	98.15
Williamson Co.	93.80	94.05	95.30	95.22
Wilson Co.	87.90	95.43	89.40	95.20

NR = Not Reported

VITA

RICHARD ERNEST SHADDEN, JR.

- Education: Ed.D. Educational Leadership and Policy Analysis,
East Tennessee State University, Johnson City, Tennessee,
2011
- M.S. Education Administration and Supervision,
Lincoln Memorial University, Harrogate,
Tennessee, 2001
- Certification in Agriculture Education, The
University of Tennessee, Knoxville,
Tennessee, 2000
- B.S. Ornamental Horticulture and Landscape
Design, The University of Tennessee,
Knoxville, Tennessee, 1996
- Daniel Boone High School, Gray, Tennessee, 1991
- Professional Experience: Doctoral Fellow, East Tennessee State University,
Department of Educational Leadership and
Policy Analysis, 2008 – 2011
- Board Member, Unicoi County Board of Education;
Erwin, Tennessee, 2008 – 2012
- Agriculture Teacher, Unicoi County High School;
Erwin, Tennessee, 1997 – 2008
- Conference Papers: Lampley, J., & Shadden, B. (2009). *Viewing and
gaming habits of fourth and fifth grade
children: Watching TV, playing video games, watching
movies, and using the internet*. Presented at the Mid-South
Educational Research Association Annual Meeting.
- Conference Presentations: The Graduation Rates of Career and Technical
Education (CTE) Concentrators. Presented at the Mid-
South Educational Research Association Annual Meeting
(2010)

Students' Perceptions of Climate and Culture on Christian College Campuses. Presented at the Mid-South Educational Research Association Annual Meeting (2009)

Viewing and Gaming Habits of Fourth and Fifth Grade Children. Presented at Mid-South Educational Research Association Annual Meeting (2009)

Honors and Awards:

National Outstanding Agriculture Education Teacher 2005 – 2006

Region V Outstanding Agriculture Education Teacher 2005 – 2006

Tennessee Vocational Agriculture Outstanding Teacher 2006

Tennessee Vocational Agriculture Teachers Association Young Agriculture Teacher of the Year 2002

Unicoi County High School Teacher of the Year (2003, 2004, 2006)

Unicoi County Soil Conservation Teacher of the Year (2001)

Who's Who Among America's Teachers