

## ABSTRACT

Title of Document: THE IMPACT OF CAREER AND  
TECHNICAL EDUCATION ON POST-  
SCHOOL EMPLOYMENT OUTCOMES  
AMONG YOUTH WITH DISABILITIES

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Given the college- and career-readiness national education agenda and the demands of the 21<sup>st</sup> century labor market, the purpose of this study was to describe and compare the relationship between post-school employment outcomes and the completion of a secondary education career and technical education concentration among youth with disabilities. Specifically, this study examined the labor force participation, employment, wages, and receipt of fringe benefits up to 11 years after exiting high school among youth with disabilities who completed a CTE concentration as part of their overall high school course of study. Data from the National Longitudinal Survey of Youth 1997 which includes a nationally representative sample of youth who attended high school in the late 1990's and beginning of the 21<sup>st</sup> century was used. A subsample of this data containing

youth with disabilities was utilized and their 2006 post-school outcomes were analyzed using logistic regression and ordinary least squares regression analyses.

The results suggest that youth with disabilities who complete a CTE concentration in high school have a higher likelihood of participating in the labor force, being employed, and earning higher wages up to 11 years beyond exiting high school controlling for household income, race, ethnicity, gender, location, and marital status. However, the likelihood that youth would have a job that provided fringe benefits was reduced for youth who concentrated in secondary CTE. Academic achievement, academic course-taking, and postsecondary degree attainment mitigated the effects of CTE on post-school employment outcomes. These findings emphasize the importance of CTE being utilized as a course of study option for youth with disabilities, especially for youth with disabilities who choose not to obtain a postsecondary degree. The findings also support the need for secondary CTE programs to integrate standards-based academic curricula and increase the facilitation of youth with disabilities into postsecondary education.

THE IMPACT OF CAREER AND TECHNICAL EDUCATION ON POST-  
SCHOOL EMPLOYMENT OUTCOMES AMONG YOUTH WITH DISABILITIES

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## **Dedication**

To my husband and son whose love fuels me every day.

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I joyfully acknowledge my heavenly father whose grace, love, and power consistently makes what seems impossible a true reality in my life. I am humbled by his awesomeness. I thank my husband, a man of authentic integrity, who makes it his priority to support my dreams. I thank my son Noah for it was his birth four and a half years ago that was the impetus for my decision to pursue a Ph.D. He truly fills my heart with joy. I thank my mother, father, brother, grandmother, grandfather, and a host of aunts, uncles, and cousins who from the time I can remember never faltered in their belief in me.

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## **List of Abbreviations**

ACASI: Audio Computer Assisted Self-Interview

ACS: American Community Survey

ADA: Americans with Disabilities Act

AFQT: Armed Forces Qualification Test

ASVAB: Armed Services Vocational Aptitude Battery

BLS: Bureau of Labor Statistics

CAPI: Computer Assisted Personal Interviewing System

CPS: Current Population Survey

CSSC: Classification of Secondary School Courses

CTE: Career and Technical Education

EBSCO: Education Research Complete

EHA: Education Handicapped Act

ELS: Educational Longitudinal Study

ERIC: Education Information Center

FCSE: Family and Consumer Sciences Education

GAO: Government Accountability Office

GLMP: General Labor Market Preparation

ICF: International Classification of Functioning

IDEA: Individuals with Disabilities Act

NAEP: National Assessment of Education Process

NAVE: National Assessment of Vocational Education

NCES: National Center for Education Statistics

NELS: National Education Longitudinal Study

NLSY97: National Longitudinal Study 1997

NLTS: National Longitudinal Transition Study

NLTS2: National Longitudinal Transition Study- 2

NRCCTE: National Research Center for Career and Technical Education

Perkins: Carl D. Perkins Education Act

POS: Program of Study

SASS: Schools and Staffing Survey

SLMP: Specific Labor Market Preparation

SOP: Summary of Performance

SPSS: Statistical Package of the Social Sciences

SST: Secondary School Taxonomy

STOWA: School-to-Work Opportunities Act

WIA: Workforce Investment Act

## Chapter 1

### Introduction to the Problem

Promoting employment of persons with disabilities is a major and long-standing federal policy goal (Executive Order No. 10640, 1955). Services, programs, and supports designed to increase employability of people with disabilities are found in a number of pieces of legislation, including Section 504 of the Rehabilitation Act of 1973, PL 93-112, the Americans with Disabilities Act (ADA) of 2008, PL 110-325, the Ticket to Work and Work Incentives Improvement Act of 1999, PL 106-170, the Individuals with Disabilities Education Improvement Act (IDEA) of 2004, PL 108-446, The 1998 Workforce Investment Act (WIA), PL 105-220, the School-to-Work Opportunities Act (STOWA), PL 103, 239 and the Carl D. Perkins Career and Technical Education Act of 2006 (Perkins IV), PL 109-270. According to the U.S. Bureau of Labor Statistics (BLS), only 34% of working-age people with disabilities are participating in the labor force compared to 77% of individuals without disabilities (U.S. Department of Labor, BLS, 2011a). An individual must be a labor force participant to have the opportunity to acquire a job. The BLS also reported an average 2010 employment rate for individuals with a disability of 18.6%, as compared to 63.5% to those without a disability (U.S. Department of Labor, BLS). These data indicate how urgent it is that schools better prepare youth with disabilities for future employment and more positive adult labor market outcomes.

For over a quarter of a century, since the release of the report, *A Nation at Risk*, by the National Commission on Excellence in Education (1983), high schools have been under scrutiny for exiting students who are not prepared to be productive citizens. Since

that time many policies have been created to raise high school achievement for all students through imposing tougher academic standards and requirements to obtain a diploma (Johnson, Stout, & Thurlow, 2009). As addressed in the recent US Department of Education's *Blueprint for Education Reform* report, state and national policy makers are currently focused on increasing the rigor of the high school curriculum and making every student college and career ready after graduation (U.S. Department of Education, 2010a). Many states are addressing this reform agenda by increasing course credit requirements in core academic subjects (National Center for Education Statistics [NCES], 2010) and adopting national common standards (U.S. Department of Education, 2010b).

In the same way, coursework that prepares students for emerging careers, called career and technical education (CTE), has also undergone reform. Historically, career and technical education (CTE) (formally vocational education) was considered a less academically rigorous course of study than college preparatory courses of study (Castellano, Sundell, & Overman, 2010). To maintain its relevancy in today's secondary education system, modern CTE emphasizes academics by integrating more rigorous standards-based academic content, increasing the academic achievement of CTE concentrators, and connecting CTE students to postsecondary education (Bishop & Mane, 2004; The Carl D. Perkins Career and Technical Education Act [Perkins IV], 2006). Instead of forcing students to select either a college or employment post-school course "track", CTE reform has allowed some students to take both a sequence of rigorous academic and a sequence of rigorous CTE courses making the rigor between the two curricular concentrations more comparable (Stone & Aliaga, 2005).

Concurrently, the percentage of youth with disabilities concentrating in CTE has decreased from 35.5% in 1990 to 30.3% in 2000 and 25.6% in 2005 (Levesque et al., 2008). At the same time, there has been an increase in the core academic credits earned by youth overall from 13.6% in 1990 to 14.9% in 2000 and 15.4% in 2005 (Levesque et al., 2008; NCES, 2010). Historically CTE was designed to prepare youth for entry-level jobs after high school; however it is not clear if the current form of CTE still provides the same, less, or greater labor market advantage for youth with disabilities.

In the remainder of Chapter 1, a rationale for investigating the relationship between CTE course taking and post-school employment outcomes is provided. First, recent data on post-school employment rates of youth with disabilities and overview key provisions in two primary laws that impact youth preparation for employment are summarized. Second, CTE course-taking patterns of youth with disabilities and discuss what is known about the relationship between CTE course-taking and employment outcomes of youth with disabilities are reviewed. Finally, the proposed research purpose, questions, and significance are provided.

### **Employment and Youth with Disabilities**

There has been interest for some time in documenting the transition of students with disabilities from school to employment. In the 1980's, Congress provided funding for the establishment of research and demonstration projects related to the transition of youth with disabilities (Sitlington, Neubert, & Clark, 2010). A portion of this funding led to the creation of the National Longitudinal Transition Study (NLTS), the first nationally representative survey of students aged 15 to 21 enrolled in special education programs. This study gathered data beginning in 1987 and follow-up data in 1990 on more than

8,000 students (Wagner, Newman, Cameto, & Levine, 2005). A number of studies have examined employment outcomes of youth with disabilities using data from the NLTS (D'Amico & Marder, 1991; Heal & Rusch, 1995; Wagner, 1992; Wagner, Blackorby, Cameto, Hebbeler & Newman, 1993). A 1993 NLTS examination of employment rates for youth with disabilities up to five years after leaving high school indicated an employment rate of 57% compared to a rate of 69% for the general population during the same time period (Wagner, Blackorby, Cameto, Hebbeler & Newman, 1993).

More recent data from the National Longitudinal Transition Study-2 (NLTS2) on post-school employment has indicated little improvement of these early outcomes for youth with disabilities overall. The NLTS2 followed over 11,000 students receiving special education services and who were ages 13 to 16 on December 1, 2000 (Wagner et al., 2005). The NLTS2 reported that among those youth in the study who had exited high school in 2005, 57% worked for pay outside the home as compared to 66% of youth in the general population (Newman, Wagner, Cameto, & Knokey, 2009).

Another source of current employment data for youth with disabilities comes from the Current Population Survey (CPS) which is the monthly survey of households conducted by the BLS. The 2010 average employment rate for older youth with disabilities ages 20 to 24 was 34.1%, as compared to of 61.3% for same aged youth without a disability (U.S. Department of Labor, BLS, 2011a). Together, these data show a persistent disparity between the employment rates of youth with and without disabilities.

### **Federal Policies Supporting the Preparation for Employment during High School**

Among the various policies that are designed to increase employability of youth, the two main federal policies that focus on the preparation of high school age youth with disabilities for employment and careers are the IDEA and Perkins IV. Together, these policies address secondary career education and post-school goal planning.

**The Individuals with Disabilities Education Act (IDEA).** Youth with disabilities are entitled to a free and appropriate public education under the IDEA. Under this law, youth with disabilities, parents, and school personnel develop an Individualized Education Program (IEP) to document the student's performance level, specifically designed instruction, services, functional and academic goals, and transition services (Yell, 2006). The IDEA requires that by the time the student reaches age 16 (some states make the requirement at age 14), the IEP should include measurable postsecondary goals based on transition assessments as well as needed transition services (Sitlington et al., 2010). Transition services include instruction, related services, community experiences, the development of post-school objectives, and vocational evaluation. The services are designed to facilitate, "movement from school to post-school activities" (IDEA, 20 U.S.C. 1400 § 602 (34)(A)). A critical transition service identified in Section 614 of the law is the course of study.

***Course of study.*** The course of study includes the set of courses a student will complete during his or her high school career. As early as age 14, the IEP team is to consider a course of study that aligns with youths' postsecondary goals. The course of study should be carefully formulated and updated annually to reflect any changes in the youth's postsecondary interests or goals (Kochhar-Bryant, Shaw, & Izzo, 2007). CTE is

considered a course of study option in the IDEA (IDEA, 2004) and is authorized by the Carl D. Perkins Career and Technical Education Act.

**The Carl D. Perkins Career and Technical Education Act (Perkins).**

According to Section 3(5) of the Perkins IV, CTE includes a sequence of courses that provides the technical knowledge and skills needed to prepare students for further education and careers in current or emerging professions. Career and technical education is offered in middle schools, high schools, community and technical colleges, and other postsecondary institutions.

Federal funding for CTE began with the passing of the Smith-Hughes Act in 1917. The original law was reauthorized seven times and today this program is the largest single source of funds the U.S. Department of Education spends on secondary education (Silverberg, Warner, Fong, & Goodwin, 2004). Historically, CTE legislation such as the Vocational Education Act of 1963, PL 88-210, the Vocational Education Amendments of 1968, PL 90-210, and the Carl D. Perkins Vocational Education Act of 1984 (Perkins I), PL 98-524, focused on training youth for entry-level jobs. Earlier CTE legislation also reserved separate funds to be used to serve special populations, including individuals with disabilities (U.S. Government Accountability Office [GAO], 1995). However, fueled by education reform and the changing skill needs of the workforce, CTE went through a wave of reforms in the 1990's (DeLuca, Plank, & Estacion, 2006; GAO, 2009).

Reforms during the 1990's included the elimination of set-aside funding for individuals with disabilities, a shift to preparing participants for all aspects of an industry, the integration of academics, and the creation of a performance measurement

accountability system (Cobb & Neubert, 1998; Silverberg et al., 2004; Sitlington et al., 2010; GAO, 2009). These changes were intended to align with the legislative mandates of broader education policy such as the No Child Left Behind Act of 2001, PL 107-110 and workforce training legislation such as the Workforce Investment Act (Sitlington et al., 2010). The reinvigorated form of CTE represents an attempt to maintain CTE's viability during a time where high school reform rhetoric centers on academic achievement (Bishop & Mane, 2004).

These changes are significant because Perkins IV accountability provisions suggest that CTE is expected to contribute to high school completion, entry into postsecondary education and training, postsecondary degree completion, and employment and earnings (Silverberg et al., 2004). Special populations such as individuals with disabilities are included in this accountability system. Perkins IV emphasizes the outcomes and performance of youth with disabilities rather than equal access (Silverberg et al., 2004). Unfortunately, states vary in whom they count in their accountability system, performance measures differ, and some states are not able to track students' transition to education and employment (GAO, 2009). This creates a lack of validity and reliability, making it difficult to analyze data across states.

Section 114 of Perkins IV establishes requirements for evaluation and assessment of CTE. Recent assessments of CTE include the National Assessment of Vocational Education (NAVE) 2004 (Silverberg et al., 2004) and the National Center for Education Statistics' (NCES) Career/Technical Education Statistic system (Levesque et al., 2008). These assessments evaluated the CTE delivery system and offerings, student participation, and outcomes of CTE course-takers. CTE can be classified into three

groups: family and consumer sciences education, general labor market preparation, and specific labor market preparation also known as occupational education. Ninety-two percent of youth with and without a disability took some type of occupational CTE coursework in 2005 (Levesque et al., 2008). The NCES found the more occupational credits earned in high school, the more often students worked and the more often they worked full time (Levesque et al, 2008). The NAVE found that for each additional occupational course students took, they earned almost 2% more annually (Silverberg et al., 2004). However, the NAVE found that this benefit may not continue for youth who do not enroll in postsecondary education within two years of exiting high school. In addition, the NAVE reported the relationship between completing a CTE concentration in an occupational area and higher earnings was mixed (Silverberg et al., 2004). Unfortunately, the NAVE and NCESS provided little specific data on the outcomes of CTE concentrators with disabilities.

### **CTE Course-taking and Employment Outcomes among Youth with Disabilities**

In the late 1980's and in the 1990's, follow-up studies examined the associations between CTE course-taking and employment outcomes (Baer et al., 2003, Frank, Sitlington, Cooper & Cool, 1990; Frank, Sitlington, & Carson, 1991; Schalock, Holl, Elliott, & Ross, 1992; Schwarz & Taymans, 1991; Shapiro & Lentz, 1991; Sitlington & Frank, 1990; Sitlington, Frank, & Carson, 1992; Wagner, 1991; Wagner, Blackorby, Cameto, & Newman, 1993). This body of research indicates mixed findings regarding the relationship between CTE course-taking and CTE employment outcomes. Some studies found no difference in the employment rates between those who did and did not participate in CTE (Frank et al., 1990; Frank et al., 1991; Sitlington & Frank, 1990;

Sitlington et al., 1992). Other studies found that participating in CTE coursework was associated with increased employment rates (Baer et al., 2003; Flexer, Daviso, Baer, Queen and Meindl, 2011; Harvey, 2002; Wagner, 1991; Wagner et al., 1993). CTE participation in high school has also been found to be associated with more weekly hours worked and a higher annual salary for youth with disabilities (Schalock et al., 1992; Wagner et al., 1993).

Since 2000, only three studies have been published that examined the relationship of CTE and post-school outcomes among youth with disabilities. Harvey (2002) used data from the National Education Longitudinal Study (NELS) to compare postsecondary outcomes of youth with and without disabilities who did and did not participate in CTE. Harvey found that students with disabilities who participated in CTE had the highest employment rate (55%) among all students with and without disabilities that did not participate in CTE one year after completing high school. Baer et al. (2003) examined the post-school outcomes of youth from four school districts in Ohio. The researchers found that youth who had CTE in high school had twice the odds of being employed than youth who did not take CTE. These two studies did not look at the employment outcomes of youth who took at least three CTE courses. Rather, both of these studies defined CTE participation as taking at least one CTE course. Flexer et al., (2011) did examine CTE concentrators and found improved odds of full-time employment one year after leaving high school. These follow-up studies collected data one year after high school graduation leaving a dearth of knowledge about employment outcomes multiple years after exiting high school. In addition, one of the studies (Harvey, 2002) included a sample that participated in CTE before the full implementation of the 1990 Perkins Act

major reforms including the eliminations of funds set-aside for special populations and the emphasis on the integration of academic instruction. Finally, these studies did not examine other employment outcomes such as labor market participation, wages, and receipt of benefits. Therefore, it is not clear how concentrating in CTE influenced these outcomes.

There are four main large-scale databases that provide data on the CTE course-taking of youth with disabilities and labor market information, the National Education Longitudinal Study of 1988 (NELS), The National Longitudinal Transition Study (NLTS), The National Longitudinal Transition Study-2 (NLTS2) and The National Longitudinal Survey of Youth (NLSY97). Only the NLSY97 has available transcript data that provide information on coursework as well as information on employment outcomes for youth with disabilities that participated in CTE in the mid to late 1990s.

The NLSY97 is a nationally representative sample of public high school youth in high school during the late 1990's and beginning of the 21<sup>st</sup> century. This study is currently in the 13<sup>th</sup> round of tracking youth living in the U.S. who were 12 to 16 years old as of December 31, 1996. The sample includes youth that graduated from high school as recently as 2002. In my study, youth with disabilities were identified by questions in the NLSY97 parent survey about their child's health. Disabilities identified included learning disabilities, attention disorder, mental retardation, emotional problems, hearing and seeing problems, and physical challenges. The NELS and NLTS only capture the school experiences of youth between 1989 and 1992. Therefore, youth in these samples were only in school during the first couple of years after the CTE legislation changes (Plank, 2001). With regard to the NLTS2 data, to this date, transcript

data have not been made available. The transcript data are necessary to determine the specific amount of CTE credits obtained during high school and identify CTE concentrators. Utilization of the NLSY97 provided the unique opportunity to analyze employment outcomes among CTE concentrators with and without disabilities over a decade after the 1990 reform efforts.

### **Purpose of the Study**

The purpose of this study is to describe and compare the relationship between post-school employment outcomes and completing a secondary education CTE concentration among youth with disabilities. To conduct this inquiry, the NLSY97 was used. This dataset provides information on youths' background, secondary education course credits earned, and a range of post-school labor market outcomes. The data were obtained through parent and youth surveys as well as high school transcripts. The employment outcome data for this came from the 2006 youth survey round. During this survey year, some youth had been out of school for up to 11 years.

### **Research Questions**

The research questions for this proposed study will be addressed using the outcome data from the 2006 survey round of the NLSY97 and include the following:

Research question 1: To what extent does completion of a CTE concentration in high school predict post-school labor force participation status for youth with disabilities in the NLSY97?

Research Question 2: To what extent does completion of a CTE concentration in high school predict post-school employment status for youth with disabilities in the NLSY97?

Research Question 3: To what extent does completion of a CTE concentration in high school predict post-school receipt of fringe benefits for youth with disabilities in the NLSY97?

Research Question 4: To what extent does completion of a CTE concentration in high school predict post-school wages for youth with disabilities in the NLSY97?

To answer these questions four regression equations were conducted. The first model included labor force participation status as the dependent variable. The second model included employment as the dependent variable. The third model included receipt of fringe benefits as the dependent variable. And the final model included wages as the dependent variable.

### **Summary and Significance of the Study**

The national education agenda has been shifting for several years to meet the needs of this 21<sup>st</sup> century economy. These changes have forced education stakeholders and programs to focus on the academic achievement and progress of students. Teachers must be highly qualified, education services such as those provided by IDEA must collect follow-up data on student outcomes, education programs such as CTE must meet negotiated performance measures, and schools have to show adequate yearly progress on high-stake assessments. Currently, national education grants challenge states to “Race to the Top” by creating common rigorous standards and assessments for students with the goal of making all students the college- and career- ready; a concept that is still somewhat vaguely defined. Meanwhile, secondary special educators must address students’ individualized goals and take into account the need for many students with disabilities to obtain specific career training and experiences to overcome the

employment challenges that have historically led to poorer employment outcomes for youth with disabilities as compared to their peers without disabilities.

Moreover, the U.S. economy is changing. Employees will increasingly have to work in a global market place and participate in global work teams (Karoly & Panis, 2004). Ninety percent of the jobs in four of the five fastest growing occupational clusters require some postsecondary education (Georgetown Center on Education and the Workforce, 2011). Nevertheless, BLS data show that individuals with disabilities are overrepresented in 19 of the top 20 declining occupations (Kruse, Schur, & Ali, 2010). Adding additional complexity to the situation, BLS data also show that a large portion of individuals with disabilities are not participating in the labor force (U.S. Department Labor, BLS, 2011a).

In light of this multi-faceted state of affairs, questions remain for decision makers on how to prepare youth with disabilities for the 21<sup>st</sup> century labor market. Can CTE, which has shown the ability to prepare students with disabilities to enter directly into the labor market, continue to do so while it also adapts its policies to meet the current economy needs and federal expectations? Do special educators continue to encourage students to complete a CTE concentration as a course of study or should they emphasize the core academic content? Is it possible for youth with disabilities to do both? While my study cannot fully answer these questions it does contribute to the body of literature related to CTE, college- and career-readiness reform, and the impact on youth with disabilities.

This study used the most recent national data available to predict the impact of completing a CTE during high school on employment outcomes at one point in time

among youth with disabilities. It is only the study in over a decade to use a national dataset to examine the outcomes of youth with disabilities that significantly invested in secondary CTE by taking three courses in one occupational area. This study also examined employment outcomes such as labor force participation and receipt of fringe benefits adding to the findings. There is a dearth of research in the field of special education on these central employment outcomes.

Finally, it is not known whether CTE participation in high school yields a labor market advantage beyond the first two or three years post-graduation. This is one of the first studies that used data from a longitudinal study to determine the influence of concentrating in secondary CTE on adult employment outcomes, while holding important youth characteristics such as gender, location of residency (urban or rural), marital status, race, and education attainment constant for the purposes of better understanding the relationship between CTE and future outcomes

## **Key Terms**

The following terms will be used in this study:

Career/technical education (CTE) in high school – Coursework that encompasses non-occupational CTE, which includes family and consumer sciences education (i.e., courses that prepare students for roles outside the paid labor market) and general labor market preparation (i.e., courses that teach general employment skills such as word processing and introductory technology skills); and occupational education, which teaches skills required in specific occupations or occupational clusters.

Credit- A standardized measure used to provide a consistent measure of course-taking from the student transcript data collected. A credit is equivalent to one Carnegie unit, which is awarded for a class that meets for one period per day for the entire school year, or the equivalent instructional time.

CTE concentrator- A student who earns 3.0 or more credits in any one following 10 broad specific labor market preparation program areas: agriculture, business (comprised of business management and business services), marketing, technology and communications (comprised of communications technology, computer technology, and other technology), trade and industry (comprised of construction, mechanics and repair, transportation, materials production, print production, and other precision production), health care, childcare and education, protective services, food service and hospitality, and personal and other services.

Employed persons- Persons who during the week prior to be surveyed (a) worked at least 15 hours as paid employees; worked in their own business, profession, or on their own farm, or worked 15 hours or more as unpaid workers in an enterprise operated by a

member of the family; and (b) all those who were not working but who had jobs or businesses from which they were temporarily absent because of vacation, illness, bad weather, childcare problems, maternity or paternity leave, labor-management dispute, job training, or other family or personal reasons, whether or not they were paid for the time off or were seeking other jobs. Each employed person is counted only once, even if he or she holds more than one job.

Employment rate- The percent of the population that is employed.

Fringe benefits- Includes , fringe benefits included any of the following: medical insurance, life insurance, dental benefits, paid maternity or paternity leave, unpaid maternity or paternity leave which allows return to the same job, retirement plan, flexible work schedule, tuition reimbursement for certain types of schooling, company provided or subsidized child care, employee stock ownership.

Labor force- Includes all persons classified as employed or unemployed.

Labor force participation rate- The percent of the population that are employed or unemployed (not working but making efforts to find employment).

Not in the labor force- Includes persons who are neither employed nor unemployed.

Occupational area- For data prior to 2005, the occupational education component of the career/technical education curriculum is organized into the following 10 (or 18 disaggregated) occupational areas: agriculture; business (business management, business service); childcare and education; food service and hospitality; health care; marketing and distribution; personal and other services; protective services; technology and communications (communications technology, computer technology, other technology);

and trade and industry (construction, mechanics and repair, materials production, print production, other precision production, transportation). For data from 2005 on, occupational education is organized into the following 11 (or 20 disaggregated) occupational areas: agriculture and natural resources; business (business finance, business management, business support); communications and design; computer and information sciences; construction and architecture (architecture, construction); consumer and culinary services (consumer services, culinary arts); engineering technologies; health sciences; manufacturing, repair, and transportation (manufacturing, mechanics and repair, transportation); marketing; and public services (education, library science, protective services, public administration and legal services).

Unemployed persons- Persons who had no employment when surveyed, were available for work, except for temporary illness, and had made specific efforts to find employment sometime during the 4-week period ending with the reference week. Persons who were waiting to be recalled to a job from which they had been laid off need not have been looking for work to be classified as unemployed.

Unemployment rate- The number of unemployed as a percent of the labor force.

Youth- For the purpose of this study, a person between the ages of 14 and 24 is a youth. This definition aligns with data available from the Bureau of Labor Statistics.

Youth with a Disability- A person between the ages of 14 and 24 who has a learning or emotional problem that limits the kind of schoolwork he/she can perform, the amount of time he/she can spend on these activities, or his/her performance in these activities; has trouble seeing, hearing, or speaking; or had physical disability.

## **Chapter 2**

### **Review of Literature**

The purpose of this study was to describe and compare the relationship between post-school employment outcomes and the completion of a secondary education CTE concentration among youth with disabilities. Specifically, this study examined the labor force participation, employment, wages, and receipt of fringe benefits up to 11 years after exiting high school among youth with disabilities who completed a CTE concentration as part of their overall high school course of study. This chapter consists of the following sections: an overview of the current employment statistics among youth with disabilities, an overview of two federal programs that support the preparation of youth with disabilities for employment, a review of evaluations of the CTE delivery system including the characteristics of CTE course takers, and a review of research related to CTE course-taking and postsecondary outcomes.

### **Employment and Youth with Disabilities**

According to the American Community Survey (ACS) data, a U.S. Census Bureau survey that provides estimates on demographic characteristics of the U.S. population, there are approximately 22,107,800 youth ages 16 to 20 in the U.S. (Erickson & von Schrader, 2010). Out of that population, 1,233,700 or 5.6% report having one or more disabilities (Erickson & von Schrader). In high schools across the country, 2,275,915 youth with disabilities ages 14 to 21 received special education services in 2007 (U.S. Department of Education, 2008). For the majority of youth with disabilities, obtaining employment is a primary post-school transition goal (Cameto, Levine, & Wagner, 2004). The employment of people with disabilities is very important as it

contributes to one's economic well-being, social capital, sense of personal efficacy, and life satisfaction (National Council on Disability, 2007). Furthermore, the employment of people with disabilities is important for society overall. Employed individuals with disabilities contribute to the diversity of the workplace, provide a pool of people to work in high-growth industries, represent a customer base for business, and reduce government social expenditures (National Council on Disability).

Awareness of poor post-school outcomes, including employment, for youth with disabilities grew as a result of findings from a number of follow-up studies in the 1980s and 1990's (Benz, Yovanoff, & Doren, 1997; Hasazi, Gordon, & Roe, 1985; Zigmond & Thorton; 1985). Findings from the first national study on outcomes of youth disabilities, the NLTS, cemented the concerns (Blackorby & Wagner, 1996; D'Amico & Marder, 1991; Heal & Rusch, 1995; Wagner, 1992). While the most recent nationally representative sample shows improvements over the past 20 years in the post-school employment outcomes of youth with disabilities, disparities between those with and without disabilities continue to persist (Newman et al., 2009).

**Employment statistics.** The Current Population Survey (CPS) is a monthly household survey conducted by the Bureau of the Census for the BLS. It provides the most current and comprehensive information on the employment of the total U.S. population as well as by race, gender, veteran status, and most recently disability. To fulfill the requirement of Executive Order 13078, signed by President Bill Clinton, the CPS added six disability questions allowing employment data by disability status. These data first became available in February of 2009 and are now reported monthly (U.S. Department of Labor, 2009). These data provide an indication of the labor force

participation and employment rate of youth with and without disabilities ages 16 to 19 and 20 to 24. In addition to BLS data, a second nationally representative study of youth with disabilities, the NLTS2 provides further information about youth employment outcomes and the factors associated with an increased probability of employment.

*The BLS data.* According to the BLS data, in 2010, 22.7% of youth with disabilities ages 16 to 19 participated in the labor force compared to 35.4% of those same-aged youth without disabilities (U.S. Department of Labor, 2011a). The participation rate includes currently employed individuals and those unemployed but making efforts to seek employment. As youth age, those without disabilities continue to increase their labor force participation at a higher percentage than those with disabilities ages 16 to 19 years old. Approximately 45.1% of youth with disabilities ages 20 to 24 participate in the labor force compared to 72.4% of youth without disabilities in the same age range. The BLS does not consider an individual not searching for employment as a member in the labor force. Unfortunately, the BLS data indicating individuals with disabilities as “not in the labor force” are quite substantial and represent over 66.0% of individuals with disabilities who are of working age. This compares to 22.8% of people with no disability (U.S. Department of Labor, 2011a).

The BLS defines the employment rate as the proportion of the population that is employed. During 2010, the BLS reported an average employment rate of 14.6% for youth with disabilities ages 16 to 19 and a rate of 34.0% for youth with disabilities ages 20 to 24. With regards to youth without disabilities ages 16 to 19, their employment rate was 26.3% representing about a 11.7 percentage point difference. However, by the time

youth without a disability reach ages 20 to 24, their employment rate is 61.3% increasing the percentage point difference to just over 27.0 percentage points.

*The NLTS2 data.* A recent NLTS2 report provided information on the 2005 employment rates of youth with disabilities who were out of school from one to three years compared to youth without disabilities (Newman et al., 2009). Newman et al. (2009) used data from the NLSY97 to make comparisons to the general population. The report also provides information on the differences in the employment outcome based on disability, demographics, and high school completion. In 2005, 57% of youth with disabilities reported having worked for pay outside the home at the time of the interview compared to 66% of youth from the general population. To date, the NLTS2 has not provided data on employment outcomes of CTE course-takers. However, this information is important to gaining insight into the employment outcomes of youth with disabilities.

*Differences by Disability.* According to Newman et al. (2009), youth with orthopedic impairments and mental retardation had the lowest employment rate at the time of the interview at 27.3% and 31.0% respectively. Youth with other health impairments had the highest employment rate at 67.8% followed by youth with learning disabilities at 63.6%. Next, were youth with speech/language impairments and hearing impairments with rates at 57.5% and 53.9% respectively. The remaining disability categories had employment rates above 40% which included multiple disabilities (48.8%), autism (46.9%), visual impairments (42.7%), and emotional disturbance (42.3%).

*Differences by Gender and Race/Ethnicity.* The NLTS2 data indicated that at the time of the 2005 interview, male youth with disabilities had higher employment rates

than female youth with disabilities at 62.2% and 45.7% respectively. Only 35.2% of out-of-high school African American males maintained employment versus 53.8% of Hispanic youth and 62.6% of White youth.

*Differences by Household Income.* Employment status for youth with disabilities also varied with household income. Youth whose household income was \$25,000 or less had the lowest employment rate at 47.8%, compared to households of \$25,001 to \$49,999 (63.2%), and households that had an income than \$50,000 or greater (56.3%).

*Differences by High School-Leaving Status.* Newman et al., (2005) indicated that 61% of youth with disabilities who completed high school demonstrated employment compared to 41.0% of youth with disabilities that did not complete high school. However, this difference was not significant.

**Summary of employment data.** The NLTS2 data show that in 2005 there was a nine percentage point difference between the employment rates of youth with and without disabilities one to three years after graduation. Also, there are employment rate differences by disability, gender, household income. Youth with orthopedic impairments and mental retardation, females, African American males, household incomes at \$25,000 or below, had the lowest employment rates amongst other disability categories, females lower than males, and youth who did not complete school. The BLS data show that differences in the employment rates for youth exist and widen overtime. The BLS data also show that more than half of the working-age individuals with disabilities are not participating in the labor force. These outcomes make it clear that preparing for participation in the labor force and maintaining employment should begin early for youth with disabilities.

## **Federal Policies Supporting Preparation for Employment in High School**

During President Ronald Reagan's administration, he observed, "Decisions about discipline, curriculum, and academic standards-the factors that make a school good or bad- shouldn't be made by people in Washington" (as cited in Astuto & Clark, 1986, p. 6). Contrary to Reagan's view, for the past 20 years, the federal government increasingly initiated education reform (Lasky, 2004). Policies such as Goals 2000, PL 103-227, The School-to-Work Opportunities Act of 1994 (STOWOA), PL 103-329, and the No Child Left Behind Act of 2001, PL 107-110 focus on academic standards, accountability, and student outcomes. Federal initiatives such as these influence the purposes, processes, and curriculum of schooling. To establish the federal policy context, two important federal policies associated with preparing high school youth with disabilities for careers, the IDEA and Perkins IV are reviewed below. Both of these policies resemble broader education reform policies by design (Sitlington et al., 2010). For each statute a brief historical overview of key provisions is provided, current key definitions and requirements are defined, and salient accountability mandates are identified..

**The Individual with Disabilities Education Act (IDEA).** IDEA is the legislation that entitles students with disabilities to a free and appropriate public education (originally entitled the Education for All Handicapped Children Act of 1975). IDEA is the primary source of federal monies to state and local school systems for special education instruction and support services to over 6 million children and youth with disabilities (US Department of Education, 2008). Under this law, youth with disabilities, parents, and school personnel develop an IEP. The IEP contains the student's present level of performance, program goals, the educational placement, the special

education and related services, the evaluation and measurement criteria, as well as transition services and goals (Yell, 2006).

***Brief historical overview.*** For nearly 25 years a consistent focus on students with disabilities transitioning from the entitlement of special education services toward successful employment outcomes exists in federal legislation. Beginning in 1983, The Education Handicapped Act (EHA) Amendments, PL 98-199 authorized over six million dollars to develop research projects related to the transition of youth with disabilities. In 1984, Madeline Will, former Assistant Secretary of the Office of Special Education and Rehabilitative Services (OSERS) at the U.S. Department of Education, provided a model for school and work services (Will, 1983). The model indicated levels of transition services for post-school employment: transition without special services, transition with time-limited services, and transition with ongoing services. Just two years after the establishment of Will's three level model, the federal government amended the EHA providing additional funds for innovative transition programs (Sitlington et al., 2010).

It was not until the federal government amended EHA again in 1990, and renamed it the Individuals with Disabilities Education Act (IDEA) (PL 101-476), that transition services and planning became a required component of students' IEPs. The IDEA of 1990 specified that IEP teams must include a statement about the youth's transition services needs in their IEP by the age of 16 (Sitlington et al., 2010). Federal law defines transition services as a coordinated set of activities for a child with a disability that:

(A) reflects a results-oriented process focused on improving the academic and functional achievement of the child with a disability in order to facilitate the

child's movement from school to post-school activities, including post-secondary education, vocational education, integrated employment (including supported employment), continuing and adult education, adult services, independent living, or community participation;

B) is based on the individual child's needs, taking into account the child's strengths, preferences, and interests; and

(C) includes instruction, related services, community experiences, the development of employment and other post-school adult living objectives, and, when appropriate, acquisition of daily living skills and functional vocational evaluation. (IDEA, 20 U.S. C. 1400 § 602 (34)(A-C))

The 1997 amendments to the IDEA changed the age requirement for addressing transition needs and services to 14. The IDEA 1997 amendments also required that the transition services component of the IEP contain the youth's course of study. The 1997 amendments specifically indicated that CTE is an example of an appropriate course of study (Sitlington et al., 2010).

***Current requirements.*** The most recent reauthorization of IDEA in 2004 (PL 108-446) made adjustments to the transition services requirements in the IEP. The age requirement for beginning transition planning returned to age 16, although many states continue to start transition planning for students with disabilities at age 14 (Sitlington et al., 2010). IDEA of 2004 mandates that the IEP include measurable post-secondary goals based upon age-appropriate transition assessments. The law also states the IEP must include the 'transition services (including courses of study) needed to assist the child in reaching those goals' (IDEA, 20 U.S.C. 1414 (d)(1)(A)(i)(VIII)).

In addition to these requirements, IDEA has additional stipulations related to transition. The 2004 reauthorization of IDEA included several other provisions related to post-school outcomes. IDEA 2004 required schools to invite students to the IEP meeting when the meeting discusses the student's post-secondary goals and the transition services needed to assist the student to reach those goals (IDEA, 2004). Also, section 614 of IDEA required all students with IEPs to exit high school with a Summary of Performance (SOP). The SOP summarizes the students' academic achievement and functional performance and serves as a tool by the student in various post-secondary environments, including employment.

*Accountability.* IDEA 2004 also increased states' accountability by requiring states to submit data related to 20 indicators in their State Performance Plans (National Secondary Transition Technical Assistance Center, 2010). Beginning in 2011, states must submit this data annually in the State's Annual Performance Report (National Secondary Transition Technical Assistance Center, 2010). Indicator 13 requires states to report the percent of youth with IEPs who have measurable, annual IEP goals and transition services including a course of study (National Secondary Transition Technical Assistance Center, 2010). Indicator 14 mandates that states collect data one year after graduation on the percent of youth with IEPs who are competitively employed and/or enrolled in post-secondary education.

**The Carl D. Perkins Career and Technical Education Act (Perkins).** Perkins IV, PL 109-270 authorizes congressional support for CTE. In fiscal year 2008, Congress appropriated \$1.2 billion for the improvement of local CTE programs (GAO, 2009). Congress designed Perkins IV to more fully develop the academic, career, and technical

skills of students to prepare for high skill, high wage, or high demand occupations in current or emerging professions (Perkins IV, 2006).

***Brief historical overview.*** Federal support for CTE began with the passage of the Morrill Act of 1862 (Cobb & Neubert, 1998). The Morrill Act provided funding for land grants to colleges to prepare workers for agriculture and mechanic arts. Fifty-five years later, Congress passed the Smith-Hughes Act of 1917 which provided funding for public schools to develop secondary vocational education programs. During this time, schools used the funds for training in the areas of agriculture, trade and industry, and home economics (Cobb & Neubert).

Historically, CTE related legislation such as the Vocational Education Act of 1963, PL 88-210 emphasized the need to include special populations (Sitlington et al., 2010). The Vocational Education Act Amendments of 1968 and 1976, respectively, required that states set aside 10% of their funding for special populations (Cobb & Neubert, 1998). Under this act, special populations included individuals with a disability, the disadvantaged, or individuals who have limited English proficiency (Cobb & Neubert). Congress renamed the Vocational Education Act, The Carl D. Perkins Vocational Education Act in 1984 (Perkins I), PL 98-524. Section 204 in Title II of Perkins I focused on individuals with disabilities. It specified that those with disabilities and disadvantages, “must have equal access to a range of career education activities and be included in recruitment, enrollment, and placement activities” (Cobb & Neubert, p.108). Perkins I mandated that each state set aside 57% of their basic grant to provide services to special populations. Ten percent of the funds for special populations were earmarked specifically for students with disabilities (Apling & Moulin, 1994; Cobb &

Neubert, 1998). Funding set-asides for special populations ended with the passage of the 1990 Perkins Amendments (Perkins II). As is the case with other pieces of major secondary education legislation, Perkins legislation in the 1990s moved from a focus on equal access to a focus on the outcomes of CTE participation for all youth.

***Current requirements.*** In the past, CTE prepared youth for entry-level jobs in occupations not necessarily requiring a baccalaureate degree (Levesque et al., 2008). However, during the 1990s, CTE legislation focused on efforts to reform programs and upgrade the image of CTE through a broader focus on all aspects of industries, mandating the integration of academics, restructuring programs to address modern labor market needs, and creating an accountability system and state performance standards for all benefactors of Perkins funds. (Silverberg et al., 2004; Sitlington et al., 2010). The definition of CTE outlines its expectations. Perkins IV defines CTE as:

organized educational activities that provide a sequence of courses that (A) offer a sequence of courses that-(i) provide 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; (ii) provides technical skill proficiency and industry-recognized credential, a certificate, or an associate degree; and (iii) may include prerequisite courses (other than a remedial course) that meet the requirements of this subparagraph; (Perkins IV 2006, 20 U.S.C. 2301 et seq. § (5)(A)(i-iii)).

Perkins IV also includes a new mandate, Programs of Study. Programs of Study include CTE courses that align secondary education with postsecondary education. They

may include the opportunity for students to participate in dual or concurrent enrollment programs to acquire postsecondary education credit, and must lead to an industry-recognized credential or certificate at the postsecondary level, or an associate or baccalaureate degree (Perkins IV, 20 U.S.C. 2301 et seq §122(c)(1)(i-iv)). Unlike a previous similar mandate called Tech Prep, at least one program of study is required for any entity that accepts Perkins funds.

*Accountability.* The standing of CTE within the current education agenda is not certain. Under the fiscal 2011 bill negotiated by the Obama Administration and Congress, Perkins Act programs are receiving a reduction of roughly \$137 million. For fiscal year 2012, the President has proposed a further cut which will reduce the total funding for CTE to \$1 billion (U.S. Department of Education, 2011). To document how CTE is supporting student outcomes, Perkins IV established six performance measures at the secondary level. The measures include academic attainment in reading/language arts, mathematics, technical skill attainment, secondary school completion, student graduation rate, student placement, and nontraditional participation (GAO, 2009). States must negotiate specific performance goals with the U.S. Department of Education (DOE) and report annually on their performance. The legislation also requires states to evaluate their local CTE programs. State reports must disaggregate the data by the special populations served under Perkins IV, which includes youth with disabilities (Perkins IV, 2006).

However, in a survey conducted by the GAO, many states reported challenges collecting data on CTE course-takers after they left the school system (GAO, 2009). In addition, Perkins IV allows states to establish their own data collection methods for the performance measures. These challenges and differences in methods make it difficult for

the U.S. Department of Education to aggregate student outcomes at the national level (GAO, 2009). Nevertheless, DOE uses the performance measures data as one way to gauge the success of state CTE (GAO, 2009).

**Summary of federal policies.** The IDEA 2004 and Perkins IV provide legal mandates that address the course of study and post-school employment outcomes of youth with disabilities. Since 1990 the IDEA recognizes the need to deliver services in the area of transition to youth with disabilities. Throughout the 1990s the IDEA strengthened its transition requirements by incorporating requirements such as a description of youths' course of study, participation of youth in IEP meetings when members discuss transition, and incorporation of annually updated, measurable post-secondary goals based on transition assessments and course of study selection. More than 30 years before IDEA transition requirements, CTE legislation mandated that schools set aside funds in CTE programs for youth with disabilities (Cobb & Neubert, 1998). Over time, CTE courses evolved to include preparing youth for all aspects of industry and integrating academics. Both IDEA 2004 and Perkins IV hold schools accountable for the post-school performance of youth with disabilities through accountability systems.

### **Federal Evaluations of Perkins III and IV**

The most current data on the CTE delivery system and offerings, student participation, and outcomes of course-takers is the NCES (Levesque et al., 2008) and the National Assessment of Vocational Education (NAVE) (Silverberg et al., 2004). Section 114 of Perkins III and IV mandates that the NCES collect and report performance information on CTE using a nationally representative sample of students (Perkins IV, 2006). Every five years, the NCES reports on the condition of CTE at the high school

level using existing NCES surveys including the High School Transcript Studies, the Schools and Staffing Survey (SASS), the National Education Longitudinal Study of 1988 (NELS:88), and the Educational Longitudinal Study of 2002 (ELS). (Levesque et al., 2008). In addition to the NCES data, Section 114 further requires the NAVE, an independent evaluation of CTE under Perkins IV (Perkins IV, 2006). The NAVE investigates questions about the effectiveness of CTE in improving student outcomes using NCES data as well as other available research studies (Silverberg et al., 2004). The NCES works with NAVE to provide Congress with information on CTE course-taking mandated under Perkins IV (Hudson & Laird, 2009). The most current NAVE is an assessment of Perkins III. To date, NAVE lacks an assessment of CTE under Perkins IV.

Analysis of high school transcripts provides a primary data collection tool for analyzing the participation of high school students in CTE. Transcripts include information on courses taken and credits earned. Annually, the NCES collects high school transcripts from a nationally representative sample of public and private schools that participate in the National Assessment of Education Process (NAEP) (NCES, 2009). The NCES codes courses using the Classification of Secondary School Courses (CSSC), which provides standardized numeric codes for over 2,200 courses (NCES, 2009). The NCES groups CSSC courses into broad subject areas called the Secondary School Taxonomy (SST). The SST is the framework used by the NCES to analyze high school transcript data (Bradby, 2007). The taxonomy shows that in the context of secondary education CTE represents into three groups: (a) family and consumer sciences education, (b) general labor market preparation, and (c) specific labor market preparation (Levesque et al., 2008; Silverberg et al., 2004). The youth who are included in the NLSY97 were

participants in CTE as reflected in the 1998 SST. Figure 1 provides an overview of the 1998 SST. Figure 2 shows the changes to CTE occupational courses as reflected in the 2007 SST.

Family and consumer sciences education (FCSE) prepares students for work outside the formal labor market and includes coursework such as home economics. General labor market preparation (GLMP) gives youth basic and introductory skills required for many jobs. GLMP includes courses such as general work experience, industrial arts, or basic keyboarding. Finally, specific labor market preparation (SLMP) also called occupational education, provides specific and advanced career training. This study examined students who took three or more classes in a single occupational area (CTE concentrators) and did not examine course-taking in the other two areas of the SST. According to the NAVE, most research on the relationship between CTE and post-school outcomes have focused on SLMP or occupational courses. This is due to the fact that nearly three out of four credits earned in CTE are SLMP coursework and previous studies suggest that they offer the greatest post-school employment and earnings benefit (Silverberg et al., 2004). It should be noted that this study did not examine whether or not the youth participated in work-based learning experiences along with completing a CTE concentration. Obtaining work-based learning experiences in high school has also been highly associated with post-school employment for youth with disabilities (Wagner et al., 1993).

**Characteristics of CTE course-takers.** According to the NCES and the NAVE, for the past few decades most youth take at least one CTE course (Levesque et al., 2008; Silverberg et al., 2004). The NCES report, *Career and Technical Education in the*

*United States: 1990 to 2005* (Levesque et al., 2008), showed that in 2005, 96.6% of youth took a CTE course in high school with an average of 4.01 CTE credits earned overall.

The report indicated that CTE participation rates for Whites, Blacks, and Hispanics were similar at 92.0%, 93.6%, and 93.0% respectively. Asian/Pacific Islanders and American Indians were also comparable at 87.0% and 89.3% respectively. More males (94.4%) participated in CTE than females (89.8%). Youth with disabilities and youth with limited English proficiency also showed similar participation rates, 92.2% and 91.3% respectively.

Wagner, Newman, Cameto, Levine, and Marder (2003) used data from the NLTS2 to examine CTE participation by disability category. Youth with multiple disabilities, mental retardation, and autism enrolled in CTE courses most frequently at 79.2%, 77.8%, and 76.9% respectively (Wagner et al., 2003). The remaining youth enrolled in CTE at a rate between 51.1% and 66% (Wagner et al.). Wagner et al. also found that, on average, CTE coursework comprised approximately 18.0% of youths' yearly course schedules.

**CTE course-taking patterns.** The NCES identifies CTE concentrators as students who take three or more courses in an occupational (SLMP) area (Levesque et al., 2008). This is the same definition that this study employs. The NAVE also defined a CTE explorer as a youth who completes three or more CTE credits but in more than one occupational area (Silverberg et al., 2004). Other researchers further differentiate between CTE course-taking by defining a dual concentrator (youth who fulfill both academic and CTE requirements); and neither (youth whose CTE and academic credit

counts did not meet the academic or CTE concentration requirements (Plank, 2001; DeLuca et al., 2006).

The NAVE reported that 44.5% of youth in high school were either CTE concentrators (26.0%) or CTE explorers (18.5%) (Silverberg et al., 2004). The NCES found that in 2005, 25.6% of the graduates with disabilities completed a CTE concentration as compared to 20.8% of the graduates in the general population. (Levesque et al., 2008). There was also some variation among students of different races and ethnicities in completing a CTE concentration. In 2005, 21.8% of White youth, 21.2% of Black youth, 18.2% of Hispanic youth, 12.6% of Asian/Pacific Islander youth, and 19.2% of American Indian youth completed a CTE concentration.

**Trends.** According to the NCES statistical analysis report, between 1982 and 1994, CTE course-taking by youth without disabilities decreased by 17.0%. On the other hand, CTE course-taking by youth with disabilities increased by 24% during the same time period (Levesque et al., 2008). Between 1990 and 2005, the rate of students with disabilities completing an occupational concentration dropped from 38% to 25.6%. Likewise, youth who completed low-level or no mathematics in ninth grade also showed a decrease in rates of completing a CTE concentration. Alternatively, from 1990 to 2005, the percentage of youth who completed a CTE concentration and whose 9<sup>th</sup> grade mathematics course was geometry or higher doubled from 8% to 16% (Levesque et al., 2008).

The pattern of increased academic coursework is consistent with the efforts during the 1990s to broaden the appeal of CTE and align with broader education reforms (Silverberg et al., 2004). The rates of youth who accumulated 4.0 or more CTE

occupational credits and completed the New Basics core academic standards (four years of English and three years of mathematics, science, and social studies) grew from 18.1% in 1990 to 60.2% in 2005 (Levesque et al., 2008). Similarly, the rates of youth who accumulated 4.0 or more CTE occupational credits and completed 4-year college-preparatory coursework (4.0 or more credits in English; 3.0 or more credits in mathematics at the algebra 1 or higher level; 2.0 or more credits in biology, chemistry, or physics; 2.0 or more credits in social studies with at least 1.0 credit in U.S. or world history; and 2.0 or more credits in a single foreign language) grew from 9.5% in 1990 to 36.6% in 2005 (Levesque et al., 2008). Trends about the academic course-taking among youth with disabilities were not specified in the report.

**Employment and earnings outcomes.** The NAVE reported employment and earnings for all CTE course-takers. The NAVE reported that CTE has little effect on employment. No matter what course of study youth focused on in high school, more than 90% of all students who graduated in 1992 maintained employment during the first year after graduating in 1992 and eight years later in 2000 (Silverberg et al., 2004).

The NAVE did find an association between CTE and higher earnings, one to two years after high school. In 1992 for every additional occupational CTE course accumulated, youth earned 3.2% more per extra course (\$207) (Silverberg et al., 2004). Seven years after graduation this benefit remained; however youth only earned 1.9% more for every additional occupational course. In addition, this 1.9% benefit may only be applicable to youth who enrolled in postsecondary education within two years after exiting high school. The NAVE only provided general information on outcomes for youth with disabilities. It reported that looking across studies, CTE “appears to

contribute to the short-term earnings for economically and educationally disadvantaged students, students with disabilities, and for both men and women” (Silverberg et al., p. 111).

For CTE concentrators, the NAVE reported that state data from the late 1990s showed an association between higher earnings and CTE concentration versus being a CTE explorer. However, the NAVE also reported that earlier examinations of NELS national data found no significant difference in earnings for youth who took 3.0 CTE credits in one occupational area (i.e. a concentration) or across multiple occupational areas (i.e. an explorer). The NAVE did not report outcomes specifically for youth with disabilities who concentrated in CTE.

The NCES also does not provide any specific outcome data for youth with disabilities. However, when examining outcomes for all high school graduates (with or without disabilities), the NCES showed that those with more occupational credits found employment and full-time employment more often eight years after high school. With regards to earnings, males in part-time job, had higher earnings associated with the amount of occupational credits earned in high school (Levesque et al., 2008). This relationship did not exist for females who worked part-time or full-time. This could be related to the type of jobs females were working in after high school.

**Summary of federal evaluations.** The NAVE and the NCES evaluation provide valuable insight into CTE from a national perspective. Both evaluations show the various patterns of enrollment in CTE by diverse student populations. The NCES reported a 25.6% of youth with disabilities concentrated in CTE. The trend for completing a secondary CTE concentration is downward. However, there has been a substantial

upward trend for higher level math course-taking for students who do choose to complete a CTE concentration.

The NAVE and the NCES agree that CTE participation may relate to higher earnings but find little difference in obtaining post-school employment for CTE concentrations compared to nonconcentrators. However, neither the NAVE and the NCES provide a very clear picture of how CTE impacts youth with disabilities specifically. The NAVE found a small earnings advantage seven years after high school for CTE participants but we don't know if this advantage holds true for youth with disabilities. In addition, the outcome data from the NCES are not based on multivariate statistics which would help explain the relationship between CTE and employment outcomes while accounting for student characteristics.

### **Review of the Research on CTE Course-taking and Post-School Outcomes**

What follows is the research on how CTE relates to post-secondary outcomes such as post-school employment, earnings, dropping out, and college attendance for youth with and without disabilities.

**Search methods.** The literature search began with the National Research Center for Career and Technical Education (NRCCTE). The NRCCTE's website provided research conducted since 2000 on CTE and outcomes of the general population using large-scale databases. The remainder of the review relied on electronic database searches in Education Research Complete (EBSCO) and Education Information Center (ERIC). Searches utilized the following combinations of key words: career and technical education, vocational education, Carl D. Perkins, outcomes of education, secondary education, disabilities, and employment. Also, an ancestral search in the journals of

*Career and Technical Education Research and Career Development for Exceptional Individuals* provided useful references. In addition, an online table of contents search in volumes of *The Journal for Vocational Special Needs Education* led to an author name search for Michael W. Harvey. This name search provided a literature review, from Harvey (2001), *The Efficacy of Vocational Education for Students with Disabilities Concerning Post-School Employment Outcomes*, which was particularly helpful as it added five articles included in this section.

Targeting literature that best met the goals of this review necessitated systematic exclusions. The literature review utilized select studies based on the following criteria: (a) youth with disabilities were included in the analytic sample when competitive employment was a dependent variable; (b) CTE course-taking was an independent variable; and (c) publication of the study occurred in the year 2000 or after. Only two studies examined CTE course-taking and employment outcomes for youth with disabilities. Therefore, the publication date was extended to 1990 or after for studies that included youth with disabilities in the analytic sample. The 1990's included several major amendments to the Perkins Act, including the removal of money set aside for the participation of special populations in CTE. This expansion of the publication date resulted in 17 articles; five that focused on all youth and 12 that focused on youth with disabilities only. A summary of the data source and analytic sample of the studies in the literature review can be found in table 1. The next section begins with a review of the articles that examined outcomes for *all* youth.

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**CTE course-takers and post-school outcomes among all youth.** While the majority of the research on CTE and post-secondary outcomes in the 21<sup>st</sup> century does not identify youth with disabilities, findings from this literature synthesis are pertinent for grounding knowledge about the potential effects of CTE for all youth. The outcome variable of interest in each study provides the structure for the following section. A summary of the variables used in all the studies can be found in Table 2.

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***Employment and earnings.*** Using NELS:88 data, Plank (2001) examined employment outcomes by focusing on youths' CTE and academic course-taking ratios to determine the effect of the ratio on youth's immediate post-secondary involvements. The data for this study came from NELS. Fulfilling a CTE concentration in this study meant the student completed at least three credits in a single occupational area. Utilizing multinomial logistic regression, Plank presented the predicted probabilities of employment for academic concentrators, CTE concentrators, dual concentrators, and those that fulfilled neither concentration. Plank found that no matter the course of study focus, none of the youth had a high likelihood of being unemployed. But the likelihood of being primarily a worker or primarily a post-secondary student did vary by course of study focus. For example, CTE concentrators had a 60% probability of being primarily a worker after leaving high school while academic concentrators had a 27% probability of being primarily workers. Unfortunately this was only a one year post graduation follow-

up. This leaves many questions, such as what percentage of youth concentrators and nonconcentrators are employed later in life? What are differences in wages of the concentrators and nonconcentrators as they enter adulthood? Are there differences in labor force participation? Are both groups likely to receive fringe benefits through their employment?

Also utilizing NELS:88 data, Bishop and Mane (2004) examined the earnings of CTE course-takers one year and again eight years after graduating from high school. Logistic regression analysis revealed that youth who took four occupation CTE courses during their overall course of study along with two academic courses and one personal interest course (i.e., visual and performing arts, health and physical education, leisure and recreation activities, military sciences, theology, and life skills, etc.) had higher earnings (21% more) one year after graduation and eight years after graduation (7.5% more) compared to students who took other variations in courses. These findings suggest that a mixture of a CTE concentration, academic, an elective of interest provides better outcomes compared to a focus only on one type of a curriculum. Compared to other studies described in this section, Bishop and Mane controlled for a larger amount of student background variables thus strengthening the study's internal validity.

***Dropping out.*** Plank (2001) examined the relationship between persistence in high school and CTE with NELS data. Using logistic regression, Plank found a curvilinear pattern in his analysis of the likelihood of dropping out and a point where the risk of dropping out began to rise. After controlling for student background characteristics and prior achievement, the study estimated the risk of dropping out to be at its lowest near the point at which a student completed three credits of CTE for every

four credits of academic subjects. As the CTE-to-academic ratio got smaller or larger (moving above or below 0.77), estimates showed an increased risk of dropping out. This seems to indicate that there is a certain mix of CTE and academic course-taking that maximizes a students' perseverance in high school. Plank explained that these findings could mean that there is a middle-range mix of CTE and academic courses that helped increase high school persistence. Plank as well as Bishop and Mane (2004) used NELS:88 data. The benefit of this dataset includes its longitudinal nature. However, the dataset reduces the external validity of the theses since it tracks youth who participated in CTE nearly two decades ago. Plank noted the importance of building on his findings with data that represent a more modern CTE such at the NLSY97. The present study used the NLSY97 to contribute to the literature in the way noted by Plank for youth with disabilities.

Plank et al., (2005) used more recent longitudinal data from the NLSY97 to examine the association between dropping out of high school and CTE course-taking. For the purposes of their research, the authors focused on a subsample of the oldest NLSY97 participants born in 1980 and who accumulated CTE credits between 1997 and 1999. They examined all CTE forms of course-taking (i.e., family and consumer sciences, general labor market preparation courses, and occupational area courses, etc.). Similar to Plank (2001), Plank et al. (2005), found a highly significant curvilinear effect of the course-taking ratio on the log-odds of dropping out. In this study, a ratio of one CTE to two academic courses was beneficial. Students' likelihood of dropping out increased as they went below or above this course ratio. Plank et al. (2005) also found that if they kept age at high school entry in the predictive model, each additional month

of age at high school entry was associated with increased risks of dropping out and the curvilinear effect was reduced. Therefore, the age when a student enters high school may be an important factor in the likelihood of dropping out. This finding shows that accounting for individual characteristics is very important when forming prediction models. My study accounted for a range of individual characteristics including race, ethnicity, household income, gender, marital status, and location.

Stone and Aliaga (2005) also examined high school completion using NLSY97 data. They focused on participation in CTE and school-to-work (STW) activities and their relationship to completing high school. Unlike all other studies reviewed, Stone and Aliaga relied on students' self-classification of their course of study focus. They found that 6.6% of their sample self-classified themselves as CTE concentrators. This is much less than the 20.8% for CTE concentrators reported by the NCES after transcript analysis.

Bishop and Mane (2004) report that the self-classification analysis may show student course of study "intent" not actual course credits earned. Thus, it is not completely clear if the study measured outcomes of CTE concentrators or youth who saw themselves as CTE concentrators. Using logistic regression, the researchers compared the likelihood of completing high school as a function of course of study concentration. They found that the lower odds of completing high school for general concentrators (one who was neither an academic nor CTE concentrator) and CTE concentrators compared to academic concentrators.

Stone and Aliaga (2005) findings are different from that of an NLTS report, *Dropouts with Disabilities: What Do We Know? What Can We Do?* (Wagner, 1991). Wagner (1991) examined the relationships between individual school program

characteristics and students' school performance. The report indicated that youth who took occupational CTE coursework were significantly less likely to drop out of school compared to youth with disabilities who did not take occupational CTE coursework, 8.0% and 12.0% respectively. In addition, multivariate analyses revealed that participation in occupational CTE relates significantly to lower absenteeism (Wagner, 1991). These contradictory outcomes suggest that CTE may affect youth with and without disabilities differently. The differences could also be due to what the study measured or how it measured CTE.

***College enrollment.*** DeLuca et al. (2006) used data from NLSY97 to examine CTE course-taking to determine its effect on college enrollment. The researchers examined whether or not the students participating in the CTE attended college and whether they enrolled in 2-year or 4-year post-secondary institutions. After adjusting for individual, family, and school background variables using logistic regression, DeLuca et al. (2006) found that students who took more than half of their courses in CTE had 67.0% lower odds of attending 2-year institutions and 83.0% lower odds of attending 4-year institutions when compared to their peers who chose more academic courses. Thus, high ratios of CTE-to-academic courses related to reduced chances of attending college.

De Luca et al. (2006) also found a negative association between taking no CTE credits and college attendance after controlling for individual and family background characteristics. The authors report that this association disappeared when controlling for school achievement. Thus, achievement in this study may have had a larger influence on college attendance than earning CTE credits. A measure of achievement in my study to examine its potential influence in my prediction models is included.

Plank (2001) found that regardless of the number of CTE courses taken in high school, almost all the students in the national sample participated in post-secondary schooling and/or paid employment during the first year after graduation. While this is encouraging, Plank did find that course of study concentration affected the probability of a student's choice of one post-secondary destination over another. After controlling for gender, race, SES, and pre-high school achievement, purely academic concentrators had an 87.0% probability to participate in post-secondary education compared to CTE concentrators who had a 56% likelihood of pursuing some type of post-secondary experience one year after graduation. However, this study does not provide outcomes beyond the first year after graduation on differences in employment and wages of CTE concentrators and nonconcentrators.

**Summary of CTE course-takers and post-school outcomes.** Due to the fact that the samples of the above studies did not specifically identify youth with disabilities, the effect of CTE on postsecondary outcomes among these youth cannot be determined. However, given the nationally representative nature of the data used in the studies that were reviewed, it can be assumed that youth with disabilities were included in the samples. The one study that looked at employment as an outcome (Plank, 2001) found that youth who were CTE, Academic, Dual, or Neither concentrators had very low probabilities of being unemployed. CTE concentrators were more likely to be primarily workers as opposed to postsecondary education students. Also, earning CTE credits in high school appears to increase the likelihood of higher post-school earnings (Bishop & Mane, 2004). One study found that completing a CTE concentration reduced youths' odds of completing high school. However, other research indicated that some balance of

CTE and academic coursework lowers youths' chances of dropping out (Plank, 2001; Plank et al., 2005). Completing a CTE concentration was also found to reduce the odds of enrollment in post-secondary education (DeLuca et al., 2006; Plank, 2001).

It is also notable that the research examined post-school outcomes as they relate to a CTE concentration or the ratio of CTE-to-academic courses taken during high school. Defining the independent variable in this way provides a clearer understanding to policymakers, educators, and families about the quantity of CTE classes in youths' courses of study that may impact postsecondary outcomes. However, what remains unknown is does concentrating in CTE predict positive outcomes beyond the first couple of years after graduating high school. My study looked at CTE concentration as the independent variable and selected outcome variables multiple years after exiting high school.

#### **CTE course-takers and employment outcomes among youth with disabilities.**

This section includes a review of the 12 of the 17 studies focused specifically on a sample of youth with disabilities and the relationship between employment outcomes of CTE course-taking. Four of the 12 studies used data from the Iowa Statewide Follow-Up Study (Frank et al., 1991; Frank et al., 1990; Sitlington & Frank, 1990; Sitlington et al., 1992). Two studies used NLTS data (Wagner, 1991; Wagner et al., 1993). One study (Harvey, 2002) used NELS data. Two studies combined data from multiple schools in a school district (Schwarz & Tayman, 1991; Shapiro & Lentz, 1991). One study combined data from multiple Ohio school districts (Bear et al., 2003) and one combined data from a state in the Great Lakes (Flexer et al., 2011). Finally, one study used data from a rural special education program (Schalock et al., 1992).

Unlike the studies in the previous section, the majority of studies reviewed in this section used independent variable that was youth who completed at least one CTE course in high school as opposed to a concentration (Baer et al., 2003; Frank et al., 1991; Frank et al., 1990; Harvey, 2002; Sitlington & Frank, 1990; Sitlington et al., 1992; Schalock et al., 1992; Wagner, 1991). Descriptions of the independent variable consisted of enrollment in occupationally oriented CTE (Wagner, 1991), participation in CTE coursework (Baer et al., 2003; Harvey, 2002), participation in general or occupational specific CTE (Frank et al., 1990; Frank et al., 1991; Sitlington & Frank, 1990; Sitlington et al., 1991) and hours in CTE (Schalock et al., 1992). Again, a summary of the variables used in the analysis can be found in Table 2.

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***Completion of at least one CTE credit in high school.*** Wagner (1991) examined the relationship between CTE course-taking during the last year of school and employment up to two years after high school based on school record abstracts and a parent/guardian telephone survey from the NLTS. Wagner identified grade-level, gender, and ethnic background variations in CTE participation. CTE course-taking was highest during the 11<sup>th</sup> or 12<sup>th</sup> grades at a rate of 81.8 compared to 67.0 for youth in grades 9 or 10. Males, females, and students from all racial and ethnic groups were almost equally as likely to have enrolled in some kind of CTE course. However, males were significantly more likely than females to enroll in occupational CTE (85% versus 68%). Caucasians

were significantly more likely to enroll in occupational CTE than blacks (83% versus 74%).

Further descriptive statistics revealed that 87.5% of youth with disabilities took occupational CTE at the high school level in 1987. Of those participants, 51% held a paying job at the time of the parental interview, compared to 38% of youth with disabilities who took no CTE courses. Wagner (1991) also conducted multivariate analyses and found that, all factors being equal, youth who took CTE courses were nine percentage points more likely to demonstrate competitive employment compared to youth who failed to take CTE courses. In addition to employment, the research identified lower probabilities of absenteeism and dropping out of school for CTE participants versus nonparticipants. Unfortunately, the definition of employment was broad and simply included working for pay. There was no investigation of wages or minimum hours worked per week. My study required youth to be working at least 21 hours per week to be considered employed. While dated, this study was the first to use a national longitudinal data to provide information on students with disabilities and employment outcomes of CTE course-takers.

Harvey (2002) also used a nationally representative dataset, the NELS:88, in his examination of CTE course-taking and post-school employment outcomes. However, unlike the NLTS used by Wagner (1991), NELS data are not representative of the IDEA disability categories for students with disabilities. Harvey's sample consisted of 7,007 youth with and without disabilities. A teacher questionnaire provided identification of a student with a disability by indicating students as having a disability that interfered with school performance. The study divided the independent variable into four groups (a)

students with disabilities with no CTE credit (b) students with disabilities with CTE credit (c) students without disabilities with CTE credit (d) students without disabilities with no CTE credit. Course-taking variables available in the NELS dataset showed that only 16.5% of youth with disabilities had a CTE credit while 49.5% of youth without a disability had a CTE credit. This is much lower than the CTE participation rates found in Wagner's (1991) analysis of the NLTS data.

Harvey (2002) found employment rates of 55% for youths with disabilities who had at least one CTE credit and 49% for youth without a disability who had at least one CTE credit. For youth with a disability and no CTE credits, employment rates were at 46% and 30% for youth without a disability and no CTE credit. Logistic regression revealed that in 1993, one year after graduating from high school, all groups had significantly higher levels of employment compared to youth without disabilities who took no CTE courses in high school. In addition, Harvey also found significantly higher annual wage earnings and hours worked per week for youth with and without disabilities who had a CTE credit. Harvey used a range of independent variables as controls increasing the internal validity of the study. Both the Harvey and Wagner (1991) analyses included youth who had participated in CTE either before or just at the beginning of changes to CTE during the 1990's. The present study included youth who participated in CTE during the late 1990's and beginning of the 21<sup>st</sup> century.

Unlike Harvey (2002) and Wagner (1991), Baer et al., (2003) did not use a national dataset in their study. Baer et al. examined special education graduates from four school districts in Ohio to determine what programs and student-related variables best predicted full-time employment and post-secondary education. To address

challenges of research influencing transition practice at the local level, the research team consisted of four school system transition coordinators, a university consultant, and the coordinator of the Special Education Regional Resource Center (SERRC). The study included a random sample of 140 former special education students who graduated from one of the four Ohio school districts in either 1997 or 2000. The majority of the youth in the sample had learning disabilities or mental retardation. The sample was reported to be fairly representative of transition-aged youth in the area. Eighteen percent of the sample was described as minority, 59% were male, 62% had learning disabilities, and 21% had mental retardation. The researchers used a survey called Linkages for Individual and Family Empowerment or Project LIFE, an adaptation Minnesota's Post-school Follow-up Study. Five Ohio interagency transition teams which included parents, students, educators, and adult service providers field-tested the Project LIFE survey. Using logistic regression, the researchers found that CTE course-taking increased the likelihood of full-time employment more than twofold, one year after graduation. However, this relationship did not exist after controlling for student-related variables (minority, gender, and learning disabilities).

Another study that used state data was the Iowa Statewide Follow-up Study. The Iowa Statewide Follow-up Study was a five-year project designed to study a random sample of special education students. The data from this project were used in four studies that examined CTE course-taking and post-school employment rates (Frank et al., 1990; Frank et al., 1991; Sitlington & Frank, 1990; Sitlington et al., 1991). Fifteen Iowa school districts developed lists that provided the sample for the Iowa Statewide Follow-up Study. The lists consisted of special education students who graduated or dropped out in

1985 or 1986. From each school district list, the study randomly selected 50% of the students which created a total sample of 2,476 former special education students. Seventy-three percent of the sample was male, and the study provided no race/ethnicity information. Representatives from the school districts, developed a field-tested survey instrument administered to a random sample of youths. Trained school staff conducted interviews of guardians and youth either on the phone or face-to-face. The study did not provide a reliability measure. It did discuss the use of field testing and staff training to help to make sure the instrument measured its intention. The researchers also reviewed school records in order to obtain information about individuals' school programs including CTE course-taking. Results indicated that 83% of the sample participated in regular CTE (FCS) and 78% participated in specially-designed CTE (occupational CTE).

Each of the four studies from Iowa focused on different disability categories. Sitlington et al., (1992) selected "mild" disabilities to define as youth with learning disabilities (n = 737), behavior disorders (n = 59), and mental disabilities (n = 142). The remaining studies examined a sample of 911 youth with learning disabilities (Sitlington & Frank, 1990), a sample of 130 youth with behavior disorders (Frank et al., 1991), and a sample of 318 youth labeled mentally disabled (mentally retarded).

The data analysis method used for all four of the Iowa studies was chi-square analysis. The use of chi-square analysis allows for the testing of a potential relationship but does not provide information on the strength of the relationship (Huck, 2008). Using chi-square analysis, none of the four studies revealed a significant association between post-school employment and CTE course-taking. However, since these youth participated

in CTE during the 1980s, it is not clear if these results generalize to more recent CTE course-takers.

Alternatively, Schalock et al. (1992) found a positive correlation between hours in CTE and weeks employed along with hours worked per week and yearly salary. Two hundred and ninety-eight youth with learning disabilities or mental retardation (34 females and 75 males) who graduated from a rural, south central Nebraska special education program between 1979 and 1988 were the subjects of this study. Each graduate was contacted by phone during the summer of 1989. There was no information about the development of the interview or the training of the interviewers. In addition, the age of the data and rural location of the sample severely diminish the external validity of the study.

*Completion of a CTE concentration in high school.* Technically only two studies used completion of a CTE concentration as an independent variable (Flexer et al., 2011; Wagner et al., 1993). However, two other studies included independent variables that included being a CTE completer (Schwarz & Tayman, 1991) and attending a CTE high school (Shapiro & Lentz, 1991).

Schwarz and Taymans (1991) examined the employment outcomes of a small sample of CTE completers in 1986, 1987, and 1988. The sample included 14 males and 9 females with learning disabilities living in households below the national poverty level. Nineteen youth were African American/Black youth, two were Hispanic and two were White. Average age was 23. The study selected youth based on a review of school records from an East Coast, inner city public school system. Unfortunately, the authors did not define what “CTE completer” meant for this school system in the mid to late

1980s. The lack of clarity about the independent variable as well as the age of the data limits the interpretation of findings. Any generalization of the results to other urban school systems requires a clearer definition, preferably one based on the SST.

Schwarz and Taymans (1991) developed a survey comprised of 95 closed and open-ended questions to collect data from school records and through telephone interviews. Data was collected on demographics, employment, and independent living for 19 youth. The authors provided no information regarding the development of instruments or protocols which brings into question the study's interval validity. A review of school records provided answers to the first 14 questions of the survey. A panel reviewed the survey and piloted it with six students. The study trained data collectors to conduct the telephone interviews, tape youth responses and interpret results. Schwarz and Taymans provided a reliability measure of their survey form, which was between 82% and 86%.

The researchers conducted frequency and percentage distributions and found a 78% employment rate at the time of the survey. However, 77% demonstrated employment for only six months or less. Other outcome data revealed that only one male received health and retirement benefits and no youth reported promotion in their jobs.

Shapiro and Lentz (1991) also obtained data from four CTE high schools located in eastern Pennsylvania. The sample included 143 youth (92 males, 51 females) who graduated from high school in 1986 and 124 youth (80 males, 44 females) who graduated in 1987. The study broke groups into youth with learning disabilities who attended a CTE school (LD-CTE), students without learning disabilities that attended a CTE school (NLD-CTE), and youth with no learning disabilities who attended a regular high school

(NLD-RegHS). Each cohort was approximately 90% White; between 3% and 6% were Black and/or Hispanic.

The author collected data using a modified version of a larger survey called the Young Adult Report (Shapiro & Lentz, 1991). The survey was administrated over the phone at three points; six months, 12 months, and 24 months after graduation. However, if an attempted survey was unsuccessful via telephone, the researchers mailed a copy of the survey to the youth's home. All participants completing the survey received \$10.00. The authors provided no information on the training of survey administrators or reliability of the survey.

Multivariate discriminant analysis of the 1986 cohort showed that 12 months after graduation, 97% of the LD-CTE group maintained employment, 97% of the NLD-CTE group maintained employment as did 85.7% of the NLD-RegHS group. These rates fell slightly at the 24 month follow-up to 91% and 90% for the LD-CTE and NLD-CTE respectfully. However, Shipiro and Lentz (1991) found that the NLD-RegHS group's employment rate rose to 94% at the 24 month follow-up. The 1987 cohort only had a 12 month follow-up and had employment rates of 93% for LD-CTE, 95.8% for NLC-CTE, and 85% for NLD-RegHS. The analysis revealed a significant difference in the employment rates of LD-CTE and NLD-CTE youth and the employment rate of the NLD-RegHS group 12 months after graduation. Like, Schwarz and Taymans (1991) no information was provided about the amount of CTE coursework youth took at the CTE schools relative to the amount of academic requirements.

Unlike Schwarz and Taymans (1991) and Shapiro and Lentz (1991), Wagner et al. (1993) defined a youth concentrating in CTE during high school as taking four or more

classes within a single CTE occupational area. The researchers found 34.3% of all youth with disabilities met their criteria for completing a CTE concentration. The researchers also examined the percentage of youth that were CTE concentrators by disability category. Wagner et al. found that 40.3% of youth with learning disabilities completed a CTE concentration, followed by 29.8% of youth with speech impairments, 26.5% of youth with hearing impairments, and 26.4% of youth with emotional disturbance at 26.4%. Fewer youth with multiple handicaps (16.5%) were CTE concentrators and the remaining disability categories completed a CTE concentration at rates between 19% and 23.9% (Wagner et al., 2003).

Wagner et al. (1993) utilized transcript analysis to determine youth who were CTE concentrators. The authors coded the transcripts using the course titles directly from the transcript to complement the Classification of Secondary School Courses coding system developed by the NCES. Multivariate analysis showed that youth who concentrated in CTE were 30.6 percentage points more likely to be employment two to three years after high school graduation compared to youth who took no CTE in high school (Wagner et al., 1993). Furthermore, youth who concentrated in CTE earned \$2,708 more annually two to three years after high school graduation compared to youth who had no CTE coursework identified in their transcript.

Finally, Flexer et al. (2011) used students from a large Great Lakes state who graduated or aged out of special educations in June 2005 through June 2008. Students were randomly chosen from randomly selected school districts. This resulted in 1,650 students from 177 school districts. The researchers conducted a student record review, a student high school exit interview, and finally a 1-year follow-up phone interview. The

survey questions were based on the first NLTS and reviewed by transition professionals. Teachers were trained to give the surveys and code the surveys. The response rate at the follow-up interview was 41%

Controlling for gender, minority status, and disability, Flexer et al. (2001) found that students who concentrated in CTE were 1.72 times as likely to be employed as compared to students who did not complete a CTE concentration. The researchers also found that African American students and students with intellectual or developmental disabilities were less likely to be employed after exiting high school as compared to CTE concentrators. This difference in outcomes could indicate the need for additional career education and preparation.

**Summary of CTE course-takers and employment outcomes.** The body of literature concerning the relationship of CTE course-taking and post-school employment outcomes among youth with disabilities is mixed. While seven studies indicated an association between CTE course-taking and employment outcomes (Baer et al., 2003; Flexer et al., 2011; Harvey, 2002; Schalock et al., 1992; Shapiro & Lentz, 1991; Wagner, 1991; Wagner et al., 1993) four studies found no association (Frank et al., 1991; Frank et al., 1990; Sitlington & Frank, 1990; Sitlington et al., 1992). Two studies also found a significant association between CTE course-taking and earnings (Harvey, 2002; Wagner et al., 1993). A summary of the findings for all studies reviewed can be found in Table 3.

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This body of literature had methodological weaknesses including: (a) imprecise independent variable descriptions; (b) limited samples; (c) year when study was conducted; and (d) year of follow-up. First, studies that included youth with disabilities in the analytic sample usually defined a CTE participant as a student who took at least one CTE course. Examining outcomes for CTE by a specific credit amount such as a CTE concentration would yield more meaningful findings. An independent variable that is more precisely defined could help provide policy makers, educators, and families understand if including a CTE concentration in students' course of study makes a difference in their future employment outcomes. Secondly, only three studies used a large-scale nationally representative sample to investigate this topic. One study was limited to rural special education students (Schalock et al., 1992). Another study analyzed the outcomes of 23 youth (Schwarz & Taymans, 1991). Four studies were from one state and utilized the same data set (Frank et al., 1990; Frank et al., 1991; Sitlington & Frank, 1990; Sitlington et al., 1992). Two studies used data from the school level (Schwarz & Taymans, 1991; Shapiro & Lentz, 1991). These types of limited samples make it difficult to generalize findings when respondents come from a few schools or school districts in a single state.

Third, the findings pertaining to students with disabilities were extremely dated. Special education and CTE policy have both evolved over the past two decades. Since 1990 IDEA transition and accountability requirements have changed. Similarly, Perkins legislation during the 1990's has mandated an accountability system, emphasis on academics, and the end of funds set-aside for special populations (Silverberg et al., 2004). Only one study (Flexer et al., 2011) used data collected beyond the very early 1990's.

Finally, none of the studies examined outcomes beyond three years after the youth exited high school. Bearing in mind that BLS data (U.S. Department of Labor, BLS, 2011a) indicate an increasing employment rate disparity between youth with and without disabilities overtime, it is important to look beyond the first few years after high school exit.

### **Chapter Summary**

There has been a national focus on post-school employment outcomes of youth with disabilities for nearly twenty years. Despite the policy support given to the employment of people with disabilities, national employment data show large inequities in the labor force participation and employment rates of youth and adults with and without disabilities. There are two main policies, the IDEA and The Carl D. Perkins Act, that may assist youth with disabilities while in high school prepare for future employment. Current IDEA 2004 accountability mandates such as the indicator 14, focus on student outcomes by requiring states for the first time to follow-up and report the post-school outcomes of their students. Therefore, schools and educators have an expanded reason to most efficiently and effectively design students' needed transition services (including the course of study) that lead to employment and/or postsecondary education.

Concurrently, the school curriculum designed to prepare youth for careers has evolved. CTE is required to collect data on its own set of performance measures, evaluate its programs, and report outcomes to the U.S. Department of Education. CTE policy has also been transforming since Perkins III and expanded with Perkins IV to prepare youth for 21<sup>st</sup> century labor market needs which includes increasing academic content in CTE coursework and connecting youth to postsecondary education. Given the

priorities of IDEA and Perkins, it is important to know whether CTE in its current design positively impacts the employment outcomes of youth with disabilities.

The review of the literature helped to identify the research needs in the area of CTE. For instance, there is a lack of current research that examined outcomes of students that invested heavily into CTE during their high school career. Only one study (Flexer et al, 2011) looked at the post-school employment of CTE concentrators. While taking at least one CTE course credit remains a part of the course of study for most youth with disabilities, the trend for these students is an increase in core academic courses course-taking and a decrease in the completion of a CTE concentration (Levesque et al., 2008). In an era where academic achievement is principal within the college and career-readiness rhetoric, it is important for policy makers to determine if CTE is a viable part of the secondary education curriculum. Moreover, outcome data on CTE concentrators is especially pivotal as federal funding for CTE is decreasing.

Another literature gap included the lack of a longitudinal analysis of outcomes. All three studies published in this century that examined completing CTE coursework and the outcomes of youth with disabilities, follow-up just one year after students graduate from high school. Since BLS projections show that in the current economy high-growth jobs require some postsecondary education; it would be helpful to learn whether or not CTE makes a difference in youths' lives as adults even when accounting for levels of postsecondary education attainment.

Finally, the review of the literature (including the NAVE and NCES evaluations), found that employment status and wages were customary labor outcomes analyzed. Additional employment outcomes such as labor force participation and receipt of job

benefits are also important especially for youth with disabilities. The labor force participation of adults with disabilities is extremely low. Receiving work benefits is an indicator of job quality and should be considered when analyzing the quality of an employment outcome. There is a dearth in special education literature about factors that support labor force engagement and the receipt of work benefits.

To address the literature gaps, this study utilized a national database that includes youth with disabilities that participated in CTE since the Perkins III amendments. Data for the study were obtained on those sample participants that chose to concentrate in secondary CTE as indicated in their high school transcript. Instead of limiting the follow-up to one or two years after graduating from high school, this study examined the data longitudinally up to 11 years after graduation for some students. Finally, the study also expanded the analysis of outcomes to labor force participation and receipt of fringe benefits. The U.S. Secretary of Education has reported that CTE needs to make a case for continued funding by showing improvement in student outcomes (U.S. Department of Education, 2011). As previously noted in my literature search, only find three studies this century that examined CTE outcomes of youth with disabilities. This study will strengthen the knowledge about whether completing a CTE concentration in high school has a value-added effect on post-school employment outcomes of youth with disabilities.

## Chapter 3

### Methodology

Current data indicate that youth and young adults with disabilities show a significant gap in post-school employment outcomes in comparison to their same-aged peers. Special education federal policy details the IEP secondary transition requirements. When a child turns 16, the IEP must include transition services. One type of transition service is the course of study or kinds or courses students should take to meet their post-school transition goals. CTE is a form of secondary curriculum that can be identified in an IEP as a course of study. However, there is a dearth of research that identifies the relationship between concentrating in CTE coursework in high school and post-school employment outcomes. This study will extend the research on how CTE influences selected employment outcomes of youth with disabilities multiple years after the exiting high school.

This study utilized the National Longitudinal Study of Youth, 1997 (NLSY97). This chapter describes the design of the study and a description of the methodology, including variables and analyses and begins with an overview of the NLSY97.

### NLSY97 Dataset

The NLSY97 is part of a set of BLS sponsored National Longitudinal Surveys (NLS) designed to provide labor market and major life event information at multiple time points for various groups of people. Recognizing the deficiency in data for studying the impact of 21<sup>st</sup> century social and economic conditions for youth (i.e. increases in graduation rates, increases in the number of children in one parent homes, and rising teenage drug use) on the current generation of youth, the BLS added the NLSY97 to its

surveys to document the transition from school to work and from adolescence into adulthood (Michael & Pergamit, 2001).

The survey collects extensive information on youths' educational and labor market experiences. It also asks questions about youths' relationship to parents, expectations, training, fertility and pregnancy, illegal activity, marriage, health, participation in government assistance, and drug use. The NLSY97 includes a nationally representative sample of 8,984 youth who were 12 to 16-years-old on December 31, 1996 (born during the years 1980 through 1984). Round 1 data collection began in 1997. Round 13 data was released July of 2011 (U.S. Department of Labor, BLS, n.d.). The NLSY97 is conducted by The Center for Human Resource Research at The Ohio State University.

**NLSY97 sampling design.** According to the NLSY97's *Technical Sampling Report* (Moore, Pedlow, Krishnamurty, & Wolter, 2000) and the *NLSY97 User's Guide* (U.S. Department of Labor, BLS, n.d.), the selection of the NLSY97 sample occurred in two phases. First, 147 metropolitan or non-metropolitan areas called primary sampling units (PSUs) were randomly selected. The PSUs consisted of two independent samples; a cross-sectional sample representing areas with 2,000 housing units and a supplemental sample of largely black and/or Hispanic or Latino populated areas. Persons with disabilities were not systematically sampled or oversampled.

In the second phase, interviewers screened 75,291 households. Interviewers administered a three minute household screener to identify if the household included individuals born between 1980 and 1984. Interviewers identified 9,806 individuals as eligible to participate in the study. To be part of the eligible population, someone who

lived in the housing unit must have been age 12 to 16 as of December 31, 1996. Included were people who were temporarily away from their residence on vacation or in a general hospital. Excluded were people visiting a residence temporarily, in a mental hospital, children in boarding schools, college students in dormitories, or people in prison or similar detention facility. If a youth met the age requirements for the survey but were “too ill or handicapped” they were deemed not eligible for the interview (Moore et al., 2000, p. 16). Therefore, the NLSY97 did not include youth with the most severe disabilities.

Prior to the screening, NLSY97 administrators sent a letter to eligible housing units. The letter was sent by mail and included a \$10 incentive payment to participate in the screening. These efforts led to nearly 92 percent of the eligible population (8,984 respondents) participation in the Round 1 survey. Most respondents came from 6,819 unique households. However, 1,862 households included more than one respondent (typically siblings) since the sample design selected all household residents in the appropriate age range. Individual sample weights provided in the dataset permit comparisons between the full NLSY97 sample and the national population in the same age range (Moore et al., 2000).

**NLSY97 Instrumentation.** The NLSY97 collects data from youth defined as individuals who were age 12 to 16 as of December 31, 1996 during each round using the youth questionnaire. Additionally, the NLSY97 includes a parent questionnaire, the youths’ high school transcripts, and an assessment of youth’ achievement using the Armed Services Vocational Aptitude Battery (ASAB). The instruments seek information on topics such as employment, schooling, training, income and assets, family

formation, family background, attitudes and behaviors. All instruments are available in English and Spanish. Bilingual Spanish-speaking interviewers are available when the Spanish instrument is requested (U.S. Department of Labor, BLS, n.d.). For this study, data from the youth questionnaires, the parent questionnaire, the ASVAB, and youths' transcripts were obtained. Each of these are described below.

***Youth Questionnaire.*** The Youth questionnaire is administered every round and requests information on the respondents' health status, financial characteristics, family background, interaction with a nonresident parent(s), political participation, childhood retrospective, participation in assistance programs, peers, employment, training, college choice, marriage, and social behavior. Currently, there are 13 rounds of these variables are available from survey years 1997 through 2009. The fact that these variables are coded each round allows for the examination of how these factors relate to one another and change overtime. The computer-assisted personal interviewing system (CAPI) is used for the youth questionnaire (U.S. Department of Labor, BLS, n.d.). It automatically guides respondents down certain question paths and loops depending on responses to previous questions. Topics of a sensitive nature such as criminal activity, drug use, and sexual behavior are administered using an audio computer-assisted self-interview (ACASI) technology. It allows respondents to enter their answers directly into a computer without the interviewer knowing the responses.

***Parent Questionnaire.*** The Parent Questionnaire was administered only in Round 1. Whenever possible, the Parent Questionnaire was completed immediately after screening using the CAPI. Out of the 8,984 eligible youth, 7,942 youth had parent interview data collected in Round 1. Data collected in the Parent Questionnaire included

information on parents' marital history, employment history, birthplace, the state of parents' health, income and assets, adoption and custody, the health and health insurance of eligible youth, and the social skills and behavior of youth. The ACASI was used for topics such as religion, self-esteem, and spouse or partner relations.

***Computer Adaptive ASVAB.*** At the time of the screening interview, respondents were given a letter that described the Armed Services Vocational Aptitude Battery (ASVAB) and included a \$75 incentive payment for the individual to take the assessment. The computer adaptive version of the *Armed Services Vocational Aptitude Battery (CAT-ASVAB)* was taken by respondents over the summer and fall of 1997 under standardized conditions at Sylvan Learning Centers. The CAT-ASVAB is "one of the most thoroughly researched test of human proficiencies in modern history" (Segall et al., 1997, p.1). Evaluations of the CAT-ASVAB psychometric procedures have been well documented and been found to be valid and reliable (Segall et al., 1997; Segall, Moreno, & Hetter, 1997).

Out of the 8,984 youth interviewed in Round 1, 73% completed the *CAT-ASVAB*. The main reasons for not completing the *CAT-ASVAB* included being incapacitated, dead, in jail, dead, out of the country, in the military, or having a language barrier. The NLSY97 has variables for CAT-ASVAB scores such as arithmetic reasoning, mathematical knowledge, word knowledge, paragraph comprehension, general science, and numerical comprehension.

***Transcript Surveys.*** Transcripts were requested from each public and private high school that enrolled one of the youth in the sample. Course descriptions and information about the school's grading scale were also obtained. Transcript information

was first collected in the spring of 2000 for respondents born in 1980 and 1981. The second collection occurred in 2004 for youth born between 1982 and 1984. Transcript information was coded using the 1998 Revised Secondary School Taxonomy (SST-R). The secondary school taxonomy is the primary method used by the NCES for transcript data analyses (Bradby & Hoachlander ,1999). The original framework was developed in the 1980's and the 1998 revised version reflects curricula during the time participants in the NLSY97 were in high school. Students in high school during the late 2007's would be reflected in the 2007 revision of the secondary school taxonomy (Bradby, 2007).

NLSY97 survey staff constructed histories of courses taken, including CTE. Other transcript data available include information on absences, standardized test scores, indicators of special education, gifted/talented, and high school graduation status. Transcript data is available for 69% of the NLSY97 sample.

## **Variables**

In the following section, the variables used in the analyses are described. Variables were selected from the Screener Questionnaire, the Parent Questionnaire, the Youth Questionnaire, the CAT-ASVAB, and the transcripts. Variables used in the analysis included information on the youths' course of study concentration, youth and family characteristics, and employment outcomes. A summary of the research by the study variables is presented in Table 4.

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**Dependent variables.** In order to take advantage of the longitudinal nature of the NLSY97 to examine outcomes in adulthood, only responses to questions from 2006 (Round 10) were used for the employment outcomes. By Round 10, the youth were out of school 1 to 11 years and ranged in ages 22 to 26 years old. In 2006, 70% of the data was available for examining when youth graduated high school. Excluding missing data, nearly the entire analytic sample (99.7%) had graduated high school by 2006. Almost half (45.6%) of the sample had graduated from high school by 2000. By 2004, 99% of the sample had graduated high school.

Four outcome variables found in the Youth Questionnaire were examined and included labor force participation status (S75453), whether or not the respondent is currently employed (S75454), the receipt of fringe benefits (S82222), and hourly wages (S75222). These questions were designed to be similar to questions asked monthly by the BLS using the CPS (U.S. Department of Labor, 2009).

To further define employment status (S75454) variable, it was combined with the number of hours worked per week (S75231). To be considered “employed” a youth had to work at least 21 hours per week. Respondents who worked less than 21 hours per week were excluded. Therefore, the dependent variables were coded as follows: (a) 1= labor force participant, 0= not in the labor force; (b) 1=employed and working 21 or more hours a week, 0= everyone else; and (c) 1=fringe benefits, 0= no fringe benefits. The hourly wages variable was continuous.

**Independent variables.** One predictor variable was created for all 4 models which was youth with disabilities that completed a CTE concentration. Nine youth and

household characteristics variables were used as controls. These were taken from the Youth Questionnaire, Transcripts, Parent Questionnaire, and the CAT-ASVAB.

*Disability.* The variables selected to identify youth with disabilities were drawn from the World Health Organization's International Classification of Functioning, Disability, and Health (ICF) model. The ICF model describes the body structures, body functions, activity, and participation (Maag, 2006). The ICF model also recognizes the contribution of contextual factors such as environmental and personal factors. The method of identifying disability was also used by Shandra and Hogan (2008; 2009) in their analyses of youth with disabilities and transition outcomes using the NLSY97.

Three items on the Parent Questionnaire that align with the ICF mode were used to determine which youth had a disability through. The first item (R06815) asked parents if their child currently had or ever had a learning or emotional problem that limits or has limited the kind of schoolwork he/she can perform, the amount of time he/she can spend on these activities or his/her performance in these activities. If a parent responded affirmatively, follow up questions were asked regarding the type of disability. A total of 822 of the 7880 parents in the Round 1 parent survey responded that their child currently had or previously had a learning or emotional problem. In the follow-up questions some parents responded affirmatively to their child having more than one type of disability. Of the 822 parents, 623 indicated that their child had a learning disability or attention disorder (R06817.00), 250 parents indicated their child has an emotional/mental problem (R06817.02), 21 indicated mental retardation as the problem (R06817.03), and 318 parents indicated some "other" learning or emotional problem (R06817.05).

The second item (R06828) asked whether the youth has trouble seeing, hearing, or speaking. This resulted in 1297 affirmative responses. The final item (R06844) had 117 affirmatives and asked if the youth had a part of his or her body that was deformed or missing. Using these questionnaire items, the total sample was 1,925 youth with disabilities.

***CTE concentration.*** The NLSY97 survey staff coded transcript data and categorized students' school program course of study. To standardize courses survey staff used the SST-R recommended by the NCES (Bradby & Hoachlander, 1999; Brady, 2007). CTE concentrators (R985990) were identified as students who completed three CTE courses in one occupational area. A dummy coded variable was created: 1=CTE concentrator and 0=No CTE concentration.

***Individual and family household characteristics.*** Several demographic variables were included in the analyses. These are described below.

***Gender, race, and ethnicity.*** NLSY97 staff captured the gender variable (R05363) with data from the Screener, Youth, and Parent Questionnaires. In the NLSY97 dataset, gender is coded dichotomously (1=male, 2=female). This variable was recoded into a dummy variable with males as the reference group so 0=female and 1=male. For race, the variable R0538700 was used, which includes Black, White, American Indian, Asian or Pacific Islander, and Other. Due to the small amount of American Indian (n= 61) and Asian or Pacific Islander (n=160) categories, these two categories were collapsed and coded as follows 1= White, American Indian, Asian or Pacific Islander, other and 0= Black. For ethnicity the variable R0538600 was used and used the provided dichotomy, 0=Hispanic and 1=non-Hispanic (all other ethnicities). In regression analysis, the

reference groups for these two variables were White youth for the race variable and non-Hispanic for the ethnicity variable.

*Household income.* To obtain background information on the household income of youth during the high school years variable R06098 from the Parent Questionnaire was used. This variable provided the total income received from wages and salaries of youth's parents in 1996. It included 11 categories of income ranges. This variable was recoded to the following three categories: (a) 1=less than \$24,999, (b) 2=\$250,000 to \$49,000, (c) 3=more than \$50,000. Youth from households with income less than \$24,000 will be the reference group.

*Location and marital status.* Using the 2000 U.S. Census Standards, the NLSY97 dataset provides the youths' location (S75371) as of Round 10 (2006). In the dataset, this variable is coded 0=rural and 1=urban. These codes were maintained. Variable S75252 from the Round 10 Youth Questionnaire was used to determine whether or not the youth was ever married. These variables were recoded so 1=never married and 0=everyone else (married, separated, divorced, or widowed).

***Academic achievement, credits, and education attainment characteristics.***

*Achievement.* The ASVAB Math and Verbal Score Percentile variable (R98296) was used as a measure of achievement in the study. This variable is a composite derived from sections of the ASVAB. It is an aggregated normed percentile score for the ASVAB's Mathematical Knowledge, Arithmetic Reasoning, Word Knowledge, and Paragraph Comprehension test. This achievement score is similar to the Armed Forces Qualifications Test score (AFQT), a primary criterion of eligibility for Armed Forces enlistment. The AFQT has a reliability estimate of .92 (Welsh, Kucinkas, & Curran,

1990). The individual percentile scores was collapsed into three categories: (a) 1=scores less than 19.999, (b) 2= scores between 20.000 to 59.999, and (c) 3=scores over 60.000.

*Academic credits and degree received.* The number of academic credits obtained high school was included to control for the differences in youths' high school academic background. This variable (R98649) was constructed in the NLSY97 dataset using the Transcript Surveys. This variable was collapsed in the following manner: (a) 1=15.00 academic credits or less, (b) 2=15.01 to 20.00 academic credits, (c) 3= 20.01 to 40.01 academic credits.

As the case with academic credits, the highest degree receive was included to control for differences in post-school education attainment. Using the Youth Questionnaire from Round 10, the degree (if any) a respondent received was included from the 2006 survey. The variable (S75142) was recoded as follows: (a) 1=No degree, (b) 2=GED or Diploma, (c) 3=Associates Degree, (d) 4=Bachelors Degree or more.

## **Methods of Analysis**

To manage data, create variables, and answer the research questions, the SPSS (originally, Statistical Package of the Social Sciences) 17.0 was used to conduct all analyses. In the next sections, weighting methods and missing data are discussed.

**Sampling weights.** The NLSY97 is a complex survey encompassing a multiple nationally representative sample. Data from large-scale national samples usually require weighting for an unbiased estimator of the population total. Weighting can correct for over- sampling which is used in the NLSY97 for Hispanics and non-Hispanic blacks and compensate for differences in participation rates (Moore et al., 2000). The NLSY97 staff

creates a set of cross-sectional weights for each survey round. Unfortunately, while each series of weights provides an accurate adjustment for any single year, none of the weights created by NLSY97 staff provide an accurate method of adjusting multiple years' worth of data (Zagarosky, n.d.). Since the research spans multiple survey years a set of customized longitudinal weights was created using a weight calculation program provided by the NLSY97. This method adjusted both for the complex survey design and for using data from multiple years.

**Missing data.** Listwise deletion was used to manage missing cases. Listwise deletion includes the deletion of all cases with missing values for variables used in the study. Therefore, full information was included in every case for my analysis. Another method of dealing with missing data is imputing values. This method allows researchers to substitute a reasonable value for each missing value. On the other hand, it can also lead to an underestimation of standard errors and an overestimation of test statistics (Allison, 2002). Utilizing listwise deletion raises the likelihood the reduced sample will deviate from the full sample when a dataset includes many missing cases (Croninger & Douglas, 2005). As shown in Table 5, in the NLSY97 dataset, the numbers and percentages of non-interviews for the 11 year span of data examined has not exceeded 18.3%.

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Common challenges associated with using listwise deletion such as reduction of statistical power and higher standard errors were low. Missing data in the NLSY97 is

given one of five different codes. The codes include the following: (-1) refusal, (-2) don't know, (-3) invalid skip, (-4) valid skip, (-5) noninterview. The next chapter describes the missing data and the degree to which the analytic sample was representative of the overall dataset.

**Research Questions.** To answer the research questions, three types of analyses were conducted; descriptive statistics, ordinary least squares regression (OLS), and logistic regression. All analyses used the same analytic sample.

**Question 1.** To what extent does completion of a CTE concentration in high school predict post-school labor force participation status for youth with disabilities in the NLSY97?

**Question 2.** To what extent does completion of a CTE concentration in high school predict post-school employment for youth with disabilities in the NLSY97?

**Question 3.** To what extent does completion of a CTE concentration in high school predict post-school receipt of fringe benefits for youth with disabilities in the NLSY97?

**Question 4.** To what extent does completion of a CTE concentration in high school predict post-school wages for youth with disabilities in the NLSY97?

To answer these questions, four regression models were fit. The first model had labor force participation status as the dependent variable. The second model had employment as the dependent variable. The third model had receipt of fringe benefits as the dependent variable. And the final model had wages as the dependent variable.

**OLS and logistic regression analyses.** Logistic regression was used for the three binary variables (labor force participation status, employment status, and receipt of fringe

benefits) and OLS regression was used for the one continuous outcome variable (wages). Logistic regression and OLS regression have many similarities. First, the purpose of both methods is to explain variance of  $y$  (dependent variable) based on all the predictors while controlling for the influence of certain variables. Second, OLS and logistic regression both deal with relationships among an outcome variable and a predictor or explanatory variable(s). Third, OLS and logistic regression both use independent variables that are continuous or categorical in nature. And finally, tests of significance can concentrate on each individual predictor or the combined effectiveness of the independent variable (Huck, 2008).

The main differences between OLS and logistic regression are the nature of the dependent variable and the odds ratios. OLS regression assumes that the dependent variable is continuous. In logistic regression, the dependent variable is binary or dichotomous in nature. In my study, the logistic regression equations helped me understand the predicted probability of participating in the labor force, being employed, and having a job that offers fringe benefits up to nine years after exiting high school for youth with disabilities who do and do not complete a CTE concentration. The OLS regression model allowed me to predict hourly wages. Unlike, OLS regression, logistic regression can use the odds ratio to discuss predictions. The odds ratio is the increase or decrease in the likelihood of being in the outcome group when the value of the predictor increases by one unit. If an odds ratio is greater than 1.0, the respondents have increased odds of the outcomes. Likewise, when odds ratio is less than 1.0, the respondents have a decreased chance of the outcome.

The equation for the odds ratio in the three logistic regression models in this study was

$$\text{Exp}(B) = e^{\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 \dots + \beta_n X_n}$$
 where Exp (B) is the odds ratio for the employment outcome of interest as provided by SPSS output, e is the base of the natural log,  $\beta_0$  is the constant,  $\beta_s$  represent the strength of the relationship between the predictor block and the outcome variable, and Xs show the variance in the employment outcome of interest as explained the predictor block. In all of the regression analysis hierarchical regression was used. This allowed for the independent variables to be entered in blocks and examine the contribution of each set of variables separately. The independent variables were entered into the equation in a two blocks. In block one included youth demographic characteristics variables including (a) gender, (b) race (c) ethnicity, (d) household income (e) location, and (f) marital status. In the second block, academic background variables achievement, total academic credits, and highest degree received were entered.

In the final regression model OLS was used which allowed for the prediction of hourly wages of youth with disabilities who do and do not complete a CTE concentration. The equation for the OLS model was the following:

$$\hat{\gamma} = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 \dots + \beta_n X_n$$
 . In this equation,  $\hat{\gamma}$  is hourly wages,  $\beta_0$  is the constant, and the  $\beta_s$  and Xs are interpreted the same as in the logistic regression equations discussed above.

Before carrying out any regression analysis, regression diagnostic work was completed. Regression analysis is based on several assumptions. Diagnostic work was

done in an attempt to identify potential problems that may result from violations of the assumptions. A screening for outliers, constant error variance (homoscedasticity), strong correlations among independent variables (multicollinearity), and normality was completed.. Normality was only considered for the OLS model because in logistic regression the binary dependent variable by definition cannot be normally distributed. To screen for outliers the sample distributions of continuous variables was examined. Potential multicollinearity of the variables was assessed by examining the bivariate correlations between all the continuous independent variables included in the models.

### **Chapter Summary**

The NLSY97 is a large-scale nationally representative dataset containing a rich set of variables about the labor market outcomes and educational experiences of youth in the 21<sup>st</sup> century. Data about these 8,984 youth began to be collected in 1997 when they were ages 12 to 16 and continue today. This dataset was used to conduct secondary data analysis to answer the research questions in the study. Using the NLSY97's youth questionnaire, parent questionnaire, ASVAB results, and transcript information, information was obtained on youths' disability status, school program, individual and household characteristics, and academic background. The longitudinal nature of the study including the annual youth questionnaire, made it possible for employment outcome information into youths' adulthood to be obtained. This data was used to conduct three types of analyses. Descriptive statistics were used to determine the characteristics of youth with disabilities who did and did not concentrate in CTE. Finally, OLS regression and logistic regression analyses were conducted to predict employment outcomes of youth with disabilities by CTE concentration.

## **Chapter 4**

### **Results**

The purpose of this study was to describe and compare the relationship between post-school employment outcomes and the completion of secondary education career and technical education concentration among youth with disabilities. In this chapter, the results of my study are presented. First, a description of the sample and a comparison of the analytic sample and the base NLSY97 sample is provided. Then, the results to questions 1 to 3 from my logistic regression models are provided. Lastly, findings from the OLS regression model are provided to answer question 4

### **Missing Data and Non-bias Analysis**

As the case with most large-scale longitudinal databases, the NLSY97 did contain some missing data and attrition. In 1997 (Round 1) the basic demographic variables were collected. There was 100% of the data for disability, race, ethnicity, and gender. For marital status and location, 13.6% and 13.9% of the cases were missing, respectively. The transcript data had the most missing cases at 30.6%. Since the transcript data was used to create the variables for the CTE concentrators and total academic credits, 30.6% of those variables were excluded. Finally, 14.1% of the data on education attainment was missing. Given these dropped cases, a non-bias analysis by comparing the analytic sample to the base sample was conducted. This comparison allows for the examination of the degree to which the dropped cases altered the characteristics of the base NLSY97 sample.

As described in the previous chapter, the NLSY97 included 1925 youth with disabilities (24.4% of the base sample). Of the 1925 youth, 23.2% met the requirements

of a CTE concentration. This is comparable to the 22% percent of CTE concentrators among youth without disabilities in the NLSY97 database. The Hispanic population was 15.5% of the sample. Race percentages included 66.3% Whites, 23.8% Blacks, and 10% all others (including Asian/Pacific Islander and American Indian). There were a higher percentage of females than males, 56.2% and 43.8% respectively. The percent of youth from urban locations was nearly double that from rural locations, 66.5% and 33.5% respectively. The majority of the sample had never been married 65.6%. Household incomes less than \$24,000 were 39.2% of the sample. Youth with household incomes \$25,000 to \$49,000 were 15.0% of the sample, while 3.4% of the analytic sample had household incomes that were more than \$50,000.

My study sample was highly comparable to the base NLTS2 sample although there were a few differences. The base sample included a Hispanic population of 21.2% compared to 15.5% in the analytic sample. Over three-fourths (75.2%) of the base sample had never been married by the 2006 survey year compared to 66.5% in the analytic sample. Like the analytic sample, the base sample included more white youth than other races, 66.3% and 58.7% respectively. There were less youth from an urban location in the analytic sample, 66.5% compared to 78.7% in the base sample. Table 6 provides a percentage comparison summary of the characteristics of the base sample and analytic sample.

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### **Findings from Regression Analyses**

Three logistic regression analyses and one OLS regression analysis to answer my research questions were conducted. The SPSS 17.0 statistical software program was used to conduct my analysis. The intercorrelations between the independent variables were examined. This examination aided in the decision about whether any of the variables should be removed from the analysis. The strongest significant associations were between achievement and education attainment ( $r = .44$ ), achievement and academic credits ( $r = .47$ ), and academic credits and education attainment ( $r = .44$ ). There was also an association between Black youth and achievement of ( $r = -.34$ ). The coefficients indicate moderate to weak associations. Strong correlations of  $r > .80$  would have represented a problem with collinearity. The intercorrelations between variables used in the study can be found in Table 7.

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**Research Question 1.** To what extent does completion of a CTE concentration in high school predict post-school labor force participation status for youth with disabilities in the NLSY97? Logistic regression analysis to examine the relationship between completing a secondary CTE concentration and being a labor force participant up to 12 years after graduating high school while controlling for demographic and academic characteristics. For this analysis, variables were entered in two blocks. The first block consisted of household income, gender, ethnicity, race, location, marital status. The second block included academic related variables, including achievement, academic credits, and education attainment. Model 1A examined the likelihood of employment for

CTE concentrators up to 11 years after exiting high school, controlling for demographic characteristics.

Results for model 1A indicated that the odds of participating in the labor force improved by 79% for CTE concentration completers, holding all else constant. Females, those who were never married and individuals who lived in an urban area also had statistically significant increased odds of participating in the labor force.

Model 1B also examined the likelihood of labor force participation for CTE concentrators but also accounted for academic achievement, academic credits, education attainment as well as demographic characteristics. Results show that CTE concentration was no longer significant in this model. Being from an urban location and never have been married remained significant. Among the education attainment variables, individuals with a diploma and those with an associate degree had an increase in odds, 1.87 and 3.56, respectively, of being a labor force participant compared to individuals with no degree. Results of model 1 can be found in Table 8.

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**Research Question 2.** To what extent does completion of a CTE concentration in high school predict post-school employment for youth with disabilities in the NLSY97? Logistic regression was conducted to investigate whether the likelihood of being an employed adult who worked at least 21 hours week was increased or decreased for those that completed a CTE concentration during high school. For this analysis, variables were entered in two blocks. The first block consisted of household income, gender, ethnicity,

race, location, marital status. In the second block academic related variables, including achievement, academic credits, and education attainment were added. Model 2A examined the likelihood of employment for CTE concentrators up to 11 years after exiting high school, controlling for demographic variables.

Results for model 2A indicated that the odds of participating in the labor force improved by 59% for CTE concentration completers, holding all else constant. Being black compared to all other races meant a 33% decrease in the likelihood of being employed, regardless of CTE participation while living in an urban area increased by 43% the odds of being employed.

Similarly, in model 2B with the addition of academic background variables, being from an urban area continued to show higher odds of employment. However, completing a CTE concentration was no longer significant. Having any postsecondary degree meant having a higher odds of being employed compared to having no degree. However, those who completed a high number of academic credits in high school had a 61% decrease in odds of being employed up to 11 years after exiting high school. Results for Model 2 can be found in Table 9

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INSERT TABLE 9 ABOUT HERE

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**Research Question 3.** To what extent does completion of a CTE concentration in high school predict post-school receipt of fringe benefits for youth with disabilities in the NLSY97? Like the two prior research questions, logistic regression analysis was utilized to examine whether the chance youth with disabilities would be employed in a job that

provided fringe benefits based on the completion on a CTE concentration in high school while controlling for demographic and academic characteristics could be predicted. Again, variables were entered in two blocks. The first block (model 3A) consisted of household income, gender, ethnicity, race, location, marital status. In the second block (model 3B) academic related variables, including achievement, academic credits, and education attainment were added.

Unlike the previous analyses which showed increased odds of employment and labor force participation for individuals that completed a CTE concentration, model 3A found that youth that completed a CTE concentration in high school were 38% less likely to be employed at a job where they received fringe benefits, controlling for demographic characteristics. Also, in model 3A, males were 45% more likely to be employed in a job that offered fringe benefits compared to females. Those that lived in an urban area also had a reduced likelihood of receiving fringe benefits.

However, in the model 3B, the significance of gender and location and completion of a CTE concentration went away once the academic achievement, academic credits, and education attainment variables were entered. Model 3B found a lower likelihood of having a job that provided fringe benefits for all education attainment (i.e., diploma or GED, associates and bachelors and beyond). Only youth that completed the middle range of academic credits (15.01 to 20.00 credits) in high school, had an improved odds of working in a job that provided fringe benefits. This group of youth was 2.07 times more likely to have a job with fringe benefits. Results for Model 3 can be found in Table 10.

INSERT TABLE 10 ABOUT HERE

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**Research Question 4.** To what extent does completion of a CTE concentration in high school predict post-school wages for youth with disabilities in the NLSY97? In this analysis, OLS regression was used to examine the relationship between completing a secondary CTE concentration and hourly wages at the point of the 2006 Round interview, while controlling for demographic and academic characteristics. For this analysis, variables were entered in two blocks. The first block (Model 4A) consisted of household income, gender, ethnicity, race, location, marital status. In the second block education related variables, including achievement, academic credits, and education attainment were added.

In model 4A the completion of a CTE concentration and demographic variables accounted for 92.4% of the variance in the individual's hourly wages ( $R^2 = 0.924$ ;  $p < 0.001$ ). In model 4A, youth that completed a CTE concentration were predicted to earn 58% more per hour than youth who did not complete a CTE concentration, up to 11 years after exiting high school, controlling for household income, gender, race, ethnicity, location, and marital status.

In model 4B, the variables accounted for 93.0% of the variance in hourly wages ( $R^2 = 0.930$ ;  $p < 0.001$ ). In model 4B, the completion of a CTE concentration did not contribute to post-school wages. As with all other selected employment outcomes, having a postsecondary degree was positively related to hourly wages up to 11 years after exiting high school. Compared to youth with no degree, youth who earned a diploma or GED earned 1.72 more, those who attained an associate degree earned 1.82 more, and

those with a Bachelors or more earned twice as much (1.98). Results for Model 4 can be found in Table 11.

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INSERT TABLE 11 ABOUT HERE

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### **Chapter Summary**

Overall, my sample used in the analysis was very similar to the base NLSY97 sample. There were differences found in the percentage of white youth, less in the base sample as compared to the analytic sample. There were less youth in the analytic sample that had never been married and less that lived in urban areas. Other areas such as gender, household income, and education attainment were highly comparable.

The results from the logistic regression analysis show that for youth with disabilities completing a CTE concentration was significantly associated with increased odds of labor force participation and being employed, and hourly wages up to 11 years after high school, accounting for household income, gender, race, ethnicity, location, and marital status. Taking into account the demographic variables only, completing a CTE concentration reduced the odds of having a job that provided fringe benefits. OLS regression analyses indicated higher wages for CTE concentrators up to 11 years after high school, controlling for demographic variables.

The inclusion of academic achievement, academic credits, and education attainment variables to the models changed all outcomes. In the final model, which included all variables, completion of a CTE concentration did not significantly increase or decrease the odds of receiving benefits. The positive association between having a

CTE concentration and labor force participation, employment, and wages all disappeared once academic achievement, academic credits, and education attainment variables were accounted for in the model.

## Chapter 5

### Discussion

The purpose of this study was to describe and compare the relationship between post-school employment outcomes and the completion of a secondary education career and technical education concentration among youth with disabilities. Specifically, this study examined differences in the labor force participation, employment, wages, and receipt of fringe benefits up to 11 years after exiting high school among youth with disabilities who completed a CTE concentration as part of their overall secondary course of study. My review of the literature related to employment outcomes of youth who participated in CTE during high school led to the conclusion that there was a need for a study of various employment outcomes of youth with disabilities who earn enough credits in high school to be considered a CTE concentrator, specifically during the late 1990's and the 2000's. In addition, the literature showed a need to examine the impact of CTE beyond the first one or two years after high school.

**Contributions to research.** This research was exploratory and provides a basis for understanding the viability of CTE as secondary education curriculum that aligns with the national education agenda of college- and career-readiness. As Secretary of the U.S. Department of Education reports,

For all its importance, the role that CTE plays in building the nation's economic vitality often gets overlooked. Too many educators assume that career and technical training is for the last century, not this one. Many reformers treat CTE as old school – rather than as a potential source of cutting-edge preparation for careers. In the new CTE we are working toward, all career and technical programs would serve as viable and

rigorous pathways to postsecondary and workforce success. (U.S. Department of Education, 2011, p. 2).

Analyzing the outcomes of youth with disabilities that chose to invest significantly in secondary CTE fills an important gap in the literature providing youth, parents, and policy-makers with current research about the potential impact of CTE on adult employment outcomes. The present study is the only research in over a decade to utilize a national database to examine the post-school outcomes of individuals with disabilities who completed a CTE concentration. The use of a national database is significant because it adds to the external validity of the research. This is also the only study to take a longitudinal examination of the adult employment outcomes of youth with disabilities who concentrated in CTE while in high school.

Additionally, the outcome variables used in this study, labor force participation and receipt of benefits are extremely rare in examinations of return on investment of education programs. My review found no research that examined these outcomes for CTE concentrators who had disabilities. Examining these outcomes is critical in educational policy research because the low labor force participation and disparate receipt of fringe benefits for those with disabilities in the U.S. is an ongoing social phenomenon. Given the dearth of research in the area of CTE and youth with disabilities, this descriptive and exploratory research offers a small step towards learning more about whether or not CTE has a measurable impact for youth with disabilities and consequently whether the federal investment in CTE through the Carl D. Perkins Act continues to be worthwhile.

### **Key Findings of the Study**

The findings from this study confirm the value of CTE as a course of study for youth with disabilities during high school. This study showed that youth who concentrated in CTE had a higher likelihood of participating in the labor force, being employed, and earning higher wages over a decade after exiting high school than those that did not concentrate in CTE. However, for all employment outcomes of interest, (labor market participation, employment, receipt of benefits, or wages) once academic achievement, credit accumulation, and educational attainment characteristics as well as demographic characteristics were factored in, the findings indicated no differences among youth with disabilities regardless of secondary CTE completion. This seems to indicate that CTE in high schools must also support youth academically and facilitate movement to postsecondary education.

**Labor force participation.** In this study, youth with disabilities who completed a CTE concentration were 79% more likely to be a labor force participant up to 11 years after exiting high school, controlling for demographic characteristics. To be considered a labor force participant an individual must be looking for a job. While labor force participation does not necessarily indicate being employed it does indicate engagement in seeking work. This is positive because it represents optimism. When an individual is not in the labor force they may be considered either marginally attached to the labor force or a discouraged worker (U.S. Department of Labor, 2009). Discouraged workers believe: (a) they believe no job is available to them in their line of work or area; (b) they had previously been unable to find work; (c) they lack the necessary schooling, training, skills, or experience; (d) employers think they are too young or too old, or they face some other type of discrimination (U.S. Department of Labor, 2009).

CTE may relate to labor force participation because those that choose a high school course of study that emphasizes CTE are inherently more interested in careers and finding a career. The relationship between CTE and labor force participation could also mean that the CTE curriculum contributes to skills and confidence such that students are less likely to get discouraged and choose to continue looking for employment. While it is not clear why CTE may support labor force participation, the association is very important. The lack of labor force participation is one of the most prevalent negative labor force characteristic for individuals with disabilities (U.S. Department of Labor, 2011).

**Employment.** Similar to labor force participation, youth with disabilities that concentrated in CTE were 59% more likely to be employed 11 years after exiting high school after controlling for demographic characteristics. The positive relationship of CTE course-taking and employment one year post high school graduation has been documented in past research (Flexer et al., 2011; Harvey, 2002; Wagner et al., 1993). This study shows that this positive relationship exists multiple years beyond the completion of high school. However, other research has found that CTE has no effect on employment of youth with disabilities (Frank et al., 1991; Frank et al., 1990; Plank, 2001; Silverberg, 2004; Sitlington & Frank, 1990; Sitlington et al., 1992). While past research is mixed, the finding from this study suggests that CTE provides youth with a set of marketable skills that increase their opportunity to find a niche in the labor force. On the other hand, it is possible that a youth who decides to concentrate in CTE may be more inclined to obtain and maintain post-school employment. Additional research should

look longitudinally at employment outcomes of students that participate in CTE under the current Perkins IV mandates.

**Fringe benefits.** In this study, fringe benefits included any of the following: medical insurance, life insurance, dental benefits, paid maternity or paternity leave, unpaid maternity or paternity leave which allows return to the same job, retirement plan, flexible work schedule, tuition reimbursement for certain types of schooling, company provided or subsidized child care, employee stock ownership. Those who completed a CTE concentration had a 38% decreased likelihood of obtaining a job that contained one or more fringe benefits. Research that has looked at health benefits found that individuals with and without disabilities have health insurance benefits at similar rates, 80% and 82%, respectively (Kruse, 1998). However, there are differences in the sources of the health insurance benefits including higher levels of health benefits from Medicaid and Medicare for people with disabilities (Kruse, 1998). Therefore, in my study the lower odds of CTE concentrators receiving fringe benefits may be because they were obtaining benefits from sources other than employers.

The 2004 National Bureau of Economic Research Working Paper (Levy, 2004) used the CPS and the Employee Benefits Survey and found that workers with low-skill, low wage, low-tenure, and those that worked part-time were less likely to have disability or health insurance coverage from employers. In my study, the reduced odds of CTE concentrators possessing fringe benefits could be contributed to the type of employment students obtained after high school. CTE concentrators may have obtained entry level jobs just after exiting high school and never obtained a more high-growth position that could yield more benefits. Additionally, CTE concentrators in my study may have been

less likely to enter postsecondary education and therefore less likely to obtain a job that offers fringe benefits. For instance, DeLuca et al., (2006) found a significant reduction in odds of college enrollment for youth with and without disabilities that took more than half of their coursework in CTE coursework. The researchers posited that this could be a function of the continued presence of curriculum tracking in schools or that youth who choose to take a high number of CTE courses may not want to go college.

**Wages.** Like labor force participation, employment, and benefits, a statistically significant relationship was found up to 11 years after exiting high school for wages and the completion of a secondary CTE concentration. CTE concentrators earned 58% more than youth who did not concentrate in CTE. This finding is consistent with past studies that have found a likelihood of higher wages among CTE course-takers with disabilities at one or two years after high school (Wagner, 1991; Wagner et al., 1993a). The findings of this study suggest that not only may there be a wage difference for youth with disabilities who are CTE course-takers or concentrators in the first few years after exiting high school, this advantage may maintain after a decade or more later. Comparably, Bishop and Mane (2004), in their study of youth in the general population, also found higher wages eight years post high school exit for youth took a high amount of CTE courses.

**Academic achievement, academic credits, and education attainment.** All of my research questions include a second model that controlled for academic background variables (achievement and number of academic credits obtained) and postsecondary education attainment variables. The academic background variables did not have a consistent association with the employment outcomes. However, the education

attainment variables were significantly associated with all post-school employment outcomes. Findings from the present study found that individuals with disabilities with a Bachelor's degree earned twice as much per hour up to 11 years after exiting high school than those youth who did not obtain a diploma. Similarly, those with a 2 year degrees earned 1.82 times more than those with no degree up to 11 years after exiting high school. Findings from this study compare to data from the BLS that in the second quarter of 2011, individuals with no degree averaged \$458 in weekly earnings, compared to \$643 for high school graduates, \$743 for individuals that have some college or an associate degree, and \$1,141 for people with a Bachelor's degree or higher, (BLS, 2011b).

Turning to changes in findings about CTE and employment outcomes, when academic background and education attainment variables were taken into account, there was no longer a statistically significant relationship between completing a CTE concentration and labor market participation, employment, wages, or receipt of benefits for youth with disabilities up to 11 years after leaving high school. The changes in the relationship of CTE and employment outcomes, suggest that without concentrating in CTE, many employment outcomes (minus receipt of fringe benefits) for youth with disabilities in this study would be worse more than a decade after attending high school. However, the benefits of CTE do not hold for those individuals who complete some postsecondary education. Findings from this study suggest that those who complete a postsecondary education degree have better employment outcomes; whether or not they concentrate in CTE during high school.

## **Limitations**

While the findings from this study give insight into the relationship of completing a secondary CTE concentration and future employment outcomes, the relationship should be interpreted cautiously. Limits related to the sample constrains the interpretation of the results. The sample used in this study identified a group of students with disabilities through questions from the parent questionnaire. While this method has been used in other research (Shandra & Hogan 2008; Shandra & Hogan 2009), this sample includes youth with disabilities who are not necessarily receiving special education services. Therefore, the extent to which this study can be generalized to other youth with disabilities who are receiving or have received special education services is limited. Future studies should look at similar variables and students who are receiving services provided by IDEA. The opportunity to look at this population will be available through the NLTS2 once the transcript variables are released. Examining this data will add to the literature base of outcomes of youth with disabilities who participated in current designs of secondary education CTE. Another benefit of using the NLTS2 is that it includes sample of over only students with disabilities. This will provide access to a sample of almost 12,000 youth with disabilities and thus a great deal of external validity.

### **Implications for Policy**

Policy makers and practitioners face multiple realities: (a) the continued focus on accountability for education outcomes as required by The Elementary and Secondary Education Act; (b) a national focus on standards-based education, like the Common Core Standards; (c) an emphasis on college- and career- readiness for every student; (d) individualized education mandates as required by the IDEA for students with disabilities; (e) a 21<sup>st</sup> century labor market where the high growth jobs require some sort of

postsecondary education or training; (f) an under representation of people with disabilities in most of the fastest growing occupations in conjunction with an overrepresentation of people with disabilities in the fastest declining occupations (Kruse, 2010). Given these contextual factors and this study's findings, several strategies should be utilized by policy makers at the Federal, State, and Local level.

**CTE and career-readiness.** Policy makers should recognize that while ensuring that all students are prepared to enter college is a worthy goal, all students will not enter postsecondary education. Some students do not want to obtain postsecondary education immediately after leaving high school. Other students cannot afford to enter postsecondary education when they exit high school. Many youth with disabilities drop out of high school at rates higher than their nondisabled peers. The school completion rate for youth with emotional disturbances is 56% (Wagner, Newman, Cameto, & Levine, 2005) leaving many students unable to move towards postsecondary education. Research has found that CTE may reduce the odds of dropping out of school (Plank, 2001). CTE should still remain a place for students to obtain specific labor market preparation through its occupational concentration offerings.

In the present study, concentrating in CTE provided a value-added effect on three important employment outcomes for youth with disabilities. Therefore, for youth with disabilities who do not desire to obtain a postsecondary education degree, the results of this study indicate that CTE provides a labor market advantage compared to youth with disabilities that did not participate in CTE. This advantage could be further strengthened by helping youth with disabilities use their CTE concentration to earn an Industry Certification while still in working towards their diploma. Even amidst an increased

focus on academic achievement in schools, the position that CTE holds in secondary education as a course of study for youth with disabilities who want to enter full-time employment after high school is critical.

**CTE and college-readiness.** This study confirmed that the more education one attained, the higher the likelihood of better employment outcomes. However, this study did not include an interaction of CTE and education attainment. Therefore, it is not clear if a CTE concentration together with postsecondary education has a stronger impact than either one alone. Nonetheless, the change in the impact of CTE on employment outcomes once academic achievement, academic credits, and postsecondary attainment were added to the models do suggest that policy makers should continue to focus on increasing the academic content and standards integration and the use of CTE as a vehicle to movement towards postsecondary CTE programs, apprenticeships, and other postsecondary education opportunities.

CTE should continue to strengthen its ability to facilitate students' transition to postsecondary education and its relevancy in today's marketplace. This strengthening could occur with the proliferation of the new Perkins IV mandate, CTE programs of study. Programs of study include a mix of academic and CTE courses that can provide the opportunity for obtaining dual secondary and postsecondary education credits through articulation agreements with community colleges. Policy makers should further expand programs of study mandates as they allow states and local education agency to develop programs provide youth with skills and training for careers that meet the high growth industries in their local economies.

### **Implications for Practice**

Due to the emphasis on accountability like the IDEA Indicator 13 and 14 requirements along with the summary of performance mandate, special educators must stay focused on guiding youth to positive post-school outcomes. In general, secondary special educators, transition coordinators, guidance counselors, and other members of youth's IEP team should have broad understandings of secondary education curriculum, including CTE. These personnel should stay aware of CTE occupational concentrations offerings and other CTE program components. As IEP team members help youth plan for the future, they must be aware of the realities of the current labor market. Even students who desire direct entry into full-time employment after high school should be informed about additional training opportunities. Post-school education can be obtained through vocational rehabilitation agencies, apprenticeships, certification programs, and classes offered the community's department of recreation, civic organization, and faith-based organizations. These opportunities will help students who do not have an interest in pursuing an advanced education degree further solidify their position in the labor market.

Additionally, special educators should know the main industries in their community, what credentials, certificates, or associates degrees are related to those industries, and how the CTE programs and academic coursework in their school district help students move to those certifications. Possessing this knowledge about CTE programming, the labor market, and post-school training and education opportunities can help teachers and counselors effectively take these factors into account during family and youth communication, transition planning, assessment, goal writing, and the identification of needed transition services. To reinforce the support of CTE, policy

makers should identify CTE concentration or CTE Programs of Study in IDEA legislation as an example of a course of study.

### **Directions for Future Research**

Future research should examine the quality and characteristics of secondary CTE programs. For example, future research should examine youth post-school outcomes based on the impact of specific CTE program characteristics such as the amount of work-based learning, CTE teacher quality, the use of accommodations, and the involvement of special education personnel. Other areas of research might include an investigation into what CTE occupation pathway options yield the most positive outcomes for youth with disabilities. Namely, do youth with disabilities have better employment outcomes as adults if they receive training in high growth occupations such as those in science, technology, engineering, and mathematics (STEM)?

STEM occupations are projected to grow by 17.0 percent from 2008 to 2018, compared to 9.8 percent growth for non-STEM occupations (U.S. Department of Commerce, 2011). Future research can look longitudinally to learn if youth with disabilities that focus on CTE coursework in the STEM areas have better outcomes than youth that focus on other CTE occupational areas, holding youth demographics and academic achievement constant.

The outcomes of youth with disabilities that participate in CTE programs of study should be a focus of subsequent research. The National Research Center for Career and Technical Education (NRCCTE) is conducting research called, *Rigorous Test of Student Outcomes in CTE Programs of Study* (Castellano, Sundell, & Overman, 2011). The findings from this research will contribute to the understanding of the impact of the

method of constructing CTE curriculum. As it stands now, the NRCCTE has not conducted a study that examines Programs of Study and youth with disabilities. Further research in this area is warranted to better understand the potential benefit of CTE Programs of Study for students with disabilities. For example, my study found that students who concentrate in CTE are less likely to have employment that provides fringe benefits. Researchers could examine the effects of CTE Programs of Study on the receipt of fringe benefits for youth with disabilities.

Longitudinal large-scale databases that include youth with disabilities, variables about CTE Programs of Study in high school, and labor related outcomes are needed so researchers can begin this line of inquiry. These databases are needed at the state and national level. Program of study could represent an opportunity to effectively provide youth with disabilities not only with CTE curriculum that supports future employment outcomes but may serve as the vehicle to post-secondary education to further enhance the labor force status of youth with disabilities.

### **Chapter Summary**

The purpose of this study was to describe and compare the relationship between post-school employment outcomes and the completion of a secondary education career and technical education concentration among youth with disabilities. This study showed that CTE may positively impact some but not all employment outcomes for youth with disabilities up to 11 years after exiting high school. Completing a CTE concentration in high school was found to provide an additional value for youth with disabilities by improving their chances of being employed and earning higher wages. This finding is consistent with some of the research on CTE and employment that was completed in the

1990's. However, this study extends prior research by finding that completing a CTE concentration not only increases the likelihood of being employed and having higher wages one or two years after exiting high school, but more than a decade after high school, controlling for race, ethnicity, gender, location, marital status, and household income. Moreover, this study found that concentrating in CTE may also contribute a higher likelihood of labor force participation up to 11 years beyond leaving high school. Youth that completed a CTE concentration were found to be less likely to have a job that offered fringe benefits. Obtaining a postsecondary education degree was associated with all employment outcomes compared to youth who obtained no postsecondary degree.

This study confirms the benefit of federal policy that appropriates funds for CTE in the nation's high school and the emphasis of CTE in special education policy and practice. Special educators should maintain a basic level of CTE knowledge proficiency such that they can best assist youth and families in transition planning and course of study development. The findings suggest that CTE needs to be a flexible curriculum that offers programs that prepare students with goals of obtaining employment immediately upon exiting high school and students who desire to obtain postsecondary education for the purposes of acquiring employment in career areas that offer higher growth and benefits. This approach makes CTE viable in the college- and career-readiness national education agenda.

## Tables

Table 1

*Studies Included in the Review of the Literature: Data Source and Analytic Sample*

Study	Data Source	Date of CTE Participation	Follow-up Data Collection	Sample Size	Nationally Representative	Data for Students with Disabilities Provided
Baer et al., 2003	A suburban and two rural school districts in Ohio.	Students participated in CTE during the 1997-1998 school year	One to three years post-graduation	140 graduates	No	Yes
Bishop & Mane, 2004	National Educational Longitudinal Study: 1998	Students earned CTE credits between 1988 and 1992. Students graduates in 1992 or 1993	One to two years after graduation and again seven to eight years after	Not reported	Yes	No
DeLuca, Plank, & Estacion, 2006	National Longitudinal Survey of Youth 1997	Students graduated high school roughly between 1997 and 1998	Three to four years after graduation	1,691 graduates Sample 1 873 graduates Sample 2	Sample 1 was nationally representative Sample 2 was not nationally representative	No

Flexer et al., 2011	A large Great Lakes state	Students graduated or aged out in June 2005, 2006, 2007, or 2008	One year after exit	1,520	No	Yes
Frank, Sitlington, Cooper & Cool, 1990	Fifteen Area Education Agencies in Iowa	Youth that aged out or dropped out but would have completed high school at the end of the 1984-1985 school year	One year after high school	318 youth	No	Yes
Frank, Sitlington & Carson, 1991	Fifteen Area Education Agencies in Iowa	Youth that aged- out or dropped out but would have completed high school at the end of the 1984-1985 school year	One year after high school	200 youth with behavior disorders	No	Yes
Harvey, 2002	National Education Longitudinal Study:1988	Students earned CTE credits between 1988 and 1992	One year after high school	7,007 youth	Yes	Yes

Plank, 2001	National Educational Longitudinal Study: 1998	Students earned CTE credits between 1988 and 1992	One year after leaving high school	10,408 youth	Yes	No
Plank, DeLuca, & Estacion, 2005	National Longitudinal Survey of Youth 1997	Youth earned CTE credits between 1997 and 1999	Not provided	846 youth	Yes	No
Schalock, Elliott, & Ross, 1992	Nebraska Department of Education data	Youth earned CTE credits between 1979 and 1988	One to ten years after graduation	298 youth	No	Yes
Schwarz & Taymans, 1991	An inner city Vocational/Technical School Records	Youth earned CTE credits between 1986 and 1988	One to three years after graduation	23 youth	No	Yes
Shapiro & Lentz, 1991	Data from four vocational-technical schools in Eastern Pennsylvania	Youth earned CTE credits between Sept. 1985 and Aug. 1988	At the end of 6, 12, & 24, months post-graduation	85-86 Cohort 143 Students, 86-87 Cohort 124 youth	No	Yes
Sitlington & Frank, 1990	Data were collected from fifteen Area Education Agencies in Iowa	Youth with disabilities that aged-out or graduated at the end of the 1985 or 1986 school year	One year after high school graduation	911 youth with learning disabilities	No	Yes

Sitlington, Frank, & Carson, 1992	Data were collected from fifteen Area Education Agencies in Iowa	Youth with disabilities that aged-out or graduated at the end of the 1985 or 1986 school year	One year after high school graduation	737 youth with learning disabilities, 59 with behavior disorders, 142 with mental retardation	No	Yes
Wagner, 1991	National Longitudinal Transition Study (NLTS)	Youth earned CTE credits between 1980 and 1984	Up to 2 years after exiting high school	More than 8000 youth with disabilities	Yes	Yes
Wagner, Blackorby, Cameto, & Newman, 1993	National Longitudinal Transition Study (NLTS)	Youth earned CTE credits between 1987- 1990	1 to 2 years after exiting high school	More than 8000 youth with disabilities	Yes	Yes

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Table 2

*Studies Included in the Review of the Literature: Variables used in Analyses*

Study	Data Analysis	Dependent Variables	Description of CTE Independent Variable	Control Variables
Baer et al., 2003	Logistic Regression	Full-time employment Postsecondary education	Participation in CTE	Gender, Ethnicity, Disability
Bishop and Mane, 2004	Logistic Regression	Earnings, number of months worked, number of months unemployed, hourly wage rate in the last job held for immediately after high school and eight years after high school.	Number of Carnegie units of computer courses, number of Carnegie units of non-computer occupation-specific courses, number of Carnegie units of beginning vocational courses, total number of Carnegie units taken in English, foreign languages, mathematics, science, and social studies courses, total number of personal interest courses	High school completion and college attendance variables, grades and test scores, geographic region, gender, race/ethnicity, participation in a program for orthopedically handicapped or learning disabled, family background variables, household religious background, school background, values and attitude toward work, work experience in 8th grade, state policies and local labor markets
DeLuca, Plank, & Estacion, 2006	Logistic Regression	College Enrollment	CTE-to-academic coursetaking ratio	Gender, race/ethnicity, gross household income, parental education, urban or rural setting
Flexer et al., 2011	Logistic Regression	Full-time employment	Concentration in CTE	Gender, Minority Status, Disability

Frank, Sitlington, Cooper & Cool, 1990	3-Way Chi Square test	Proportion of employed and unemployed	Regular vocational education course taken in high school	Not provided
Frank, Sitlington, & Carson, 1991	3-Way Chi Square test	Proportion of employed and unemployed	Regular vocational education course taken in high school	Not provided
Harvey, 2002	Logistic Regression and Ordinary least-squares regression	Employed at least one month, number of average hours worked per week, total earnings from jobs, job satisfaction rating, postsecondary education participant	Nondisabled and CTE course credits, disabled and no CTE course credits, disabled and CTE course credits, nondisabled and no CETE course credits	Received a high school diploma, a responsibility for the well-being of another, ever married, gender, suburban, rural, urban area of residence, lives with others, lives with parent or guardian, race, school type, family socioeconomic status, postsecondary education participation
Plank, 2001	Ordinary least-squares regression, logistic regression, multinomial logistic regression	Achievement growth (as measured by standardized test in math, science, reading, and history), the likelihood of dropping out of high school, immediate postsecondary involvements (not enrolled, held job; enrolled, held no job; not enrolled, held job; enrolled, held job primarily student; enrolled, held job, primarily worker)	Individuals who fulfilled neither a CTE or Academic concentration, individuals who were purely CTE concentrators, dual CTE and academic concentrators, purely academic concentrators	Gender, race/ethnicity, SES, pre-high school test scores

Plank, DeLuca, & Estacion, 2005	Cox Nonproportional Hazards Model	Dropping out	CTE-to-academic coursetaking ratio	Gender, race/ethnicity, highest grade completed by a residential parent, household income, living with biological mother/father/mother and father/one step parent/other, urban/non-urban, age, mathematics knowledge subscore from the CAT-ASVAB, GPA
Schalock, Holl, Elliott, & Ross, 1992	Multiple Regression	Weeks employed, Hours worked per week, wages, yearly salary	Hours in CTE program	IQ, verified handicap, gender, family involvement
Schwarz & Taymans, 1991	Descriptive Statistics	Employment Status	CTE program completer	None Provided
Shapiro & Lentz, 1991	Multivariate discriminant function analyses	Employment Status, annual income, current job satisfaction	CTE school attendee with LD, CTE school attendee without LD, regular high school attendee without LD	None
Sitlington & Frank, 1990	3-Way Chi Square test	Proportion of employed and unemployed	Regular vocational education course taken in high school	Not provided

Sitlington, Frank, & Carson, 1992	3-Way Chi Square test	Proportion of employed and unemployed	Regular vocational education course taken in high school	Not provided
Stone & Aliaga, 2005	Logistic regression	High school completion	General Concentrators, CTE Concentrators, Dual Concentrators, Academic Concentrators	Gender, Race, Ethnicity, Parent Education, Urban/Rural/Suburban, 8th grade GPA, high school GPA,
Wagner, 1991	Logistic regression	Employment	Enrollment in a CTE course	Disability, age, youth was male, youth lived in urban area, unemployment rate in local area
Wagner, Blackorby, Cameto, & Newman (1993)	Logistic regression	Employment	Enrollment in a CTE course, concentrating in CTE	Disability, age, ethnic background, gender, annual household income

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Table 3  
*Studies Included in the Review of the Literature: Findings*

Study	Findings
Baer et al., 2003	Participation in CTE coursework predicted the likelihood of full-time employment more than twofold one year after exiting high school.
Bishop and Mane, 2004	Non-computer (occupational) CTE was associated with a 1.4% in earnings eight years after graduation.
DeLuca, Plank, & Estacion, 2006	Youth who took over half of their courses in CTE had 80% lower odds of attending college than youth who had a smaller proportion of CTE courses one year after leaving high school. Taking no CTE credits was negatively associated with college attendance.
Flexer et al., 2011	Students who concentrated in CTE were 1.5 times as likely to be employed full-time by 1 year after graduation as students who did not concentrate in CTE.
Frank, Sitlington, & Carson, 1991	No significant association was found between postschool employment and participation in CTE during high school.
Frank, Sitlington, Cooper & Cool, 1990	No significant association was found between postschool employment and participation in CTE during high school.
Harvey, 2002	Youth with and without disabilities who participated in CTE and students with disabilities that did not participate in CTE had significantly greater odds of being employed 1 year after high school compared to youth without disabilities that took no CTE. Annual wage earnings were significantly higher for youth with and without disabilities that participated in CTE. No significant difference was found in the annual wage earnings for youth with disabilities who did not participate in CTE and students without disabilities who took no CTE in high school. Average weekly hours worked were significantly higher for youth with and without disabilities who participated in CTE compared to youth who took no CTE. No significant difference was found between the average weekly hours worked for youth with and without disabilities who took no CTE during high school. Postsecondary participation 1 year after high school graduation was significantly lower for youth without disabilities who participated in CTE compared to students without disabilities who took no CTE. No significant difference was found between the postsecondary education participation for youth with and without disabilities who took no CTE during high

school.

Plank, 2001 The probability of dropping out was lowest when 3 credits of CTE were completed for every 4 of academic credits. Academic concentrators had the greatest likelihood of becoming purely or primarily a student after graduation, followed by dual concentrators, students with neither an academic or CTE concentration, and those who were CTE concentrators. CTE concentrators were most likely to be purely or primarily workers after graduation followed by those who had neither concentration, dual concentrators, and academic concentrators.

Plank, DeLuca, & Estacion, 2005 Students who enter high school at 14 and younger have a lower likelihood of dropping out of school if they take a mix of CTE and academic coursework. For students who enter high school at an older age, the proportion of academic and CTE courses do not affect the chances of dropping out.

Schalock, Holl, Elliott, & Ross, 1992 CTE participation significantly predicted post-school employment, hours worked per week, and yearly salary.

Schwarz & Taymans, 1991 78% of students who attended a CTE high school were employed after high school

Shapiro & Lentz, 1991 Students without LD and attended a regular high school had a post-school employment rate of 85% compared to a rate of 97% for students with and without LD who attended a CTE high school.

Sitlington & Frank, 1990 No significant association was found between post-school employment and participation in CTE during high school.

Sitlington, Frank, & Carson, 1992 No significant association was found between post-school employment and participation in CTE during high school.

Stone & Aliaga, 2005 Less odds of completing high school was found for general and CTE concentrators compared to academic concentrators.

Wagner, 1991 Youth who took CTE in their last year of high school were employed at a rate of 51% compared to 38% for youth who took no CTE. Youth who took CTE were 9 percentage points more likely to be competitively employed after high school compared to students who took no CTE.

Wagner, Blackorby, Cameto, & Newman (1993) Youth with mild disabilities who concentrated in CTE had 40% greater odds of being employed post-school. CTE concentrators had \$6,247 more in annual income than those who took no CTE. Youth who took some CTE had annual incomes that were \$4,000 greater than youth who took no CTE.

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Table 4

*Studies Included in the Review of the Literature: Summary of Research by Variable*

Variable	Findings from Literature
SES/Household Income	Lower family socioeconomic status associated with higher odds of employment and hours worked per week (Harvey, 2002). Postsecondary education participation was more likely with students from higher family socioeconomic status (Harvey, 2002). Household income was associated with odds of attending college (Deluca et al., 2006).
Gender	Being a female reduced likelihood of post-school employment (Flexer et al., 2011; Harvey, 2002). Higher earnings were associated with being male (Harvey, 2002). Postsecondary education participation was more likely with females from higher family socioeconomic status (Harvey, 2002). Females were twice as likely to attend college after graduation (Deluca et al., 2006).
Race	African American students were less likely to be employed compared to non-African American youth (Flexer et al., 2011). Higher earnings were more likely among Caucasian youth (Harvey, 2002).
Marital Status	Youth who were not married had higher odds of post-school employment (Harvey, 2002). Postsecondary education participation was more likely with students who were not married (Harvey, 2002).
Location	Youth who lived in a suburban or urban area had a higher likelihood of being employed after exiting high school (Baer et al., 2003; Harvey, 2002).
Achievement	High school grades of mostly Bs, or half Bs/As had a likelihood of attending college 3.3 times those with lower grades and having mostly A's was a 6.6 advantage. ASVAB arithmetic reasoning score associated with higher odds of college enrollment (Deluca et al., 2006). CTE concentrators had greater odds of lower achievement (Plank, 2001).
Academic credits	Youth who focused on academic coursework were less likely to be primarily or purely workers after high school (Plank, 2001). A mix of academic and CTE coursework reduced likelihood of dropping out (Plank, 2001; Plank et al., 2005).

Table 5  
*Interviews and Non-Interviews for NLSY97 Youth Questionnaire Data Collection*

Year	Personal Interviews		Telephone Interviews		Not Interviewed	
	Number	Percentage	Number	Percentage	Number	Percentage
Round 1- 1997	8700	96.8%	284	3.2%	0	0.0%
Round 2- 1998	7924	94.5%	460	5.5%	598	6.7%
Round 3- 1999	7552	92.0%	655	8.0%	776	8.6%
Round 4- 2000	7372	91.2%	706	8.7%	904	10.1%
Round 5- 2001	7215	91.5%	664	8.4%	1102	12.3%
Round 6 - 2002	6614	83.8%	1281	16.2%	1088	12.1%
Round 7- 2003	6825	88.0%	927	12.0%	1230	13.7%
Round 8- 2004	6577	87.7%	925	12.3%	1482	16.5%
Round 9- 2005	6348	86.5%	989	13.5%	1646	18.3%
Round 10- 2006	6663	88.2%	894	11.8%	1425	15.9%
Round 11- 2007	6484	87.4%	932	12.6%	1566	17.4%
Round 12- 2008	6417	85.7%	1072	14.3%	1494	16.6%
Round 13- 2009	6496	85.7%	1064	14.1%	1423	15.8%
Round 14- 2010	Not Reported	Not Reported	Not Reported	Not Reported	Not Reported	Not Reported

Table 6  
*Comparison of the Characteristics of the Analytic Sample and Base Sample*

	Analytic Sample (n = 1925)	Base Sample (n = 7889)
	%	%
Disability	100	24.4
CTE Concentrator	30.6	31.3
Gender		
Female	43.8	48.8
Male	56.2	51.2
Race		
White	66.3	58.7
Black	23.8	26.8
Others	10.0	14.4
Ethnicity		
Hispanic	15.5	21.2
Household Income		
Less than \$24,999	68.0	64.1
\$25,000 to \$49,999	26.0	27.3
More than \$50,000	06.0	06.5
Location		
Urban	66.5	78.7
Rural	33.5	21.3
Never Married	65.6	75.2
Education Attainment		
No Degree	13.2	12.7
Diploma/GED	58.2	65.8
Associate	03.9	05.2
Bachelor's and Beyond	10.5	16.1

Table 7  
*Intercorrelations Between Variables Used in the Study*

	Female	Hispanic	Urban	Never Married	Education Attainment	Academic Credits	Achievement	Household Income	CTE	Black	Disability
Female	1.00	---									
Hispanic	-0.02	1.00	---								
Urban	0.01	0.11	1.00	---							
Never Married	-0.10	-0.05	0.09	1.00	---						
Education Attainment	0.09	-0.12	0.05	0.00	1.00	---					
Academic Credits	0.14	-0.10	0.04	0.03	0.44*	1.00	---				
Achievement	0.01	-0.17	0.03	-0.02	0.44**	0.47*	1.00	---			
Household Income	-0.06	0.05	-0.05	-0.13	0.11	0.07	0.12	1.00	----		
CTE	-0.13	-0.04	-0.07	-0.04	-0.02	-0.13	-0.02	0.12	1.00	---	
Black	0.07	-0.22	-0.05	0.14	-0.15	-0.13	-0.34*	-0.16	-0.01	1.00	---
Disability	-0.07	-0.02	0.00	0.00	-0.07	-0.08	-0.08	-0.02	0.04	-0.04	1.00

\* $p \leq .05$ ; \*\* $p \leq .01$

Table 8  
*Mode 1: Logistic Regression Results for Predicting Labor Force Participation*

Independent Variables	Odds Coefficients <sup>a</sup> ( <i>n</i> = 1164)	
	Block1A	Block 1B
Constant	1.79***	1.53
Demographic Characteristics		
Household Income <sup>b</sup>		
\$25,000 to \$50,000	1.33	0.49
More than \$50,000	1.97	0.19
Female <sup>c</sup>	1.63***	1.44
Hispanic <sup>d</sup>	0.89	0.95
Black <sup>e</sup>	0.63*	0.67
Urban <sup>f</sup>	2.19***	1.74**
Never Married <sup>g</sup>	2.26***	1.62*
Academic Characteristics		
Achievement <sup>h</sup>		
Middle		0.22
High		0.40
Academic Credits <sup>i</sup>		
Middle		0.67
High		0.68
Education Attainment <sup>j</sup>		
Diploma/GED		1.87*
Associates		3.56*
Bachelors and Beyond		2.42

\**p* ≤ .05; \*\**p* ≤ .01; \*\*\**p* ≤ .001

<sup>a</sup> Coefficients are in an odds metric. Coefficients greater than one indicate an increase in the odds; coefficients less than one indicate a decrease in the odds.

<sup>b</sup> Reference Group = Household Income \$24,999 or less

<sup>c</sup> Reference Group = Male

<sup>d</sup> Reference Group = Non-Hispanic

<sup>e</sup> Reference Group = White

<sup>f</sup> Reference Group = Rural

<sup>g</sup> Reference Group = Married, Widowed, Divorced

<sup>h</sup> Reference Group = Low Achievement

<sup>i</sup> Reference Group = Low Academic Credits

<sup>j</sup> Reference Group = No Degree

Table 9  
*Model 2: Logistic Regression Results for Predicting Employment*

Independent Variables	Odds Coefficients <sup>a</sup> ( <i>n</i> = 609)	
	Block 2A	Block 2B
Constant	1.59***	1.39
Demographic Characteristics		
Household Income <sup>b</sup>		
\$25,000 to \$50,000	1.04	0.85
More than \$50,000	1.32	2.34
Female <sup>c</sup>	0.95	0.82
Hispanic <sup>d</sup>	0.92	1.15
Black <sup>e</sup>	0.67*	1.18
Urban <sup>f</sup>	1.43**	1.68*
Never Married <sup>g</sup>	1.20	1.36
Academic Characteristics		
Achievement <sup>h</sup>		
Middle		1.26
High		1.13
Academic Credits <sup>i</sup>		
Middle		0.55
High		0.39**
Education Attainment <sup>j</sup>		
Diploma/GED		2.54**
Associates		5.43*
Bachelors and Beyond		6.02***

\**p* ≤ .05; \*\**p* ≤ .01; \*\*\**p* ≤ .001

<sup>a</sup> Coefficients are in an odds metric. Coefficients greater than one indicate an increase in the odds; coefficients less than one indicate a decrease in the odds.

<sup>b</sup> Reference Group = Household Income \$24,999 or less

<sup>c</sup> Reference Group = Male

<sup>d</sup> Reference Group = Non-Hispanic

<sup>e</sup> Reference Group = White

<sup>f</sup> Reference Group = Rural

<sup>g</sup> Reference Group = Married, Widowed, Divorced

<sup>h</sup> Reference Group = Low Achievement

<sup>i</sup> Reference Group = Low Academic Credit

<sup>j</sup> Reference Group = No Degree

Table 10  
*Model 3: Logistic Regression Results for Predicting Receipt of Fringe Benefits*

Independent Variables	Odds Coefficients <sup>a</sup> (n = 498)	
	Block 3A	Block 3B
Constant	0.62**	1.20
Demographic Characteristics		
Household Income <sup>b</sup>		
\$25,000 to \$50,000	1.07	0.93
More than \$50,000	0.68	0.47
Female <sup>c</sup>	0.58***	0.80
Hispanic <sup>d</sup>	0.96	0.61
Black <sup>e</sup>	1.15	0.98
Urban <sup>f</sup>	0.62***	1.00
Never Married <sup>g</sup>	0.91	1.29
Academic Characteristics		
Achievement <sup>h</sup>		
Middle		0.41
High		0.35
Academic Credits <sup>i</sup>		
Middle		2.07*
High		1.49
Education Attainment <sup>j</sup>		
Diploma/GED		0.46*
Associates		0.12**
Bachelors and Beyond		0.13***

\*p ≤ .05; \*\*p ≤ .01; \*\*\*p ≤ .001

<sup>a</sup> Coefficients are in an odds metric. Coefficients greater than one indicate an increase in the odds; coefficients less than one indicate a decrease in the odds.

<sup>b</sup> Reference Group = Household Income \$24,999 or less

<sup>c</sup> Reference Group = Male

<sup>d</sup> Reference Group = Non-Hispanic

<sup>e</sup> Reference Group = White

<sup>f</sup> Reference Group = Rural

<sup>g</sup> Reference Group = Married, Widowed, Divorced

<sup>h</sup> Reference Group = Low Achievement

<sup>i</sup> Reference Group = Low Academic Credits

<sup>j</sup> Reference Group = No Degree

Table 11  
 Model 4: OLS Regression Results for Predicting Hourly Wages

Unstandardized Regression Coefficients (b) <sup>a</sup> (n = 591)		
Independent Variables	Block 4A	Block 4B
Constant	0.58***	0.11
Demographic Characteristics		
Household Income		
\$25,000 to \$50,000	0.43***	-0.01
More than \$50,000	0.49***	0.14
Female <sup>c</sup>	0.50***	0.00
Hispanic <sup>d</sup>	0.22	0.14
Black <sup>e</sup>	0.05	0.01
Urban <sup>f</sup>	1.14***	0.35***
Never Married <sup>f</sup>	0.89***	0.18*
Academic Characteristics		
Achievement <sup>g</sup>		
Middle		0.48***
High		0.40*
Academic Credits <sup>h</sup>		
Middle		-0.24***
High		-0.19*
Education Attainment <sup>i</sup>		
Diploma/GED		1.72***
Associates		1.82***
Bachelors and Beyond		1.98***
$R^2 = 0.93$		

\* $p \leq .05$ ; \*\* $p \leq .01$ ; \*\*\* $p \leq .001$

<sup>a</sup> Coefficient changes by 100 percent for a one unit increase in the independent variable while all other variable in the model are held constant

<sup>b</sup> Reference Group = Household Income \$24,999 or less

<sup>c</sup> Reference Group = Male

<sup>d</sup> Reference Group = Non-Hispanic

<sup>e</sup> Reference Group = White

<sup>f</sup> Reference Group = Rural

<sup>g</sup> Reference Group = Married, Widowed, Divorced

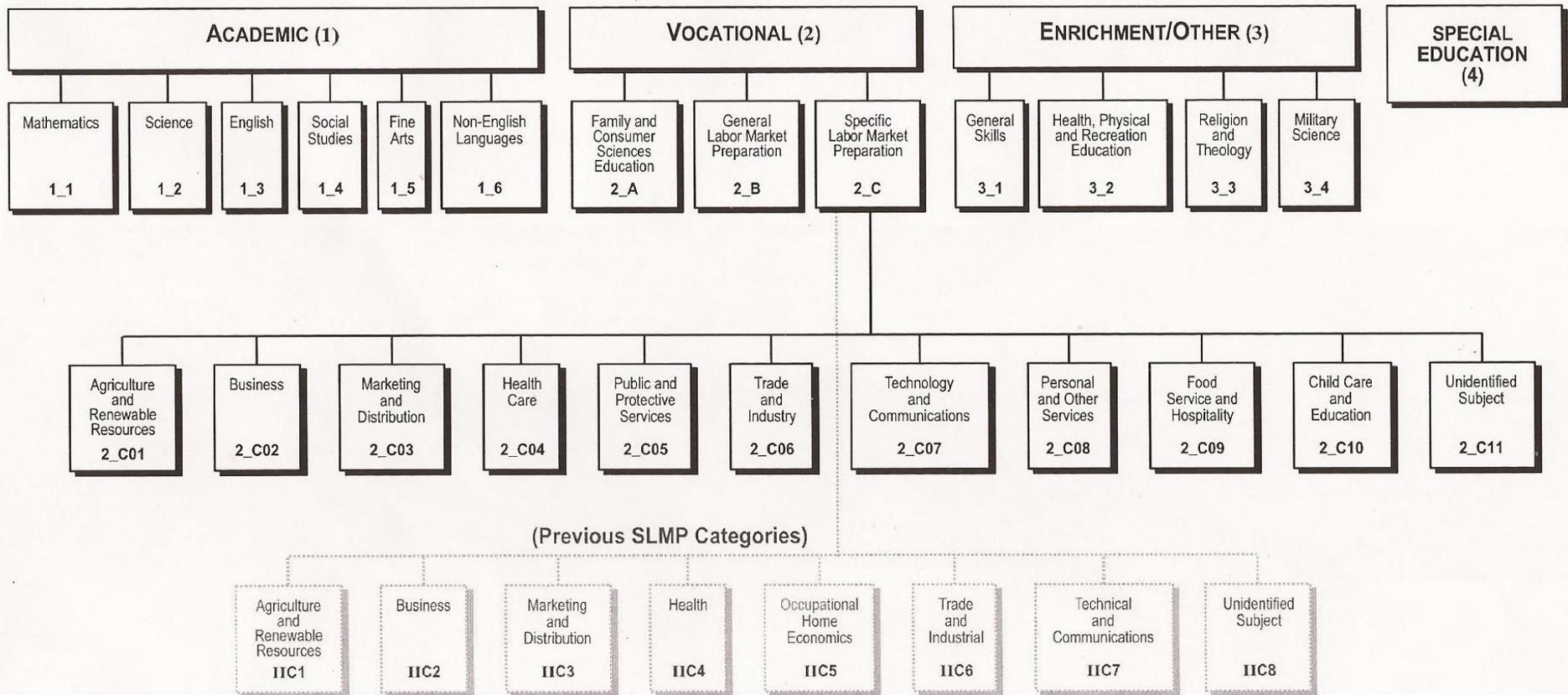
<sup>h</sup> Reference Group = Low Achievement

<sup>i</sup> Reference Group = Low Academic Credits

<sup>j</sup> Reference Group = No Degree

## Figures

## The 1998 Secondary School Taxonomy



*Figure 1.* The 1998 Secondary School Taxonomy used for transcript analyses. Adapted from Bradby, D., & Hoachlander, G. (1999). 1998 revision of the Secondary School Taxonomy (Working Paper No. 1999-06). Retrieved from the National Center for Education Statistics website: <http://nces.ed.gov/pubs99/199906.pdf>.

The 2007 and 1998 Secondary School Taxonomy Categories

2007 SST categories	1998 SST categories	
Agriculture and Natural Resources	Agriculture and Renewable Resources	
Computer and Information Sciences	Technology and Communications Communications technology Computer technology Other technology	
Health Sciences		Health Care
Engineering Technologies		
Architecture		
Communications and Design		
Marketing	Marketing and Distribution	
Business Support	Business Business services Business management	
Business Management		
Business Finance		
Construction	Trade and Industry Construction Precision production Mechanics and repair Transportation and material moving	
Manufacturing		
Mechanics and Repair		
Transportation		
Consumer Services	Personal and Other Services Food Service and Hospitality	
Culinary Arts		
Education	Child Care and Education	
Library Science	Public and Protective Services	
Public Administration		
Legal Services		
Protective Services		

Figure 2. Comparison of the 2007 and 1998 Secondary School Taxonomy (SST) Categories within the Career/Technical Education (CTE) Specific Labor Market Preparation categories. Adapted from Bradby, D. (2007). *The 2007 Revision of the Career/Technical Education Portion of the Secondary School Taxonomy* (NCES 2008-030). Retrieved from the National Center for Education Statistics website: <http://nces.ed.gov/pubs2008/2008030.pdf>

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