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A COST-BENEFIT ANALYSIS OF THE OKLAHOMA DEPARTMENT OF CAREER AND TECHNOLOGY EDUCATION

A Dissertation

SUBMITTED TO THE GRADUATE FACULTY

in partial fulfillment of the requirements for the

degree of

Doctor of Philosophy

By

Jeff Baenziger
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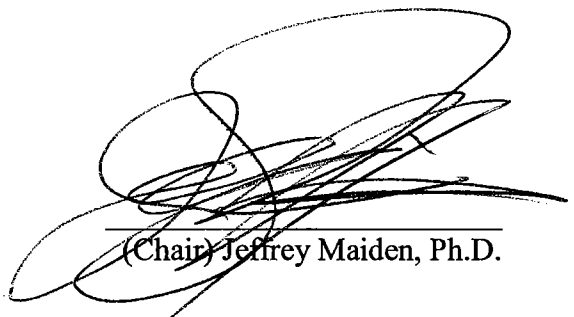

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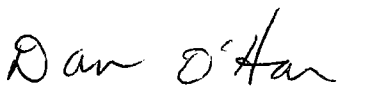

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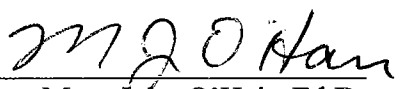

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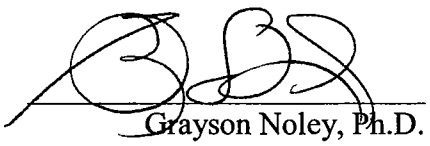

Grayson Noley, Ph.D.

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Abstract

As educational policy-makers attempt to allocate scarce resources among competing educational options they face the problem of a lack of quality quantitative research to assist in the process. The purpose of this study was to contribute to the existing educational literature by performing a high quality cost-benefit analysis and comparison of wages across demographic groups within career/technical institutes by analyzing the Oklahoma Department of Career and Technical Education. The Oklahoma *Career*Tech system was analyzed for FY1999, 2000 and 2001. Utilizing the ingredients method and a 17% tax rate, total system costs and cost per full-time equivalent (FTE) student were estimated. In FY1999 total system costs were $398.591 million with a cost per FTE of $11,430. In FY2000 total system costs were $400.940 million with a cost per FTE of $12,115. In FY2001 total system cost were $431.194 million with a cost per FTE of $13,789. Economic benefits were estimated by comparing the lifetime tax payments of *Career*Tech system completers with those holding the next lower academic credential, the high school diploma and/or equivalent. Tax comparisons were estimated at the 5, 17, and 29% tax rates across multiple age, gender, and ethnic groups. Wage data for the *Career*Tech completers were taken from 1-year follow-up salary surveys as provided by the *Career*Tech system. High school diploma comparison data were taken from the U.S. Census Bureau's 2000 census, 2001 Current Population Study, and 2002 Current Population Study (U.S. Census Bureau, 2004). The results of the cost-benefit analysis reported net benefit, benefit-cost ratios, and rate of return estimates. In FY1999, from a national perspective, the net benefit was -$45,239 with a benefit-cost ratio of -2.96 and a rate of return of -3.96. In FY2000 the net benefit was -$47,069 with a benefit-cost ratio of -2.89 and a rate of return of -3.89. In FY2001 the net benefit was -$52,654 with a benefit-cost ratio of -2.82 and a rate of return of -3.82. Demographic wage comparisons indicated a statistically significant difference in wages based upon gender and ethnicity. No significant interaction effects between gender and ethnicity were found.

Chapter One: Introduction

Upon entering the 20th century America embraced a multitude of changes evidenced by the explosion of the industrial revolution and the resulting urbanization of society. In an attempt to harness a large, mostly poor, uneducated workforce, education began to shift in its purpose and method of organization and delivery. As Taylorism and the concepts of scientific management swept through the industrial/corporate world, educational leaders began to apply some of the same concepts to education. This new face of education resulted in the expansion of facilities to house large numbers of students, the breaking up of subjects and classes into discrete blocks, and the introduction of the concept of "productivity." As a result of this new educational structure, many scholars, John Dewey (1916) being one of the more vocal and prominent, criticized the lack of coherency in curriculum and questioned whether manufacturing production models were appropriate to the enterprise of education.

As the United States continued to prosper through the end of the 1950's, education was attributed with being a potent force in economic growth and development. When the economy slowed in the 1960's, however, the convergence of slower economic production and academic research resulted in a huge backlash and public outcry for educational reform. In response, many studies were conducted in an attempt to determine whether one type of educational input, practice, or methodology was better at producing positive outcomes than others. These early studies were some of the first attempts of academic scholars to actually determine the effective use of resources (efficiency) and resulted in an emerging body of work known today as *production studies:* These studies

specifically attempt to find causal relationships between educational inputs and outcomes (Swanson & King, 1997).

Of these early studies, none had greater impact than the 1966 Coleman Report, which was the result of one of the best-known and most controversial input-output studies involving over 500,000 students in four thousand schools. Its conclusion that schooling had little potential for closing the achievement gap between white and minority students was both controversial and inflammatory (Coleman, 1966). There were many critics of Coleman's work, with most of the criticism aimed at methodology and research design. Nevertheless, Coleman did prove a strong correlation between the student's socioeconomic status and his/her educational outcome, a connection that, along with teacher quality, remains a strong indicator of academic success today. In particular, Mayeski et al. (1972) reanalyzed Coleman's data and determined that although schools are important factors, it is clear that there is a colinearity of variables with the impact of schools being bound to the student's characteristics.

Although many scholars have criticized production studies as being inappropriate for the process of education, production studies continue to be popular and relevant. Hanushek (1986, 1991) conducted one of the more influential production studies utilizing a more sophisticated meta-analysis methodology of 187 production-function studies published in thirty-eight articles or books. He concluded that there is no systemic relationship between school expenditures and student performance. This study was particularly significant not only for affirming Coleman's assessments of minimal impact by schools, but also because he tied educational activity and corresponding student outcomes to expenditures. Although the public is concerned with educational outcome,

the tax-paying public is particularly interested in how schools are spending public funds in an attempt to educate children. Hanushek once again spawned a public outcry for reform. In a bitter challenge, Hedges, Laine, and Greenwald (1994a.) claimed that the methodology used by Hanushek may have been appropriate for the time period, but would be considered inadequate given current levels of sophistication. When examined using more adequate methods, the data upon which Hanushek's findings were based support exactly the opposite inference. Hedges, Laine & Greenwald (1994b.) concluded that the amount of resources is positively related to the accomplishments of students. Hanushek's use of an analytic method known as vote counting, as opposed to a combined significance test and combined estimation method sparked a debate between the two camps over whether the issue was a matter of statistical method or an identification of correct policies.

Because the education research and policy-making communities continue to focus on the outcomes of educational programs, researchers increasingly focus upon the more effective, efficient, and equitable use of resources. Unfortunately, the education production process has been difficult to define and interpret, even to the point of causing some researchers to refer to it as a "black box" into which resources are deposited and from which outcomes emerge (Rice, 2001). Others have attempted to demystify this black box by developing an education production function that empirically describes the systematic relationship between educational inputs and outputs or outcomes. Production functions are developed by taking information about the productivities of various inputs, combined with data on prices, in order to reveal the marginal returns to different types of educational investments such as smaller class sizes versus higher teacher salaries. This

line of research recognizes the multiplicity of competing policy alternatives and identifies those with the highest productivities relative to cost as the most preferable on economic grounds. Further, to the degree that inefficiencies exist in the education sector, productivity studies have the potential to improve current resource allocation practices. In simplest terms, specification of the production function involves three steps; identifying the inputs, identifying the outcomes, and specifying the function that transforms inputs into outcomes (Rice, 2001).

Using this educational production framework, cost analysis procedures can be applied to four distinct concepts of efficiency: internal, external, technical, and economic. The internal efficiency of education compares the costs of education to the outputs or effects within education; efficiency increases as the same input resources produce more outputs. The external efficiency of education compares the costs of education to the benefits of education that are external to educational production providing a measure of the profitability of investment in education. While internal and external efficiency are defined by the boundary of education production, technical and economic efficiency are concerned with the very nature of education production. Technical efficiency specifically refers to the optimization of existing and/or chosen resources; economic efficiency focuses on the combinations of inputs chosen in an attempt to find the best combination of inputs for the intended outcome (Tsang, 1988).

U.S. System of Public Education

In the fall of 2002, about 69.2 million persons attended American schools and colleges. About 4.3 million were employed as elementary and secondary schoolteachers and as college faculty. Other professional, administrative, and support staff of educational

institutions numbered 4.8 million. Thus about 78.3 million people were involved, directly or indirectly, in providing or receiving formal education. In a nation with a population of about 288 million, more than 1 out of every 4 persons participated in formal education. Elementary and secondary education includes kindergarten through high school graduation, generally after grade twelve. Postsecondary education includes an array of diverse educational experiences, including a wide range of programs offered by American colleges and universities. For example, a community college may offer vocational training or the first 2 years of training at the college level. A university typically offers a full undergraduate course of study leading to a bachelor's degree as well as first-professional and graduate programs leading to advanced degrees. Vocational and technical institutions offer training programs that are designed to prepare students for specific careers. Community groups, religious organizations, libraries, and businesses provide other types of educational opportunities for adults (National Center for Education Statistics, 2002).

Expenditures for public and private education, from kindergarten through graduate school (excluding postsecondary career and technical schools not awarding associate's or higher degrees), are estimated at $745 billion for 2001-02. The expenditures of elementary and secondary schools are expected to total $454 billion for 2001-02, while those of colleges and universities are expected to total $291 billion. The total expenditures for education are expected to amount to 7.4% of the gross domestic product in 2001-02, about the same percentage as in the recent past (National Center for Education Statistics, 2002). The proportion of total state and local government funds spent on education declined between 1980-81 and 1994-95, at least partly as a result of

the drop in elementary and secondary enrollment in the early part of the 1980s and the expansion of other governmental services. Between 1994-95 and 1998-99, the proportion of state and local government funds spent on education rose, from 33.5 to 35.0%. Of the 1998-99 state and local funds spent on education, about 70% went to elementary and secondary schools, 25% to colleges and universities, and 4% to other education programs (National Center for Education Statistics, 2002).

Problem and Purpose of the Study

As with all economic decisions, educational policy-makers must allocate scarce resources among competing options. A major problem policy-makers face is the lack of quality quantitative research to assist in this process. Many important decisions in education are concerned with the costs of education. Cost analyses may reveal the cost implications of an educational policy, assess the financial feasibility of an educational reform, provide diagnosis of past and current resource utilization in education, project future education cost requirements, and evaluate the relative efficiency of alternative educational policies or interventions (Tsang, 1995). The purpose of this study was to contribute to the existing educational literature by performing a high quality cost-benefit analysis of career/technical institutes.

Significance of the Study

Despite the obvious relevance of cost analysis for informed decision-making in education, a lack of awareness of the relevance of cost analysis on the part of decision-makers or sociopolitical barriers often prevent such analysis from taking place. For instance, Tsang (1995) observed that policy-makers may not always have any genuine interest in determining the financial requirements, feasibility, or benefits of an

educational plan and may even draw up educational plans for symbolic purposes or for legitimizing the power and actions of a regime. Analysis of educational costs may yield findings inconsistent with the hidden agenda of such policy-makers, or it may expose glaring inequalities or inequities in the distribution of educational resources by social class, gender, ethnicity, and region; or in the case of a cost-benefit analysis, it may show there are no benefits at all for a given educational program. This study utilized the specific methods of cost-benefit analysis in order to add to the body of cost-benefit literature an analysis of career/technical institutes. A secondary and practical use of the data from this research study will be to provide policy-makers with quantitative data to assist in the efficient allocation of educational resources.

Economic Benefits of Education

With a tremendous amount of expense and complexity of operation, the educational system in the United States appears, at least on the surface, to provide increased career opportunities. According to the National Center for Education Statistics (2002), adults with higher levels of education were more likely to participate in the labor force (including those who were employed and those actively seeking employment) than those with less education. Likewise, persons with lower levels of educational attainment were more likely to be unemployed than those who had higher levels of educational attainment. The 2001 unemployment rate for adults (25 years old and over) who had not completed high school was 7.3% compared with 4.2% for those with 4 years of high school and 2.3% for those with a bachelor's degree or higher.

For all levels of education, the discussion of educational benefits must begin by asking who will benefit from the education? The obvious beneficiary is the individual

being educated. In addition to students, other societal groups whom benefit must be considered. It is important to know what benefits accrue to students and to society at large in order to devise policies that achieve the socially optimal amount of education. Within the context of beneficiaries to education, there is a third group of individuals which must be taken into consideration, namely, those who work within the educational industry themselves. This group is important, according to Solmon & Fagnano (1995) because in many cases, decisions are made within a school not for the benefit of students or society, but for the benefit of those employed in the industry. It is therefore vital when evaluating educational decisions to ask in whose interest decisions have been made, and in particular who are benefiting from those decisions.

In 1963, Theodore Schultz (an early pioneer in the field of the economics of education) developed a number of categories of educational benefits. These include the benefits the economy obtained from educational research, the cultivation and discovery of potential talent, increased capability of workers to adjust to changes in job opportunities, the preparation of teachers, and the provision of manpower for sustained economic growth. In addition, schooling provides better citizenship, the ability to appreciate and recognize a wider range of cultural and other services, reduced reliance on the market for services, and a chance to give the next generation a better education and a better future.

One of the problems with researching the benefits of education is how to identify, assess, measure and evaluate all the complex aspects of such benefits. As a place to begin, the concept of human capital was developed. Human capital refers to the fact that human beings invest in themselves. By means of education, training, or other activities,

this investment in themselves raises their future income by increasing their lifetime earnings. This concept was not fully developed however, until the early 1960's when Schultz analyzed educational expenditure as a form of investment. In 1963, Schultz wrote:

> The economic value of education rests on the proposition that people enhance their capabilities as producers and as consumers by investing in themselves and that schooling is the largest investment in human capital. This proposition implies that most of the economic capabilities of people are not given at birth or at the time when children enter upon their schooling. These acquired capabilities are anything but trivial. They are of a magnitude to alter radically the usual measures of the amount of savings and of capital formation that is taking place. They also alter the structure of wages and salaries and the amount of earnings from work relative to the amount of income from property. There are long standing puzzles about economic growth, changes in the structure of wages and salaries, and changes in the personal distribution of income that can be substantially resolved by taking account of investment in human capital. (pp. 10-11)

Shortly after Schultz, Gary Becker (1964) published a book with the title *Human Capital* in which he developed a theory of human capital formation and analyzed the rate of return to investment in education and training. This rate of return to investment is a measure of the expected return on investment in terms of future economic benefits compared to the cost of acquiring the human capital. Often referred to as cost-benefit analysis, rate of return theory attempts to quantify a ratio of costs to benefits of a particular investment. In the educational context the rate of return examines the investment of education or development of human capital.

Since the 1960's human capital researchers have attempted to expand the scope of research on the benefits to education by conducting research on the non-market returns to education. Non-market analyses focus on the returns that are realized during nonmarket consumption-time or leisure-time hours. In particular, studies investigating the

relationship between schooling and health (Grossman, as cited in Cohn & Geske, 1990), schooling and asset management (Solmon, as cited in Cohn & Geske, 1990), schooling and consumption behavior (Michael, as cited in Cohn & Geske, 1990), and between schooling and migration (Schwartz, as cited in Cohn & Geske, 1990). Of particular importance is the research examining the ideas that education and training enhances the productivity of human capital formation through more efficient learning and adaptation to new environments and the embracing of change both in the workplace and in ones personal life (Cohn & Geske, 1990).

Assuming the money spent on developing human capital through education and training is viewed as a legitimate investment, then cost-benefit methodologies could appropriately be applied to compare the returns from various types of education and training. Woodhall (1995) expands upon the benefits of the education concept by separating the benefits to the individual and the benefits to society as a whole. For the individual who takes part in education and training, the benefits of future employment and increased earnings are probable, representing the private returns of education. At the same time, both the costs and benefits of an individual's education or training affect society as a whole, since society benefits from the increased productivity and availability of an educated and trained workforce. Recognizing the fact that most forms of education and training involve some form of public assistance, the costs and benefits to society represent the social return to education and training. Cohn and Geske (1990) point out that there are basically two types of benefits that belong to the social but not to the private domain. They include tax payments associated with the education benefit (i.e. income taxes paid), and "external" benefits, benefits that are due to the educational

investment but that the individual cannot capture. McMahon (1987, pp. 134-135) outlines seven external benefits to society from education:

1. Necessary for effective democracy and democratic institutions.
2. Important for efficient markets and the adaptation to technical change.
3. Lower crime rates and reduced penal system expense.
4. Lower welfare, Medicaid, unemployment compensation, and public health costs.
5. Reduced imperfections in capital markets.
6. Public service in community and state agencies.
7. Complementarities in production: Noneducational benefits.

Spring (1990) reiterates the continuing goal of common education by pointing out the idea that children from a variety of religious, ethnic, economic, and social backgrounds being educated in the same schools would gain common political and social values that would help eliminate conflict. The idea is that the teaching of social values from the schools would become a social benefit of education to all. Spring concludes by restating the idea that schools must become the channel for transmitting knowledge about the structure and functions of the U.S. government and the role of the people.

Ten years later external benefits to society from education do not seem to have changed much. Modern researchers like Labaree (2000) and Cuban (2000) purport that education is still considered a common good as it confers skills, knowledge and values required to function as voters, jurors and public spirited participants in the political life of democratic society. Individuals also develop capacities and orientations that allow them to be economically productive in occupational roles that promote economic growth and produce jobs which broaden the tax base for everyone in society. Cuban in particular echoes Spring's sentiments with the belief that education can encourage participation and a willingness to serve local and national communities, develop open-mindedness to different opinions and a willingness to listen to such opinions, respect for values that

differ from one's own, a willingness to treat individuals decently and fairly regardless of their background, and a commitment to talk through problems, reason, deliberate, and struggle toward openly arrive at compromises.

As a way to summarize the economic benefits of education, particularly from a rate of return perspective, Psacharopoulos (1985) calculated and summarized the returns to education for many countries. His basic findings were: (a) returns to primary school are higher than those to other levels of education; (b) private returns exceed social returns, particularly at the university level; (c) most rates of return are above 10%; and (d) returns to education were higher in the poorer countries, reflecting the greater scarcities of trained workers in these countries.

Methodology

The current study includes a cost-benefit analysis and wage comparisons of the Oklahoma Department of Career and Technology Education (referred to herein as the Oklahoma *Career*Tech system). The cost-benefit analysis involves estimating the monetary values of benefits and costs in order to determine the benefit-cost ratio, net benefit and social rate of return on investment by the taxpayers in the Oklahoma *Career*Tech system. The cost-benefit analysis for this study will follow the standard procedures set forth by Levin and McEwan (2001). The wage comparisons will include a factoral Analysis of Variance (ANOVA) with post hoc multiple comparison procedures to determine significant wage differences depending upon gender and ethnicity.

Research Questions

The following research questions were addressed:

1. What is the net benefit, benefit-cost ratio, and social rate of return for the Oklahoma *Career*Tech system completers for fiscal years 1999, 2000, and 2001?

2. Is there a significant difference in wages between male and female completers of the Oklahoma *Career*Tech system for fiscal years 1999, 2000, and 2001?
3. Is there a significant difference in wages among American-Indian, African-American, Hispanic, Caucasian, and Asian completers of the Oklahoma *Career*Tech system for fiscal years 1999, 2000, and 2001?
4. Is there a significant interaction between the variables of gender and ethnicity as compared by wages for fiscal years 1999, 2000, and 2001?

Definitions

Completer: Individuals fulfilling the requirements for a program of study within the Oklahoma *Career*Tech system, usually a 1050 contact hour certificate program with a career/technical focus.
External Benefits (EB): Benefits of education that exclude other benefits to education beyond earnings, such as increased health, decreased crime rates, and/or decreased transfer payments from other taxpayer supported agencies.
Fiscal Year (FY): The annual financial cycle for the Oklahoma Department of Career and Technology Education that begins July 1 and ends June 30. It is designated by the ending year.

Assumptions

1. No statements can be made about the quality of a program on the basis of cost-benefit analysis.
2. All self-report data collected from *Career*Tech completers is accurate and complete to the best of their knowledge.
3. All cost estimates contained in the audit report are accurate and complete to the best of the auditor's abilities.
4. All earnings are based upon working a full 40 hours per week for 52 weeks from age 18 to 64.

Delimitations

Funding and measuring of public higher education are issues of broad scope and hold the potential for varied approaches to in-depth study and research. In order to narrow the scope and establish suitable parameters, the following delimitations were imposed to more clearly mark the boundaries of this study:

1. The study was limited to completers of the Oklahoma *Career*Tech system during FY1999 to 2001 who were between the ages of 18 and 64 at the time of the one-year follow-up surveys, were working within a field related to their field of study, who participated in the surveys, and who answered the pertinent questions of age, gender, race, and salary.

2. Cost data are limited to that which was reported in the Career and Technology Education Special Audit Report for the period July 1, 1996 through June 30, 2001.
3. Benefits to education were limited to monetary returns as represented in the salary surveys conducted one year after completion of the program of study.

Limitations

1. All revenue and expenditure data utilized for this study were collected by independent auditors in cooperation with Oklahoma *Career*Tech system employees, although all due prudence is assumed to have been taken, there is still a possibility of coding, classification and/or accounting errors.
2. Limited data are available from the Oklahoma *Career*Tech system pertaining to individuals preventing the estimation of non-salary related external benefits or the ability to isolate possible confounding variables such as individual ability or socio-economic status.
3. There may be a contamination of data between those surveyed by the Oklahoma *Career*Tech system and those surveyed by the U.S. Census Bureau. For the purposes of this study any contamination is assumed to be randomly distributed.

Organization of this Dissertation Research Study

This dissertation research study is presented in five chapters. Chapter one includes the introduction, which sets the broader context of this study within the field of formal education within the United States, the development of the problem and purpose of the study, and a description of the significance of the study. Chapter one then continues with an overview of educational benefits, a brief description of the chosen methodology for this study and a list of research questions. Chapter one concludes with the relevant definitions, specific assumptions, delimitations and limitations of this particular study.

Chapter two begins by narrowing the broader context of formal education in the United States specifically with a focused discussion of career and technical education. The chapter then continues with an in depth exploration of cost-benefit analysis and rate of return methods within education. Educational rate of return literature is then reviewed

within the areas of: international studies, sub-baccalaureate studies, federally funded program studies, national studies, state specific studies, and career and technical education studies.

Chapter three begins by completing the discussion of broader context by specifically describing the Oklahoma *Career*Tech system, their students whom will serve as participants for this study, and the high school graduate students whom will serve as the comparison group for the cost-benefit analysis. The chapter continues with a discussion of the procedures by which this study will be conducted along with the design of the study. The chapter concludes with a discussion of limitations to the study and how those limitations compare to similar studies within the body of cost-benefit literature in education.

Chapter four presents basic *Career*Tech system descriptive statistics and the results of the net benefits, benefit-cost ratios, rates of return, and wage comparisons conducted for this study. Net benefits, cost-benefit ratios and rates of return results will be reported for fiscal years 1999, 2000, and 2001 as an aggregated group, and disaggregated according to the demographic characteristics of age, gender and ethnicity. Wage comparison results are reported according to the demographic characteristics of gender, ethnicity, and the interaction between gender and ethnicity.

Chapter five includes the conclusions and discussions of the findings from chapter four. The chapter begins with a summary of the problem, methodology and results. Next the conclusions and implications are presented along with any design limitations and/or delimitations. The chapter, and this dissertation, ends with recommendations for practice and further research.

Chapter Two: Literature Review

United States taxpayers spend in excess of $750 billion dollars a year on education with 1 in 4 persons participating in formal education in some way. With this investment of time, energy, and money, determining effective means of organizing and delivering educational services has the potential to impact millions of individuals. While researchers continue to attempt to illuminate the "black box" of educational production, the concepts of cost effectiveness and the need for cost analyses continue to proliferate.

Cost analysis is a particularly powerful tool in education because it puts the outcomes of education in a meaningful context, allowing all stakeholders to evaluate outcomes in relation to their necessary resources. One form of cost analysis which has been used extensively to evaluate educational programs is the standard cost-benefit analysis that attempts to clearly identify, assess and measure benefits while also connecting them to the estimated costs. This chapter will review cost-benefit analysis methodology and rate of return studies. Rate of return studies in education will be reviewed from an international perspective for all levels of education. Then, rate of return studies for the sub-baccalaureate level of education will be explored from a federal, national, and state perspective, followed by an examination of the differences in wages due to demographic factors such as ethnicity and gender.

Career and Technical Education

Before the extensive cost-benefit literature is explored, an examination of the current state of career and technical education may help provide some important contextual perspective. Vocational education in the United States is in transition at the beginning of the 21st century. Historically, the purpose of vocational education has been

to prepare students for entry-level jobs in occupations requiring less than a baccalaureate degree. Over the last 15 years, however, this purpose has shifted toward broader preparation that develops the academic, vocational, and technical skills of students in vocational education programs. This preparation involves integrating academic and vocational education, emphasizing all aspects of an industry, and implementing academic performance measures, among other reform efforts. Vocational education policy currently encourages high school students to continue their studies at the postsecondary level, and 2-year postsecondary students to pursue 4-year credentials through various articulation or "techprep" arrangements. The traditional focus of vocational education is giving way to a broader purpose—one that includes greater emphasis on academic preparation and provides a wider range of career choices (National Center for Education Statistics, 2000).

The United States is shifting from a manufacturing-based economy to one that overwhelmingly provides services and information. This trend has two important implications for vocational education programs. The first signals an ongoing shift in the education and training fields that are required of the U.S. work force as well as shifts in the levels of that education and training. Vocational programs that prepare students for manufacturing jobs include trade and industry programs, such as construction, mechanics and repair, precision production, and transportation and material moving. Vocational programs that prepare students for jobs in the services and information industries include health care and technology and communications, among others. The second implication, illustrated in the research literature, describes a trend toward greater education and training requirements and a greater need for critical thinking, personal responsibility, and

social skills among work force participants. For example, recent projections anticipate that average growth will be greater for occupations requiring at least an associate's degree than for occupations requiring less education. However, these trends are not uniform across industries and occupations, and some disagree about their magnitude. Some emerging occupations require high education and training requirements (such as a bachelor's degree or moderate- to long-term on-the-job training), while many jobs still demand relatively low education and training levels. In 1996, 39% of all jobs required no more than short-term on-the-job training (National Center for Education Statistics, 2000).

While the general labor market trend may be toward higher education and training requirements, employers have a unique perspective which is particularly important in the short term. When hiring front-line workers from an established applicant pool, surveyed employers did not rate years of completed schooling or academic performance as highly as attitude and communication skills. However, it may be that years of completed schooling and academic performance are more important during initial applicant screening. It may also be that employers have historically found that schooling measures are not reliable indicators of what students know and can do. With the evolving economy and changes in education and skill requirements, attention over the last two decades has focused on whether employees are adequately prepared for the demands of the workplace. According to most surveyed employers, the proficiency of their production workers either stayed the same or increased in recent years. In addition, the majority of employers with new production employees who participated in work-based learning reported that these employees were superior to comparable new hires in terms of productivity and attitude. Virtually no employers reported that employees with work-

based learning experience were inferior in these two respects to comparable new hires (National Center for Education Statistics, 2000).

Economic Benefits of Education

Most people would readily acknowledge that those with more education usually differ from those with less education. The question then becomes whether those differences are due to the education itself or other factors such as innate ability or motivation. Similarly, not only are more educated people different from less educated people, but as a person goes through the process of being educated, they experience change; this change could also be due to the educational process itself, or other factors such as natural maturation or growth. Ideally, researchers would set up experiments to isolate education and measure its direct impact, but in reality it is almost impossible to accomplish this because it is very difficult to control all the factors. In the United States, it is also difficult to find control groups who have not experienced formal education as elementary and secondary education are virtually universal with post-secondary education also experiencing extremely high levels of participation as well. To further confound the issue, modern technology does not confine education to formal institutions; books, videos, and the internet make extensive self-learning a reality for most literate individuals. Nonetheless, any discussion of economic benefits to education must differentiate between the different levels of schools, such as elementary, secondary, vocational certificate, associate degree, bachelor degree, graduate, and professional. One of the benefits of credentials are that they become an economic good, subject to the basic economic concepts of supply and demand with more scarce credentials demanding higher premiums than less scarce credentials.

Regardless of the level of education or type of credential, discussion of educational benefits must begin by determining who is going to benefit from the education. The three predominating benefactors of education are the students themselves, others in society, and those providing the educational services. Within the literature, a variety of possible educational benefits have been considered, and categorized according to whether they are psychological or behavioral, cognitive or affective, vocational or non-vocational and monetary or non-monetary. Of course, benefits of any of these types could possibly accrue to students, society at large, or those employed within educational institutions (Solmon, 1987). From this list of categories of benefits it becomes clear that some benefits are easier to quantify and measure than others. To the economist the monetary benefits are of utmost importance because they can be evaluated in dollars and easily combined with cost estimates. Of course, educational researchers must keep in mind that monetary benefits are neither comprehensive nor necessarily the most important tool in assessing the total value of an education. The difficult question continues to be how to identify, assess, measure and evaluate all of the benefits of education. Further confounding the issue, researchers must always account for other non-educational factors that might cloud the link between the educational treatment and the outcome in the student.

As early as 1977, Bowen attempted to determine the worth of the changes in individuals wrought by higher education through five separate approaches. His first approach used the amount of resources invested in education as evidence of the worth of education. In the current context, the argument would be made that because the United States spends over $750 billion dollars annually on formal education, there must be

benefits associated with formal education. The second approach he tried was to use the student's perceptions as a gauge. This approach was problematic though, because the results were inconclusive and represented the perspectives of students who were not paying the full cost of their education; though a large majority of students surveyed did express positive regard for the educational benefits they were receiving. The third approach was to consider the possible increases in the capital value of human beings resulting from higher education. Although some would consider this approach offensive, Bowen made an argument for the ability to place a value on a human life, and the possibility of that value increasing with formal education. Bowen's quaternary approach used the Denison technique of determining the sources of growth in the United States economy over a particular period of time and determining the extent to which higher education was responsible for that growth. Finally, Bowen looked at the rate of return on investments in education, the approach that is of particular interest to this study. Bowen found that each of these five approaches were applicable to all levels of education with an emphasis upon the point that all educational benefits are important and should be considered, not just those benefits which are easy to measure.

There has been a great deal of research conducted on educational benefits, outcomes, impacts, and effects at all levels of education. For the purposes of this study, the economic benefits to post-secondary sub-baccalaureate education in general and vocational certificate education specifically, will be emphasized. Yet for all levels of education, the research has generally focused on a very limited range of educational outputs and has not considered, in an empirical sense, a large number of other possible benefits (Solmon, 1987). Because this particular study is focused on answering the

economic question of social rate of return to the taxpayer for the investment in the Oklahoma *Career*Tech system, it will emphasize the economic benefits to society as a whole.

Although there is a remarkable amount of research that seeks to measure the specific types of external benefits of education, much work remains to be done before there is any amount of comprehensiveness to the measurement of the value of these external benefits. The complexity involved with computing external benefits is tremendous, for example, if higher levels of education indeed are linked with higher levels of health, the use of shadow pricing and other techniques to determine direct effects, and monetary benefits or cost savings is tremendous. This task is also complicated by a real lack of direct subject specific data, nevertheless, attempts must avoid double counting benefits from the internal and external sources, eliminate distributional effects, and avoid errors of omission (McMahon, 1987).

McMahon pointed out the first, and possibly most readily defensible argument for common education in the United States, the necessity of basic literacy and numeracy for effective democracy and efficient operation of democratic institutions. Shultz (1975) found that society benefits from education by enjoying more efficient markets and a higher level of adaptation to technical change. Shultz refers to this as "the ability to deal successfully with economic disequilibria, which is enhanced by education, and…is one of the major benefits of education accruing to people in a modernizing economy" (p. 843). Spiegleman (1968), Webb (1977), Ehrlich (1975) and Phillips et al. (1972) all determined through separate research studies that lower crime rates and reduced penal system costs are external benefits to society as a whole from higher levels of education. Garfinkle &

Haveman (1977) found a strong relationship between higher levels of education and lower welfare, Medicaid, unemployment compensation, and public health costs. Lefocowitz (1973), Lando (1975), Orcutt et al. (1977), and the National Center for Health Services (1982) have extensively documented the specific effect of education on health. Burton Weisbrod (1964) and others at the University of Wisconsin have studied the connection between higher levels of education and increased public service in the community. These researchers found it most reasonable that the more education a person has, the more altruistic their behaviors become. Weisbrod (1962) also noted other noneducational benefits to education such as providing low cost daycare to working families, drivers' education which benefits everyone, school lunch programs, and the use of educational facilities at reduced cost by various organizations such as the Boy Scouts or Girl Scouts.

Although the aforementioned benefits are very valuable, and should be included in any assessment of the total value of education, most economists tend to focus on the monetary or career-related benefits to education. This emphasis by economists is not a lack of interest in other benefits as much as an intense interest in whether changes effected by higher levels of education translate into higher levels of productivity as evidenced by higher earnings. This human capital theory hypothesizes that the amount and quality of education an individual experiences accumulates as human capital and results in greater productive capacity within the workplace as evidenced by increased earnings. Thus, the relationship between education and earnings is tested empirically by looking at the partial correlation between earnings and quality and quantity of education, with an attempt to hold other factors that could impact earnings constant. From the early

work of Becker (1964) to the extensive international compilations of Psacharopoulos (1993), the human capital theory seems to have been validated: everything else being equal, those with higher levels and higher quality educations seem to earn more.

Educational Costs

The cost of education is of critical importance to educational planners and policy-makers, but there are a number of different ways of defining and measuring cost. It is important, therefore, to distinguish between different concepts of cost before attempting to analyze the costs of education. The issue of cost is even further confused by the fact that economists, accountants, policy-makers and teachers or parents may use the term differently (Woodhall, 1987). Any educational program is going to have some form of desired outcome and an associated cost. Common educational outcomes include such indicators as higher student achievement, often shown on standardized tests, acquired skills, greater employability, increased literacy and numeracy and so on. The crucial component to achieving educational outcomes though is always the cost associated, because every intervention uses resources that could have been utilized for other valued alternatives. This point is even more important when one considers that most educational programs are at least partially taxpayer supported, and that support could be used for any number of other worthy programs, both educational and otherwise.

In determining the cost of an educational program, it is the desire of the researcher to ascertain the cost of the intervention in terms of the value of the resources that were used or lost by applying them in one way rather than another. The method for doing this emphasized here will be the "ingredients" model, which requires that all ingredients that are required for any particular intervention be specified. Once these

ingredients are specified, a value is placed on each of them. When the values of all the ingredients are added, the total cost of the intervention is established. This is generally the method most commonly employed for cost analysis in an educational evaluation setting. Dividing ingredients into four or five main categories that have common properties often facilitates the identification and specification of ingredients. A typical breakdown would include (1) personnel, (2) facilities, (3) equipment and materials, (4) other program inputs, and (5) required client inputs. Three overriding considerations should be recognized in identifying and specifying ingredients. First, the ingredients should be specified in sufficient detail that their value could be ascertained in the next stage of the analysis. Second, the categories into which ingredients are placed should be consistent. Finally, the degree of specificity and accuracy in listing ingredients should depend upon their overall contribution to the total cost of the intervention (Levin & McEwan, 2001).

Cost analyses may be concerned with the total costs of an educational intervention, as determined using the ingredients model, or with unit costs, which measure the costs of educating one student. There are two different ways of measuring unit costs. If total expenditure or cost is divided by the total number of students enrolled in a school or level of education this gives the average cost per student. Alternatively, if total expenditure is divided by the number of graduates or completers, this gives the average cost per graduate or completer. For some purposes, however, it is necessary to measure the additional costs incurred when one additional student is enrolled. The additional cost attributable to one extra student is called marginal or incremental. It is

measured by the increase in total costs which occurs as a result of increasing enrollment by one unit (Woodhall, 1987).

This relationship between average and marginal costs varies among various educational programs as a reflection of the relationship between cost and size. As a result of this relationship, average and marginal costs may increase, decrease, or remain constant as the number of students changes, depending upon the current capacity characteristics of the program. The reason capacity characteristics play such an important part in determining costs is that each program has costs that are fixed, while others are variable with respect to size or number of students. The effect of these capacity characteristics on costs is determined by the mix of fixed and variable costs, as well as the degree of resource optimization, particular in terms of how much of the classroom space is being utilized in relation to full capacity (Woodhall, 1987).

Cost-Benefit Analysis

Cost-benefit analysis (CBA) represents an important tool for analyzing the desirability of social investments. CBA refers to the evaluation of alternatives according to their costs and benefits when each is measured in monetary terms. CBA has been applied widely to educational investments at the national and international levels, particularly in evaluating the ability of such investments to raise productivity and earnings. Since CBA assesses alternatives in terms of their monetary costs and the monetary values of its benefits, alternatives can be examined on their own merits to see if they are worthwhile with the idea that alternatives must show benefits in excess of costs. In selecting from among several alternatives, such as competing educational programs, one would choose the one that had the highest benefit-cost ratio, net benefit, or rate of

return. Because CBA assesses alternatives in terms of the monetary values of costs and benefits, one can ascertain (a) if any particular alternative has benefits exceeding its costs, (b) which of a set of educational alternatives with different objectives has the highest ratio of benefits to costs, (c) which of a set of alternatives among different program areas show the highest benefit-cost ratios for an overall social analysis of where the public should invest (Levin & McEwan, 2001). The disadvantage of this method is that benefits and costs must be assessed in pecuniary terms. Sometimes this can be problematic, especially for social benefits such as effects on crime rates, utilization of public services, general health, and quality of life.

CBA was developed in the 1930's by the United States Corps of Army Engineers when the US Congress was overwhelmed with requests for massive regional investments in water-resource projects. Congress responded by asking the Corps of Army Engineers to only recommend projects whose benefits were at least equal to costs. By the 1960s, economists widely used CBA to assist in the search for efficiency in government spending. At the same time (in conjunction with the Coleman report) it began to be used to scrutinize educational investments (Levin, 1995). Once education began to be scrutinized as an investment, the next logical question was to determine the profitability of educational investments in relation to competing alternatives. Such comparisons can provide priorities for the allocation of public funds to different levels of education, or can explain individual behavior regarding the demand, or lack of demand, for particular levels or types of schooling.

Since CBA requires that benefits be measured in monetary units, it is only possible to apply it to subjects where that is feasible. Accordingly, CBA is especially

useful to those alternatives or interventions in which the outcomes are market-oriented, such as educational and training programs that are designed to improve employment and earnings. Many educational programs are dedicated to raising labor force productivity and income, such as career/technical education, workforce training and even much of the effort of common education. Thus, educational programs with these labor market outcomes are the most appropriate for using CBA. The most typical method of measuring the benefits of such educational programs is to compare the earnings of similar persons with different amounts of education under the assumption of a competitive marketplace where long-term differences in earnings can be associated with higher levels of education and subsequently to higher levels of productivity (Levin, 1995). To put the rates of return to education into perspective, Table 2-1 shows estimates of the inflation adjusted total returns to financial and human capital investments.

Table 2-1 Inflation adjusted total returns to financial and human capital investments

	Large Company Stocks	Long-term Corporate Bonds	Intermediate Government Bonds	High School Education	College (4-year) Education
1975	-3.2%	-2.4%	-1.8%	10.4%	8.2%
1980	7.0	-10.5	-6.4	12.0	10.6
1985	16.1	19.3	13.3	11.4	12.9
1990	7.4	3.3	3.0	10.2	11.7
1995	11.1	8.1	4.7	11.3	13.3
Average	7.7%	3.6%	2.6%	11.1%	11.3%

(Arias & McMahon, 2001, Table 4)

Levin and McEwan (2001) outline a straightforward cost-benefit analysis procedure. The first step in their procedure is to identify and place monetary values on benefits, utilizing either traditional experiments, quasi-experiments, and\or correlational studies; contingent valuation; and methods that rely upon the observed behavior of individuals. Once benefits are monetized, costs are assembled in an ingredients model, generally divided into four or five main categories that have common properties. A

typical breakdown would include (1) personnel, (2) facilities, (3) equipment and materials, (4) other program inputs, and (5) required client inputs. With all costs estimated, values for cost per student, cost per graduate, etc. may be calculated as needed. With benefits and costs estimated, there are three measures available: Net benefits, cost-benefit ratio, and rate of return. Net benefits provides the total dollar figure left when costs are subtracted from benefits, the benefit-cost ratio provides a simple indicator of whether benefits outweigh costs, while the rate of return gives the percentage of return from the investment.

There are also several concerns and criticisms against the use of cost-benefit analysis in education that warrant consideration. These include: selection bias (SB), omitted variable bias (OV), lack of concern for external benefits to education beyond wages (EB), and use of cross-sectional data only (CS). Selection bias occurs when research participants in the control condition differ in some way from those in the experimental condition, usually due to nonrandom assignment, preexisting groups, or the effects of mortality. As mentioned earlier, rate of return studies are criticized for not satisfactorily isolating the confounding variables from the effect of education on earnings, referred to here as omitted variables. Another criticism of rate of return studies is concerned with the exclusion of other benefits to education beyond earnings, such as increased health, decreased crime rates, and/or decreased transfer payments from other taxpayer supported agencies. The common usage of cross-sectional data limits the ability to track individuals beyond one point in time and is particularly problematic in tracking wage data. Evidence shows that in conventional age-earnings profiles by levels of education; earnings for different education groups begin to diverge only after age 30

(Grubb, 2002). As the various rate of return studies are reviewed throughout the rest of this chapter, they will be analyzed in relation to these four common methodological issues.

Rate of Return Estimates in Education

Empirical cost-benefit analyses of education began in the late fifties with T.W. Schultz's presidential address to the American Economic Association and with the publication of Becker's (1964) National Bureau of Economic Research (NBER) book that lent a tremendous amount of exposure and credibility. This first wave of rate of return literature utilized the 'elaborate type' of estimation procedure. The second wave of rate of return literature started somewhere in the early 1970s with the publication of Mincer's (1974) NBER book. Mincer's estimation technique is now known as the 'earnings function' and is considered the dominant rate of return estimation procedure today (Psacharopoulos, 1981).

Compilations of rate of return estimates to investment in education have appeared in the literature since the early seventies (see Psacharopoulos 1973, 1981 and 1985). Estimates of the profitability of investment in education can be arrived at using two different basic methods which, in theory, should give very similar results: (a) the "full" or "elaborate" method, and (b) the "earnings function" method, which has two variants. Understanding the estimation method is important for interpreting rate of return patterns. The method adopted by various authors is often dictated by the nature of the available data (Psacharopoulos, 1993).

The elaborate method amounts to working with detailed age-earnings profiles by level of education and finding the discount rate that equates a stream of education

benefits to a stream of educational costs at a given point in time. The annual stream of benefits is typically measured by the earnings advantage of a graduate of the educational level to which the rate of return is calculated, and the earnings of a control group of graduates of a lower educational level. The stream of costs consists of the foregone earnings of the individual while in school (measured by the mean earnings of graduates of the educational level that serves as the control group) in a private rate of return calculation, augmented by the true resource cost of schooling in a social rate of return calculation. Private rates of return are used to explain people's behavior in seeking education of different levels and types, and as distributive measures of the use of public resources. Social rates of return, on the other hand, can be used to set investment priorities for future educational investments (Psacharopoulos, 1993). In principle, the primary difference between social and private education benefits is taxes. Whereas the after-tax wage differential is the private benefit of an education program, it is the gross (pre-tax) wage that is relevant from the social perspective (Horowitz & Schenzler, 1999)

The "basic" earnings function method is due to Mincer (1974) and involves the fitting of a semi-log ordinary least squares regression using the natural logarithm of earnings as the dependent variable, and years of schooling and potential years of labor market experience and its square as independent variables:

$$\ln Y = a + b\,Ed + c\,Exp + d\,Exp2 + \ldots + u$$

where u is an error term and the coefficient b is the Mincerian rate of return; when education is measured by a series of dummy variables, the coefficient b is *approximately* equal to the percentage increase in wages (or earnings) associated with a change in education (Grubb, 2002). In this semi-log earnings function specification the coefficient

on years of schooling can be interpreted as the average private rate of return to one additional year of education, regardless of the educational level to which this year of schooling refers. The "extended" earnings function method can be used to estimate returns to education at different levels by converting the continuous years of schooling variable into a series of dummy variables referring to the completion of the main schooling cycles, i.e. primary, secondary and higher education, or referring to drop outs of these levels, or even to different types of curriculum (say, vocational versus general) within a given level. After fitting such extended earnings functions the private rate of return to different levels of education can be derived by comparing adjacent dummy variable coefficients (Psacharopoulos, 1993).

Psacharopoulos (1993) opinions that the discounting of actual net age-earnings profiles is the most appropriate method (among those listed above) for estimating the returns to education because it takes into account the most important part of the early earnings history of the individual. To purists, the best method would be the net present value, though the popularity of this method has declined because net present values are not easily comparable across countries and currencies. The problem with the net age-earnings method, though, is that it is very data intensive; one must have a sufficient number of observations in a given age-educational level cell for constructing "well-behaved" age-earnings profiles, (i.e. non-crossing and concave to the horizontal axis). This is still a luxury in many empirical investigations, hence researchers have resorted to less data-demanding methods.

Authors have found it increasingly convenient to estimate the returns to education based on the Mincerian earnings function method. Although easy to use,

Psacharopoulos (1993) outlines several pitfalls. First, in most applications, only the overall rate of return to the typical year of schooling is reported (i.e., the coefficient of years of schooling in the semi-log earnings function) with very few authors going to the trouble of specifying the education variable as a string of dummies in order to estimate the marginal effect of each level of education on earnings. But even authors who do this often label the coefficients of these dummy variables "returns to education," whereas these are marginal wage effects, not rates of return to investment in education. The "returns" notion necessitates taking into account the cost of education, whether private or social, and relating this cost to the wage effects. (It is noted that in the extended (dummy) specification each education coefficient has to be related to the one referring to the previous educational level and divided by the number of years of incremental years of schooling separating the two levels in order for the result to be interpreted as a rate of return). Second, there is an important asymmetry between computing the returns to primary education and those to the other levels. Primary school children, mostly aged 6 to 12 years, do not forego earnings during the entire length of their studies. Hence it is a mistake to mechanically assign to them six years of foregone earnings as part of the cost of their education. When using the full discounting method, it is very easy to assign, say, only three years of opportunity cost to primary education (although it is rare for authors to have actually done this). But when using the basic earnings function method, foregone earnings are automatically imputed to the rate of return calculation for the full length of one's schooling cycle. Hence, such estimates grossly underestimate the average rate of return to schooling. Of course in the extended earnings function it is easy to allow for

differential duration of opportunity costs by assigning one, two, or three years of foregone earnings to primary school graduates.

Jencks (1972) points out the obvious imperfection with the earnings-education correlation that led him to minimize the value of education for earnings. He believes economic success has as much to do with individual competence or even pure luck and concludes that competence has as much to do with personality as technical skills. Other factors for an imperfect relationship between education and earnings could also be differences in educational programs, graduates could be highly productive in a skill that has a low market value, or discrimination on the basis of age, gender, race, and/or sexual orientation. Collins (1979) and Dore (1976) argue that the correlation between earnings and education is due to the fact that education confers credentials that are used as screening devices that represent desirable traits more so than skills which directly increase productivity.

International rate of return studies in education.

The World Bank (2004) compiled social and private rate of return estimates for investment in primary, secondary and higher education as well as returns to secondary education by the type of curriculum. Table 2-2 in Appendix A shows the mean social rate of return for primary, secondary, and higher education as: 18.9, 13.1, and 10.8% respectively while the mean private rate of return is 26.6, 17.0, and 19.0% respectively. Table 2-2 also demonstrates the comparison between the mean rates of return for all participating countries, and the members of the Organization for Economic Cooperation and Development (OECD), which include most of the highly industrialized nations of the world. The mean social rate of return for primary, secondary, and higher education

within OECD countries is: 9.4, 9.2 and, 9.0% respectively while the mean private rate of return is 11.4, 10.9, and 12.5% respectively. Notice the rate of return for OECD countries is not only lower than the overall mean, but it is close to the long-term opportunity cost of capital which is often estimated between 8 and 10%. This means that the profitability of human and physical capital, at the margin, has reached virtual equilibrium within the OECD countries.

There are many concerns when interpreting and ultimately attempting to utilize the rate of return data presented by the World Bank (2004). In particular, closer examination of the individual studies often shows sample selectivity biases, omitted variables, exclusion of educational externalities, and limitations due to cross-sectional surveying. These omissions result in rate of return estimates that may not be accurate. The main selectivity bias appears to be the result of utilizing wage incomes of individuals working in the formal sector as indicators of benefits from education. This is an issue because in a large majority of low and even middle-income developing countries only a small proportion of the economically active population are in waged employment. The most critical variables omitted are usually natural ability, socioeconomic background, and the examined economic sector; these variables are crucial due to varying levels of unemployment across sectors. There also seem to be some issues with the calculation of opportunity costs, particularly with primary school students, because of the use of prevailing wage rates of peer cohorts being used as foregone earnings versus the actual value of production actually foregone. This issue is no small concern since even small changes in opportunity costs for primary education can drastically affect rate of return estimates. The exclusion of educational externalities is an issue which is common with

most rate of return studies; the multitude of operational and measurement issues have caused most of these rate of return studies to ignore externalities and focus solely upon salary data as the sole benefit to education. Almost without exception, all rate of return estimates for the World Bank studies utilized cross-sectional surveying with no attempts to track individuals longitudinally. This is a major concern because there are multiple factors which could impact earnings at any one particular moment.

Table 2-3 shows that the mean social return on academic/general education is higher than the mean social return on technical/vocational education at 15.5 and 10.9% respectively. The mean private return to academic/general education is close to the mean private return to technical/vocational education at 10.6 and 11.5% respectively. An additional weakness of international rate of return studies is the fact that secondary education enrollment ratios are low, generally representing the more able students. The results of this is a tendency for the less able and often poorer students being enrolled in vocational education as a second option instead of higher levels of academic education. This trend may bias the rates of return to academic versus vocational education making academic education appear more profitable, as seen in Appendix A Table 2-3, though the effects are by no means clear as differences do not appear to be consistent across social and private rates of return.

Sub-baccalaureate education in the United States.

In the United States vocational coursework represents a substantial component of sub-baccalaureate students' education. Among all sub-baccalaureate students, about one-half majored in a vocational program area in 1996; the proportion decreased from 54 to 49% over the 6 years from 1990 to 1996. There was an increase between 1990 and 1996

in the proportion of postsecondary vocational students being served by community colleges, with a corresponding decrease at private proprietary institutions. Sub-baccalaureate students with vocational majors were more likely to be older, to have family responsibilities, to receive financial aid, to have a previous postsecondary degree or certificate, and to report higher postsecondary grade-point averages (GPAs) than their academic counterparts. These students with vocational majors also tended to have parents with lower educational attainment; as the education level of their parents increased, students' likelihood of reporting a vocational major generally decreased. Differences by race–ethnicity among sub-baccalaureate students in their probability of having a vocational major were either minimal or not statistically significant. Also, among sub-baccalaureate students, there was no clear association between majoring in a vocational field and disability status (National Center for Education Statistics, 2000).

While the economic benefits to the most familiar credentials (e.g. the high school diploma, the baccalaureate degree, and various professional degrees) are well established, the economic benefits are much less clear for other kinds of education and training. Sub-baccalaureate education has been growing substantially. Thirty years ago, only 13% of the labor force had "some college." Currently, however, as part of the upward trend in education, about 27% of the labor force have more than a high school diploma but less than a baccalaureate degree. Forecasts of the nation's occupations suggest that this trend will continue. Even if occupational forecasting is a risky business, the educational level of the labor force will continue to increase, and much of the growth will take place at the sub-baccalaureate level (Grubb, 2002).

Federally supported rate of return studies.

Federal programs, such as the Manpower Development and Training Act, Neighborhood Youth Corps, Job Corps, Comprehensive Employment and Training Act, Job Training Partnership Act and the Carl Perkins Vocational Training Act represent an obvious need to provide the required education and vocational training to bridge the gap between labor supply and demand. Evaluations of vocational programs emanate from these and other federal acts, including a number of cost-benefit analysis studies. Although the United States has over three decades of experience running training programs, a meta-analysis of the cost-benefit studies conducted suggests that most federally sponsored programs have not become more effective over time. Moreover, the effects are rarely found to be large with the vast majority of estimates indicating that training programs increased earnings by less than $2,000 a year for a typical trainee. However, compared to the average cost of about $6,600, effects close to $2,000 may be sizable if they persist for several years, which most of the findings examined did suggest (Greenberg, Michalopolous & Robins, 2003). Of the multitude of federal training initiatives, Job Corps is the only one to be the subject of a careful large-scale evaluation twice in its 36-year history. The first study conducted by Maller et al. (1982) produced estimates of the benefits and costs of Job Corps as it operated in the late 1970's. Results of this study demonstrated a positive rate of return of .46, or $1.46 for every $1.00 invested. In the second evaluation, Burghardt et al. (2001) found that although Job Corps is very expensive at about $16,500 per participant evidence suggests that Job Corps is still a good investment with the benefits to society exceeding costs by nearly $17,000 for

a return of 1.02, or $2.02 for every $1.00 invested. From these estimates, Job Corps is easily the most successful federally funded training program in history.

Methodologically Burghardt's 2001 study appears to be very strong, especially considering the fact that Burghardt had complete access to students from the initial contact point when they were still prospective students, through 12, 30, and 48 month follow-up surveys. Due to this level of access there was the ability to take the initial prospective Job Corps students and randomly assign them to control and treatment groups, with the control group being restricted from entering Job Corps for three full years, and the treatment group being admitted immediately. The only criticism is that the prospective student pool is a selective group as Job Corps is designed to serve low income students between the ages of 16-24, which may not make the selected sample representative of the population as a whole. This issue is not necessarily a problem though because the design of the study was such that they were specifically trying to ascertain whether Job Corps was effective at its mission, not effective to the population as a whole. Although Burghardt did as good a job with selectivity and randomization as he did, he appeared to ignore confounding variables altogether. There is no evidence that any attempt was made to determine individual ability or other variables which may affect outcomes besides the Job Corps treatment. This issue may be mitigated, though, by the fact that there is an extremely high level of homogeneity of characteristics naturally due to the nature of the stringent admission criteria, specifically along the lines of socio-economic status. Burghardt did an excellent job specifying external benefits, once again due to the fact that he had complete access to individuals. Burghardt was able to track data on crime rates, receipt of public assistance, and impact upon health and health

related behaviors for both the treatment and control groups. From a cross-sectional standpoint, there was also an effort made to perform follow-up surveys at 12, 30, and 48 months. There is no doubt Burghardt's cost-benefit analysis of the Department of Labor's Job Corps system is currently the strongest example of a rate of return to education study available in the literature.

National rate of return studies.

Most states are providing a portion of their sub-baccalaureate education through 2-year technical institutes (or technical colleges) that offer credentials in occupational areas. According to the 1990-1991 National Postsecondary Student Aid Survey (NPSAS) data, enrollments in technical institutes were 3.3% of students in public 2-year colleges and 1.4% of post-secondary students overall (Tuma, 1993, Table 2.1). There appears to be a shift in the United States toward higher-status academic institutions as the proportions of technical institute students have been shrinking and states have been converting technical institutes into community colleges, as evidenced in Minnesota and South Carolina (Grubb, 2002). According to Chung (1995) there have been 27 major published studies on the returns to vocational education in developing countries. Of those, only 12 found returns higher than the reference, while 10 found returns lower than or not different from the reference and 5 provided no basis to decide if returns are lower or higher. This study will add to this body of literature by focusing on technical institutes in the United States through an analysis of the Oklahoma *Career*Tech system.

Unfortunately, relatively few data sets include information about technical institutes that focus on certificate programs, which are 1 or 2-year programs focusing on occupational preparation without the academic and general education content of an

associate degree. As reflected in Table 2-4, the National Longitudinal Survey of the Class of 1972 (NLS72) and the National Survey of Adult Literacy (NALS) data suggest a zero return to a certificate for both men and women. The Survey of Income and Program Participation (SIPP) data indicate significant returns, though they appear to be declining for men [see Grubb (1997) for the estimates for 1984, 1987, and 1990] while they are steady for women and tend to be slightly lower than the return to an associate degree. The certificate is a common credential in proprietary schools and area vocational schools in particular, and it would be desirable to have better information about it. Unfortunately, the results on certificates are likely to be flawed by a lack of information about alternative credentials (Grubb, 2002).

Table 2-4 Effects of Certificates on Employment Outcomes

Source and Data set	Dependent Variable	Coefficient on Education	
Grubb (1995c) SIPP (1990) Individuals 25–64	Annual earnings	0.063 M (0.042)	0.219* W (0.044)
Grubb (1995a) NLS 72 High school class of 1972 (as of 1986)	Annual earnings, 1985 Wages, 1986	-0.029 M (0.026) 0.002 M (0.021)	-0.046 W (0.037) 0.027 W (0.018)
Hollenbeck (1993) NLS 72 High school class of 1972 (as of 1986)	Wages	-0.049 M (0.054)	0.052 W (0.066)
Rivera-Batiz (1998) NALS Individuals 18+	Wages Earnings	-0.004 M (0.056) -0.062 M (0.058)	0.008 W (0.059) 0.059 W (0.072)
Surette (1997) NLS-Youth Men 18–30	Wages (discrete factor method)	0.050* M (0.018) (hours of vocational training)	

*Significant at 5%, two-tailed test. (Grubb, 2002a, Table 3).

The participants in the NLS72 study were selected when they were seniors in high school in the spring of 1972, and in a supplementary sample drawn in 1973. The records include the "Base Year" survey; follow-up surveys in 1973, 1974, 1976, 1979, and 1986; high school records; and postsecondary transcripts (collected in 1984). The National Center for Education Statistics (NCES) has conducted NALS studies since 1985. A nationally representative sample of adults were assessed again in 2003, providing the first indication of the nation's progress in adult literacy since 1992. The SIPP sample is a multistage-stratified sample of the U.S. civilian non-institutionalized population. For the 1984-1993 panels, households were introduced each year in February. Based upon these characteristics, results from NLS72, NALS, and SIPP data are probably valid in terms of selection bias, especially considering the level of randomization involved in the original samples. It appears that data may be available in the raw survey results to attempt, at least, a look at socio-economic status, yet none of the cited studies reported such an analysis. Similarly, there were data collected on transfer payments and other such possible benefits to education; though the rate of return studies utilizing these data sets did not appear to attempt any type of analysis of benefits beyond earnings. The reasons for this are unclear, beyond a typical stance that rate of return to education studies are concerned with the earnings profile only. These data sets are an excellent source of longitudinal data, although they are also capable of providing cross-sectional analysis, their intended purpose is for tracking individuals over an extended period of time.

State specific rate of return studies.

Several states have developed systems that collect data for a variety of education and training programs, not just community colleges, facilitating various kinds of

comparisons across programs. In California, for example, Friedlander (1993) generated early outcomes for Santa Barbara and Grossmount Community Colleges, shown here in Table 2-5.

Table 2-5 Employment and earnings, Santa Barbara and Grossmont Community Colleges

Educational attainment	Earnings, year prior to leaving college (US$)	First year after college		Third year after college:	
		Working four quarters (%)	Earnings (US$)	Working four quarters	Earnings (US$)
Associate degree	8545	63	18443	71	26078
Certificate	6426	69	18914	76	21729
12+ units, no credential	8479	62	16080	67	20519

(Friedlander, 1993, Table 1)

The results indicate those with associate degrees earned 20% more than certificate holders, who in turn earned 5% more than those who left with at least 12 credit hours completed but without any credential. Notice that these differences were much less apparent in the first year after graduation, suggesting that results should be analyzed after several years when the effects of the education have a chance to make an impact on an individuals earning capacity. The fact that the associate degree and 12 credit hour groups both earned roughly the same salary prior to college suggests the difference in income after college is actually a program effect and not just variance due to personal characteristics, though this conclusion is by no means definitive. Another approach might be to compare the college students to high school graduates, requiring data collection which is often overlooked by those studying the effects of higher education. The California data may also be used to examine increases in earnings between the year prior to leaving college to 1 and 3 years after college. Notice the increase at one year for

associate degrees and certificates are approximately the same, but then at the three year mark the associate degrees begin to separate themselves.

North Carolina's Common Follow-up System (CFS) now includes such agencies as the Departments of Correction, Labor, and Employment and Training, as well as the agencies responsible for K-12 education, community colleges and the university system. Some preliminary results are presented in Table 2-6, illustrating again the importance of controlling for experience, or through the use of age as a proxy.

Table 2-6 Earnings by credentials completed and age, North Carolina, 1991 completers

	Age				
Degree Completed	21-24	25-29	30-34	35-39	40+
Certificate	$17,578	$20,076	$22,910	$22,306	$23,125
Diploma	19,100	21,414	22,945	22,903	21,537
AAS	19,996	23,649	26,300	26,781	26,383
BA/BS	20,569	22,763	26,675	28,554	31,034
MA/MS	25,188	27,943	33,245	39,572	33,582

(Vanderheyden, 1994, Table 8)

In North Carolina: certificates require 1 year, diplomas are awarded for 1-year programs, and the associate of applied science (A.A.S.) degree is a 2-year degree usually in an occupational area. The earnings differences among those with varying credentials are minimal for those 21–24 and even for those 25–29. In the latter group, individuals with A.A.S. degrees earn more than those with Baccalaureate degrees, probably because of the extra years spent working versus being in school. The expected patterns begin to emerge in the 30-34 age group and continue to differentiate themselves up through those 40 and over (Vanderheyden, 1994). Once again, these results indicate the problems of relying on earnings too soon after leaving postsecondary education, and of examining earnings without disentangling the effects of experience.

Florida's Education and Training Placement Information Program (FETPIP) system, which collects Unemployment Insurance earnings data for a variety of education

and training programs, seems to indicate (as shown in Table 2-7) that those with any postsecondary vocational credits earn substantially more than high school graduates right after leaving schooling. Individuals with associate of science (A.S.) degrees earn more than twice as much as high school graduates, and even more than those with Baccalaureate degrees while those with associate of arts degrees earn less than those with vocational credits. However, the results four years later are more likely to be affected by differences in experience. One group includes those who made no educational progress during the intervening four years; potentially, they have four more years of on the job experience, but have not attained a higher level of formal schooling. The second group are those who attained each level of education between 1990–1991 and 1994–1995. Because this second group by definition has been in school during the intervening period, they are likely to have less on the job experience which may explain their earnings being lower than those of the non-educational advancement group.

Table 2-7 Quarterly earnings of 1990–1991 Florida graduates

	Original cohort 4th quarter, 1991	No educational advancement 4th quarter, 1995	Some educational advancement 4th quarter, 1995
HS dropouts	$3349	$4020	$4020
HS graduates	2960	4296	4291
District PS voc	4585	5864	5680
CC adult voc	5063	6100	5927
CC voc credits	5974	7613	7269
CC-AS	6800	8555	8387
CC-AA	4656	6724	6024
BA	5731	8418	7712
Master's	8086	10,573	9868

HS, high school; CC, community college; PS, postsecondary; AS, Associate of Science; AA, Associate of Arts. (Lanham & Whitfield, 1997, Table 6)

Since FETPIP includes information from the state's welfare and corrections agencies, the data can also indicate the effect of education on the receipt of public assistance (food stamps or AFDC) and involvement with corrections (incarcerated or on parole). The results, in Table 2-8 are pretty strong indicators of the effects of education

on both welfare and crime: high school dropouts are at the greatest risk of both receiving welfare and being incarcerated or on parole, and those with community college vocational education and postsecondary credentials have by far the lowest risk (Lanham & Whitfield, 1997). Unfortunately, similar data are not collected for the state of Oklahoma which limits the ability of this study to perform a similar analysis of the impact of the Oklahoma *Career*tech system.

Table 2-8 Experience with welfare and corrections, Florida cohort, Fall 1995

	Receiving Welfare %	Involved with Department of Corrections %
HS dropouts	23.4	8.1
GED	18.2	12.7
HS Voc	8.6	1.6
HS Graduate	7.4	1.8
District PS Voc	9.5	1.4
CC Adult Voc	8.6	1.4
CC Voc Credits	1.9	0.9
CC-AS	1.3	0.3
CC-AA	1.7	0.5
BA	0.4	0.2
Master's	0.3	0.2

(Lanham & Whitfield, 1997, Table 4)

A critical analysis of the state specific rate of return studies demonstrates similar results as the international and national analyses. California, North Carolina and Florida all showed a high level of selectivity bias; California and North Carolina used a basic convenience sample, and Florida used a preexisting sample, though Florida's was a much broader sample as it was collected from the state level FETPIP system. Likewise, all three states had no mention of possible confounding variables to the effects of education, with the exception of North Carolina which did not specifically look at any omitted variables, yet did attempt to separate individuals by age, which is often used interchangeably with work experience. Researchers using data from California and North Carolina completely ignored any other benefits to education beyond wages, while the

Florida study did an excellent job of tracking individuals interaction with the correctional and human services departments. The results in Table 2-8 give an excellent example of external benefits to additional years of education. The cross-sectional category is split as North Carolina only surveyed students one year after graduation, while California surveyed at one and three year intervals and Florida collected data at one and four year intervals.

Wage Comparisons by Gender and Ethnicity

Utilizing the same SIPP and NLS72 data from the national rate of return studies, Grubb (1992) presents results specific to the technical institutes separately for men and women. The results reported for the SIPP data indicate that a completion of a vocational certificate for men does increase earnings above those of high school graduates with mean earnings of $20,388 and $16,200, respectively. The NLS72 data indicate just the opposite for men though with vocational certificate mean wages of $8.03 and high school only mean wages of $8.13. For women the patterns are slightly different as the SIPP data and NLS72 data both indicate an increase in earnings and wages for a vocational certificate over a high school only education with mean earnings of $9,276, $6,996 and $7.81, $6.25, respectively.

According to the 2000 U. S. Census, the median yearly earnings of year-round male workers in 1999 were $38,000 while female workers median earnings were $28,000. For the same year, American Indian workers median earnings were $30,000, African-American workers median earnings were $28,000, Caucasian workers median earnings were $35,000, Hispanic workers median earnings were $24,000 and Asian workers median earnings were $36,000. Reported by level of education, those aged 25

and older with less than high school reported median earnings of $22,000, high school graduates with no college reported $28,000, those with some college reported $33,000 and those with a bachelor's degree or higher reported median earnings of $49,000.

Conclusion

This chapter reviewed cost-benefit analysis methodology and rate of return studies. Rate of return studies in education were reviewed from an international perspective for all levels of education showing positive social rates of return on average of 18.9% for primary, 13.1% for secondary, and 10.8% for higher education. Then, rate of return studies for the sub-baccalaureate level of education were explored from the federal, national, and state levels. From the federal perspective Job Corps appears to be the most successful federally funded vocational training program. From the national perspective results are mixed as to whether certificate programs have any positive rate of return. From the state perspective certificate programs were consistently shown to have a lower rate of return than associate, baccalaureate or higher degrees.

A thorough economic analysis of educational outcomes is unmistakably important, for both effective policy making and internal programmatic improvement. What is not clear is how desirable and/or feasible the rate of return to education studies are in setting policy priorities; especially in light of the four methodological issues discussed previously. Thus, it appears prudent to exercise caution when interpreting the results of cost-benefit analysis, especially in isolation from other forms of program evaluation. Cost-benefit analysis *can* serve as an excellent tool for identifying and diagnosing problems that are rarely discussed, such as how much educational programs actually cost and whether they appear to have any real impact on tangible outcomes.

Unfortunately there is very little research focusing specifically on career/technical institutes, making this study a much needed addition to the rate of return to education literature.

Chapter Three: Design

This study presents a cost-benefit analysis of the Oklahoma *Career*Tech system. Cost-benefit analysis involves estimating the monetary values of benefits and costs in order to determine the benefit-cost ratio, net benefit, and rate of return on investment for a particular activity. The cost-benefit analysis for this study will follow the standard procedures set forth by Levin and McEwan (2001). This research study will be completed in two parts, the cost-benefit analysis and the descriptive comparison of wages earned by various demographic groups. This cost-benefit analysis involves the estimation of program costs, the identification and estimation of benefits, and the computation of the benefit-cost ratio, net benefit, and social (external) rate of return of return for the Oklahoma *Career*Tech system. The wage comparisons involve performing a factoral Analysis of Variance (ANOVA) and post hoc multiple comparison procedure to test for differences in wages among demographic groups based on gender and ethnicity. Unfortunately, the aggregation of data does not allow for the specification of costs to individuals making the estimation of the private (internal) rate of return impossible.

This chapter begins by continuing the review of career and technical education from chapter two with a specific discussion of the Oklahoma *Career*Tech system. A description of the subjects within the Oklahoma *Career*Tech system and the high school graduate comparison group will follow. Procedures for how the study is to be conducted will be outlined next, including a discussion of the use of public information. Next, the chapter will describe in detail the cost ingredients and benefits necessary for computing benefit-cost ratios, net benefits and social rates of return. The specific procedures for

computing net benefits, rates of return, and the analyses of wages across demographic groups will follow. The chapter then ends with a discussion of the methodological limitations of this study and how those limitations compare to similar studies within the body of cost-benefit literature.

Context

Career and technical education, commonly known as vocational education, is a massive enterprise in the United States. Thousands of comprehensive high schools, vocational and technical high schools, area vocational centers, and community colleges offer vocational education programs. Virtually every high school student takes at least one vocational education course, and one in four students takes three or more courses in a single program area. One-third of college students are involved in vocational programs, and as many as 40 million adults engage in short-term postsecondary occupational training. Today, 85 years after the passage of the first piece of federal vocational education legislation, vocational education is evolving from its original focus of preparing students for work immediately following high school to preparing students for further training and education. With national and state school reform efforts focused on academic achievement, and with the fastest-growing occupations now requiring some postsecondary education, vocational education is seeking effective ways to contribute to higher levels of educational attainment (U.S. Department of Education, 2003).

In order to focus this study's cost-benefit analysis specifically on career/technical institutes, completers of the Oklahoma *Career*Tech system between fiscal years 1999 and 2001 were chosen as the unit of analysis. The real benefit of the Oklahoma *Career*Tech system as a unit of analysis lies in its comprehensiveness and its diversity. *Career* Techs

constituencies include: Junior high school students, high school students, dropouts, unemployed adults, employed adults, senior citizens, prison inmates, businesses and industries, and any other adult seeking to continue their education (Oklahoma *Career*Tech, 2004).

Most of Oklahoma's career and technology education students at the secondary level are enrolled in *Career*Tech programs in their local schools. In FY03, a total of 1,378 *Career*Tech teachers in 400 comprehensive public school districts served a total enrollment of 145,788. These comprehensive school programs focus on producing well-rounded students. Students learn theory in the classroom, practice their skills in labs and shops, and gain vital leadership and teamwork skills through their participation in one of seven career and technology student organizations (Oklahoma *Career*Tech, 2004).

The foundation for Oklahoma's statewide network of 29 technology center districts, operating a total of 54 campuses statewide, was laid in 1966 when Oklahoma voters approved a constitutional amendment allowing the establishment of what were then called area vocational-technical schools. One of the main goals of these schools was to provide cost-effective vocational education. The amendment allowed school districts to join together to form a vocational-technical district with an independent board of education and its own locally approved tax base. The new school could then offer specialized occupational training programs that sending schools could not afford to offer, or for which they might not have enough enrollment to justify. Oklahoma's technology centers serve full-time students, both high school pupils and adult learners. Also, district residents, usually adults, utilize the centers to learn new skills or enhance existing ones in various short-term courses. In FY02, more than 14,000 high school students enrolled in

Oklahoma's technology centers. The centers also serve more than 11,000 full-time adult enrollments (Oklahoma *Career*Tech, 2004).

Oklahoma's *Career*Tech (2004) system is a key resource for Oklahoma's economic recovery by:

- Helping to spur new jobs in both rural and urban Oklahoma.
- Attracting new businesses and industries.
- Contributing to a more robust economy in both the public and private sectors.
- Retooling unemployed workers and upgrading skills of incumbent workers.
- Providing valuable corporate business development services and resources.

Oklahoma's *Career*Tech (2004) system is easily accessible to nearly every Oklahoman by:

- Offering programs in 398 high schools and at 54 technology center campuses.
- Offering training programs specifically customized to fit the unique needs of any business or industry.
- Equipping Oklahoma's inmates who are nearing their release from prison with marketable skills and job placement opportunities.
- Providing flexible, lifelong learning for all Oklahomans.

Oklahoma's *Career*Tech (2004) system offers quality programs and high standards by:

- Producing graduates with marketable job skills and nationally recognized industry certifications.
- Collaborating with higher education to enable students to earn credit from colleges and universities for the knowledge and skills learned in many technology center programs.
- Using curriculum that has been validated by industry representatives and meets the needs of business and industry.

Oklahoma's *Career*Tech (2004) system offers leading edge programs by:

- Providing continual learning and in-servicing opportunities to keep course instructors on the leading edge of technology.
- Using a combination of state and local funding sources to ensure technology used in programs adequately prepares students for the job market.
- Anticipating and rapidly responding to workforce demands.

Description of Participants

The participants for this study were students of the Oklahoma *Career*Tech system who completed their programs of study during the fiscal years of 1999 through 2001. Technology programs are required to adhere to the 55/55/55 rule according to Oklahoma *Career*Tech policy: 55% capacity in each program, 55% completion rate, and 55%

positive job placement. To ensure adherence to this policy several tracking procedures were developed. For this study, the 1-year follow-up surveys were of particular interest because they provide age, ethnicity, gender, and starting wage information 1-year after the completion of a *Career*Tech program. Subject specific data for this study were utilized from these 1-year follow-up surveys.

According to Oklahoma *Career*Tech officials, survey results contained data only for those students who completed their programs of study, were employed in related jobs at the time of the 1-year follow-up survey, and who volunteered to participate in the survey. Within the survey instrument, students self-report their age, gender, ethnicity (choosing among American Indian, African American, Hispanic, Caucasian, or Asian), and their current hourly wage with the understanding that participants may not work a full 40 hours per week or report tips. For the purposes of this study, all hourly wages were multiplied by 2080 hours to represent an annual salary. Due to the level of aggregation necessary for the data to qualify as public information, there is no way to determine which specific program of study the subjects completed.

Comparison participants.

In order to isolate the effect of the Oklahoma *Career*Tech certificate from other forms of formal education, the salaries of the Oklahoma *Career*Tech completers were compared against those holding the next lower academic credential, the high school diploma. Although many of the completers of the *Career*Tech system earn their high school diploma at the same time as their certificate, the *Career*Tech certificate is still conferred as a separate and additional credential to the high school diploma. As a result,

any determination of benefit conferred by the Oklahoma *Career*Tech certificate must be separated from the benefits conferred by the high school diploma.

For the purposes of this study, high school diploma comparison data were taken from the U.S. Census Bureau's 2000 census, 2001 Current Population Study, and 2002 Current Population Study (U.S. Census Bureau, 2004). The 2000 census data provide salary information for Oklahoma residents separated by age and gender and national salary information separated by age, gender and ethnicity. According to the 2000 census the median salaries in Oklahoma for 1999 were 10% below the national salaries. As a result, the national salaries used for comparison in this study were adjusted downward by 10%. Due to the limitations of the Current Population Studies, and the fact that full census surveys are completed only every 10 years, no Oklahoma specific comparison data were available for 2000 and 2001, limiting comparisons to national data only.

Procedures

The procedures for this study were slightly irregular due to the nature of the Oklahoma *Career*Tech system and the timing. The idea for this cost-benefit analysis was actually inspired by former Oklahoma governor Frank Keating. On April 9, 2002, Keating ordered the Career and Technology Education Special Audit Report for the period July 1, 1996 through June 30, 2001 (State of Oklahoma, 2002, referred to from this point forward as the audit report). This publication was printed and issued by the State Auditor and Inspector, as required by 74 O.S. Supp. 1994, § 212. Pursuant to 74 O.S. Supp. 1992, § 3105, 87 copies were prepared and deposited with the Publications Clearinghouse of the Oklahoma Department of Libraries. Under normal circumstances collecting detailed cost data on a system such as the Oklahoma *Career*Tech system

would be an extensive undertaking wrought with access issues. With the publishing of the audit report, there is not only access to detailed cost information, but it is verified by an independent third party.

Considering the fact that the *Career*Tech system is almost singularly focused upon workplace training, wage information on completers would be the focus of any discussion of benefits. From this point most research studies would look at the prospect of developing a survey instrument and gaining access to *Career*Tech completers. In this particular study, inquiries into the Oklahoma *Career*Tech system revealed that yearly salary surveys are conducted for all system completers.

Upon contacting the information management department at the Oklahoma *Career*Tech headquarters in Stillwater, Oklahoma, more specific information about these surveys was obtained. According to *Career*Tech policy, most written requests for information are granted, provided the information is considered within the public domain. In order to qualify for public domain, there must be no information specifically connected to individuals. The researcher submitted a written request to the Oklahoma *Career*Tech system for salary survey results from 1999, 2000, and 2001 separated by gender, age, and ethnicity. While waiting for the *Career*Tech system to respond, the researcher completed a University of Oklahoma Institutional Review Board (IRB) application. The IRB determined that this study was exempt from the requirements for full board review. The IRB approval letter for this study is included in Appendix B. Upon receipt of the salary survey results from the *Career*Tech system, this study was conducted according to the following methodology.

Methodology

All revenue and expenditure information for this study was taken from the audit report. The audit report includes the added benefit of having an independent third party verify the information to ensure the most reliable information possible. The following revenue and expenditure information for the Oklahoma *Career*Tech system is included in the audit report:

- Total annual income from all sources;
- Total expenditures;
- Number of students served by category: FTE students, other secondary students and adults, including those paying tuition;
- Expenditures, allocable to each category of student and the resulting cost per student.
- Travel, broken out between in-state and out-of-state travel;
- Total staff (numbers and cost) by job category, i.e. administrative, instructional and support;
- Average compensation for administrative, instructional and support staff, separating superintendents from other administrators.

Expenditures will be estimated for the total system utilizing the following ingredients:

- Employee salaries;
- Employee benefits;
- Operation, repair & maintenance;
- Supplies;
- Property, furniture & equipment;
- Travel;
- Other-District level expenses;
- State level professional services;
- State level administrative expenses;
- State level payments to local governments;
- Other State level disbursements.

Although state office expenditures are listed within the audit report separately, they were combined with the rest of the *Career*Tech system revenue and expenditure data as these expenses are not technically separate from the rest of the system. In fact, state office expenditures constitute overhead for the system as a whole, and should be factored into the cost of educating students. For the purpose of this study, the state office

activities were combined with the revenue and expenditure categories of the rest of the system with the understanding that the full costs and benefits of the *Career*Tech system is the result of all the costs and benefits of the system at the state and local levels.

Benefits for the Oklahoma *Career*Tech system were separated into three categories: direct revenues of the system through tuition, fees, licenses, permits, sales and services; taxes paid by system employees (with the assumption that a certain percentage of employees base salaries are recaptured through tax collection resulting in a reduction of social costs); and the estimated increased tax payments of system completers above those who have only attained a primary and secondary education. Non-tax revenue information were taken from the audit report. Taxes paid by system employees were based upon the employee salary information found within the audit report and estimated using the 5, 17, and 29% tax rates as determined from Table 3-1.

Benefits for *Career*Tech completers were calculated by estimating the difference of lifetime tax payments between *Career*Tech completers and those with only a primary and secondary education. These tax estimates were also obtained by applying the 5, 17, and 29% tax rates to the median salary of the *Career*Tech completers and the median salary of primary and secondary education completers nationally and within the state of Oklahoma as reported by the U.S. Census Bureau. Unfortunately, the Oklahoma *Career*Tech system does not track completers beyond the 1-year follow-up survey limiting salary estimate information to only one year after completion. A second limitation with the determination of benefits is also caused by the fact that neither the Oklahoma *Career*Tech system nor the state of Oklahoma tracks the completers of the system in relation to their involvement with public assistance or the criminal justice

system. This limitation does not allow for an estimation of possible benefits from lower transfer payments from other tax supported agencies or decreases in involvement with the criminal justice system.

Table 3-1 Tax Burden Estimation for Oklahoma Residents

Type of Household	Income Tax	Property Tax	Sales Tax	Motor Vehicle Tax	Motor Fuel Tax	Total Tax	Total Tax as a % of Income
Household I	$30,071	$1,593	$2,043	$1,855	$527	$36,089	25.78
Household II	$14,257	$0	$965	$1,761	$224	$17,207	28.68
Household III	$5,302	$1,017	$1,194	$172	$424	$8,108	18.02
Household IV	$2,106	$0	$628	$145	$283	$3,162	12.65
Household V	-$971	$0	$553	$45	$192	-$181	-1.21
Mean	$10,153	$522	$1,077	$796	$330	$12,877	16.78
SD	$12,506	$743	$599	$926	$142	$14,536	11.88

(Adapted from the Oklahoma Office of State Finance, 1999, Tables 11, 13, 16, 17, and 18)

Household I (Married, Two Children, $140,000 Total Income)
Household II (Single, $60,000 Total Income)
Household III (Married, Two Children, $45,000 Income)
Household IV (Married, Two Children, $25,000 Income)
Household V (Single, One Child, $15,000 Income)

Cost-benefit analysis.

Cost-benefit analysis allows for the determination of whether the benefits of an alternative outweigh the costs and thus whether the alternative is worth the investment. In this study, the alternative in question is the certificate of training conferred by the Oklahoma *Career*Tech system. There are three aspects to cost-benefit analysis: Cost-benefit ratio, net benefits, and rate of return. The benefit-cost ratio provides a simple indicator of whether benefits outweigh costs, but it does not provide a clear picture to the overall scale of the investment. Though net benefits provide the best overall indicator of project desirability, it is sensitive to the selection of a discount rate. The rate of return does not clearly demonstrate investment scale either, nor is it as simple to calculate when

benefits and costs are dispersed unevenly across an investment life cycle. Due to these limitations, this study will complete all three computations.

Table 3-2 Projected Net Benefit, Benefit-Cost Ratio and Rate of Return Comparisons of Oklahoma *Career*Tech Completers and HS Diploma and/or Equivalent at 5, 17 and 29% Tax Rates, 1999-2001

*Career*Tech Completers	HS Diploma and/or Equivalent, 1999		HS Diploma and/or Equivalent, 2000-2001
	Oklahoma	Nationally	Nationally
18 to 64 years	No	Yes	Yes
21 to 64 years	Yes	No	No
21 to 24 years	Yes	No	No
25 to 34 years	Yes	Yes	Yes
35 to 44 years	Yes	Yes	Yes
45 to 54 years	Yes	Yes	Yes
55 to 64 years	Yes	Yes	Yes
Caucasian	No	Yes	Yes
African American	No	Yes	Yes
Hispanic	No	Yes	Yes
Male	No	Yes	Yes
Caucasian	No	Yes	Yes
African American	No	Yes	Yes
Hispanic	No	Yes	Yes
Female	No	Yes	Yes
Caucasian	No	Yes	Yes
African American	No	Yes	Yes
Hispanic	No	Yes	Yes

The benefit-cost ratios were calculated by dividing the cost of educating an FTE into the benefits of the *Career*Tech certificate as determined by taking the difference of lifetime tax payments between those completing the high school diploma only and those also completing the *Career*Tech certificate. The net benefits were calculated by subtracting the cost of educating an FTE from the benefits of the *Career*Tech certificate as determined by taking the difference of lifetime tax payments between those completing the high school diploma only and those also completing the *Career*Tech certificate. The rates of return were calculated by taking the benefit-cost ratio and subtracting one, which represents the removal of the initial one dollar of investment, leaving the percentage of return on the investment. For all three calculations, lifetime payments were determined by taking the mean age of each demographic group and

subtracting it from age 64 and then multiplying that by the estimated annual tax payments as determined by the groups salary and the 5, 17, and 29% tax brackets.

The resulting benefit-cost ratio can be interpreted as the number of monetary units of benefit for each unit of cost, with each monetary unit represented by one dollar. With this interpretation, the ratio represents the number of dollars received as benefit for each dollar invested. If the ratio is greater than one, it implies that benefits outweigh costs and the Oklahoma *Career*Tech certificate is a desirable investment. The net benefits calculation represent the return on investment to the Oklahoma taxpayers in more absolute terms, which in this study was represented in total dollars received, above and beyond those dollars invested. If the net benefit dollar amount is more than zero, then the implication is that benefits outweigh costs and the Oklahoma *Career*Tech certificate is a desirable investment. The rate of return represents the rate by which the benefits can be discounted to equal zero. This figure is directly related to the benefit-cost ratio as it represents the percentage of return, whereby the benefit-cost ratio represents the ratio of return. For this study, a rate of return greater than zero would implicate that benefits outweigh costs and the Oklahoma *Career*Tech certificate is a desirable investment. For this study benefit-cost ratio, net benefits and social rate of return estimates for FY 1999-2001 were calculated separately based upon age, gender and ethnicity at 5, 17, and 29% tax rates as shown in Table 3-2.

Demographic wage comparisons

Differences in wages among demographic groups based upon gender and ethnicity was determined utilizing a factoral ANOVA, including a post hoc Games and Howell (GH) multiple comparison procedure, with wages as the dependent variable and

gender and ethnicity as the independent variables. Gender was a two level assigned variable (male or female) while ethnicity will be a five level (American Indian, African American, Hispanic, Caucasian, and Asian) assigned variable. The interaction effects between gender and ethnicity were also tested. The GH multiple comparison procedure was chosen because there was unequal sample sizes, requiring the use of a multiple comparison procedure that is robust under unequal sample sizes and variance. The .05 alpha level was utilized to determine statistical significance.

Limitations

This study was limited in many of the same ways the other rate of return studies reviewed in Chapter Two. Due to the lack of any real experimental design, there is a high selectivity bias. Ideally, this study would have followed the cost-benefit analysis procedures performed by Burghardt et al. (2001). With the right level of access, students interested in the Oklahoma *Career*Tech system could have been separated into control and treatment groups, then tracked across multiple years to determine benefits accrued through their participation versus the control group who did not participate. Unfortunately, this level of control was not available at this time.

The data collected in this study were also limited by representing a snapshot of one point in time, with no explanation of variables other than the education received which may, or may not be contributing to the salary of the individual. The nature of the items on the salary survey instrument itself also did not include any data pertaining to other possible benefits beyond the individuals' salary. The instrument did delineate gender and ethnicity, which was helpful in determining any possible differences due to demographics. Although these limitations were considerable, they are not uncommon

within the rate of return literature. As seen in Table 3-3, most of the literature reviewed in Chapter Two contained similar limitations.

Table 3-3 Limitations of Rate of Return Studies

Criteria	International Studies	Federal Studies	National Studies	State Studies	This Study
Selectivity Bias	High	Experimental Design	Low	High	High
Omitted Variables	Yes	Yes	Yes	Yes, except NC (Age)	Yes, except for age, race, and gender
External Benefits	None	Crime, Public Assistance, Health	None	None, except FL (Transfer Payments, Crime)	None
Cross-Sectional Data Only	1 yr only	12/30/48 month follow-up	1 yr only	CA: 1&3 NC: 1 FL: 1&4	1 yr only

Conclusion

This chapter began by completing the development of the broader context by specifically describing the Oklahoma *Career*Tech system, their students whom will serve as participants for this study, and the high school graduate participants whom will serve as the comparison group for the cost-benefit analysis. The chapter continued with a discussion of the procedures by which this study will be conducted along with the design of the study. The chapter concluded with a discussion of limitations to the study and how those limitations compare to similar studies within the body of cost-benefit literature in education.

Chapter Four will report the results of the study for FY1999, 2000, and 2001. The first results reported will be descriptive statistics. The second results reported will be revenues, expenditures, total system revenue, total system costs, and cost per FTE student. Next the estimated lifetime tax payments comparisons will be reported. The

cost-benefit analysis results will then me reported. Chapter Four will conclude with a reporting of the demographic wage comparisons by gender and ethnicity.

Chapter Four: Results

Educational policy-makers must allocate scarce resources among competing options, a common function of any economic decision making process. A major problem policy-makers face is the lack of high quality quantitative research to assist in this process. Many important decisions in education are concerned with the costs of education. According to Tsang (1995), cost analyses may reveal the cost implications of an educational policy, assess the financial feasibility of an educational reform, provide diagnosis of past and current resource utilization in education, project future education cost requirements, and evaluate the relative efficiency of alternative educational policies or interventions. The purpose of this study is to contribute to the existing educational literature by performing a cost-benefit analysis of career/technical institutes.

The current study presents a cost-benefit analysis of the Oklahoma *Career*Tech system. Included are two components; the cost-benefit analysis itself and the descriptive comparison of wages earned by various demographic groups. The cost-benefit analysis involves the estimation of program costs, the identification and estimation of benefits, and the computation of the benefit-cost ratio, net benefit, and social (external) rate of return of return for the Oklahoma *Career*Tech system. The wage comparisons involve performing a factoral Analysis of Variance (ANOVA) and post hoc multiple comparison procedure to test for differences in wages between demographic groups based on gender and ethnicity.

Descriptive Statistics

The Oklahoma *Career*Tech system is a statewide network of 29 technology center districts, operating a total of 54 campuses with a total of 1,378 *Career*Tech teachers

including 400 comprehensive public school districts and serving a total enrollment of 145,788 students (Oklahoma *Career*Tech, 2004). One of the main goals of these schools is to provide cost-effective career oriented vocational education. Oklahoma's technology centers serve full-time students, both high school pupils and adult learners. Additionally, district residents, usually adults, utilize the centers to learn new skills or enhance existing ones in various short-term courses. In FY 2002, more than 14,000 high school students enrolled in Oklahoma's technology centers. The centers also served more than 11,000 full-time adult enrollments (Oklahoma *Career*Tech, 2004).

The participants for this study were students of the Oklahoma *Career*Tech system who completed their programs of study during the fiscal years of 1999 through 2001. Data for this study were collected by the Oklahoma *Career*Tech system as part of the 1-year follow-up surveys and provide age, ethnicity, gender, and starting wage information 1-year after the completion of a *Career*Tech program.

The one year follow-up surveys for FY 1999 reported in Table 4-1 included 4,619 participants with a mean age of 28.33, a median wage of $8.75 and an interquartile range of $4.20. Of these participants 2,372 were male with a mean age of 28.42 and a median wage of $10.00 with an interquartile range of $3.73. The female participants numbered 2,247 with a mean age of 28.23, median wage of $8.00 and an interquartile range of $3.50. The American-Indian participants numbered 532 with a mean age of 27.47, median wage of $8.00 and an interquartile range of $3.55. The African-American participants numbered 301 with a mean age of 28.67, median wage of $8.00 and an interquartile range of $3.09. The Hispanic participants numbered 118 with a mean age of 26.29, median wage of $8.50 and an interquartile range of $3.00. The Caucasian

participants numbered 3,621 with a mean age of 28.48, median wage of $9.00 and an interquartile range of $4.23. The Asian participants numbered 47 with a mean age of 29.72, median wage of $9.00 and an interquartile range of $5.00.

Table 4-1 One Year Follow-Up Surveys Descriptive Statistics, FY 1999

1999	N	%	Mean Age	VAR	SD	Median Wage	MIN	MAX	Range	H - Spread
Total	4619	100%	28.33	113.822	10.67	$8.75	$3.56	$30.00	$26.44	$4.20
Male	2372	51%	28.42	130.815	11.44	$10.00	$3.56	$30.00	$26.44	$3.73
Female	2247	49%	28.23	95.916	9.79	$8.00	$3.85	$30.00	$26.15	$3.50
Am. Indian	532	12%	27.47	90.046	9.49	$8.00	$4.86	$26.00	$21.14	$3.55
African Am.	301	7%	28.67	115.743	10.76	$8.00	$3.75	$18.00	$14.25	$3.09
Hispanic	118	3%	26.29	86.856	9.32	$8.50	$4.62	$20.00	$15.38	$3.00
Caucasian	3621	78%	28.48	118.002	10.86	$9.00	$3.56	$30.00	$26.44	$4.23
Asian	47	1%	29.72	101.639	10.08	$9.00	$6.00	$20.00	$14.00	$5.00

Table 4-2 One Year Follow-Up Surveys Descriptive Statistics, FY 2000

2000	N	%	Mean Age	VAR	SD	Median Wage	MIN	MAX	Range	H - Spread
Total	4805	100%	27,69	112.457	10.60	$9.00	$3.00	$50.00	$47.00	$3.80
Male	2256	47%	26.52	116.529	10.79	$10.00	$4.61	$40.00	$35.39	$4.00
Female	2549	53%	28.73	106.609	10.33	$8.50	$3.00	$50.00	$47.00	$3.28
Am. Indian	604	13%	26.91	89.562	9.46	$8.29	$4.61	$35.00	$30.39	$3.10
African Am.	300	6%	26.72	73.806	8.59	$8.20	$5.15	$22.83	$17.68	$3.35
Hispanic	158	3%	24.39	78.851	8.88	$8.50	$5.50	$22.00	$16.50	$3.00
Caucasian	3680	77%	28.01	120.472	10.98	$9.25	$3.00	$50.00	$47.00	$4.25
Asian	63	1%	29.71	89.917	9.48	$10.00	$4.25	$24.03	$19.78	$6.50

The one year follow-up surveys for FY 2000 reported in Table 4-2 included 4,805 participants with a mean age of 27.69, median wage of $9.00 and an interquartile range of $3.80. Of these participants 2,256 were male with a mean age of 26.52, median wage of $10.00 and an interquartile range of $4.00. The female participants numbered 2,549 with a mean age of 28.73, median wage of $8.50 and an interquartile range of $$3.28. The American-Indian participants numbered 604 with a mean age of 26.91, median wage of $8.29 and an interquartile range of $3.10. The African-American participants numbered 300 with a mean age of 26.72, median wage of $8.20 and an interquartile range of $3.35. The Hispanic participants numbered 158 with a mean age of 24.39, median wage of

$8.50 and an interquartile range of $3.00. The Caucasian participants numbered 3,680 with a mean age of 28.01, median wage of $9.25 and an interquartile range of $4.25. The Asian participants numbered 63 with a mean age of 29.71, median wage of $10.00 and an interquartile range of $6.50.

Table 4-3 One Year Follow-Up Surveys Descriptive Statistics, FY 2001

2001	N	%	Mean Age	VAR	SD	Median Wage	MIN	MAX	Range	H - Spread
Total	4207	100%	26.35	98.519	9.93	$9.00	$2.13	$55.00	$52.87	$4.00
Male	2037	48%	27.47	98.394	9.92	$9.88	$2.30	$55.00	$52.70	$4.00
Female	2170	52%	25.17	96.131	9.80	$8.50	$2.13	$55.00	$52.87	$3.50
Am. Indian	543	13%	26.03	87.464	9.35	$8.50	$2.50	$55.00	$52.50	$3.50
African Am.	301	7%	26.93	78.709	8.87	$8.75	$4.32	$33.33	$29.01	$3.10
Hispanic	150	4%	23.94	57.305	7.57	$8.50	$5.15	$35.00	$29.85	$3.85
Caucasian	3157	75%	26.42	103.664	10.18	$9.00	$2.13	$50.00	$47.87	$4.50
Asian	56	1%	29.30	111.270	10.55	$10.00	$5.35	$21.63	$16.28	$4.50

The one year follow-up surveys for FY 2001 reported in Table 4-3 included 4,207 participants with a mean age of 26.35, median wage of $9.00 and an interquartile range of $4.00. Of these participants 2,037 were male with a mean age of 27.47, median wage of $9.88 and an interquartile range of $4.00. The female participants numbered 2,170 with a mean age of 25.17, median wage of $8.50 and an interquartile range of $3.50. The American-Indian participants numbered 543 with a mean age of 26.03, median wage of $8.50 and an interquartile range of $3.50. The African-American participants numbered 301 with a mean age of 26.93, median wage of $8.75 and an interquartile range of $3.10. The Hispanic participants numbered 150 with a mean age of 23.94, median wage of $8.50 and an interquartile range of $3.85. The Caucasian participants numbered 3,157 with a mean age of 26.42, median wage of $9.00 and an interquartile range of $4.50. The Asian participants numbered 56 with a mean age of 29.30, median wage of $10.00 and an interquartile range of $4.50.

Revenue and Expenditures

All revenue, expenditure, and student enrollment data for this study were taken from the Career and Technology Education Special Audit Report for the period July 1, 1996 through June 30, 2001 (State of Oklahoma, 2002). These data are summarized in Table 4-4 with total costs for the Oklahoma *Career*Tech system for FY1999, 2000, and 2001 totaling $398.591M, $400.940M, and $431.194M respectively. The number of FTE Students for FY1999, 2000, and 2001 were 34,873, 33,094, and 31,272 respectively bringing the total cost per FTE student to $11,430, $12,115, and $13,789.

Table 4-4 Oklahoma *Career*Tech Revenues and Expenditures, 17% Tax Rate

Amounts Expressed In Thousands	FY 1999	FY 2000	FY 2001
Salaries	$141,195	$147,275	$158,920
Employee Benefits	$36,385	$37,958	$42,943
Operation, Repair & Maintenance	$27,066	$19,131	$26,482
Supplies	$29,623	$32,260	$36,953
Property, Furniture & Equipment	$43,377	$40,132	$35,421
Travel	$3,804	$3,858	$4,255
Other-District Level	$36,913	$37,988	$40,166
State Level Professional Services	$1,390	$965	$570
State Level Administrative Expenses	$3,368	$3,358	$3,236
State Level Payments to Local Governments	$120,628	$123,527	$131,406
Other State Level Disbursements	$1,195	$919	$1,447
SUBTOTALS	$444,944	$447,371	$481,799
Tuition, Fees, Licenses, Permits, Sales and Services	$22,350	$21,394	$23,589
Taxes paid by system Employees	$24,003	$25,037	$27,016
TOTAL COSTS	$398,591	$400,940	$431,194
# FTE Students	34,873	33,094	31,272
Cost Per FTE	$11,430	$12,115	$13,789

NOTE: Revenue and Expenditure data at the 5% and 29% tax rates are included in Appendix C

These cost figures represent a combination of revenues and expenditures at the state and local level for a comprehensive picture of total costs for operating the

Oklahoma *Career*Tech system. Income tax revenue from *Career*Tech system employees is estimated utilizing a 17% tax rate with the understanding that a portion of total costs for any public system of education is recaptured through income tax payments of employees, thus reducing total costs for the entire system. Of the data collected for the audit report, only the student enrollment numbers showed discrepancies between what the auditors found and what the Oklahoma *Career*Tech system reported. In the audit report these discrepancies are clearly noted with the adjusted student enrollment figures listed along with a plan of action for reducing discrepancies in the future. This study utilizes the adjusted student enrollment figures in Table 4-4 and throughout the rest of this study.

Economic Benefit

Economic benefits for the Oklahoma *Career*Tech system are separated into three categories: direct revenues of the system through tuition, fees, licenses, permits, sales and services; taxes paid by system employees, and the estimated increased tax payments of system completers above those who have only attained a primary and secondary education. Non-tax revenue data were taken from the audit report. For ease of reporting, direct system revenues and taxes paid by system employees are reported in Table 4-4 and Appendix C because these benefits were counted as revenue and deducted from total system expenditures in order to ascertain total system costs.

Economic benefits for *Career*Tech completers were calculated by estimating the difference of lifetime tax payments between *Career*Tech completers and those with only a primary and secondary education. In order to determine value added by each successive credential, it is customary to compare earnings at one credential level with the next lowest credential. In the current study, the *Career*Tech certificate was compared to

the high school diploma and/or its equivalent. These tax estimates were obtained by applying the 5, 17, and 29% tax rates to the median salary of the *Career*Tech completers and the median salary of primary and secondary education completers nationally and within the state of Oklahoma as reported by the U.S. Census Bureau. The resulting estimated lifetime tax payments comparisons for the 17% tax rate are included in Table 4-5, the 5 and 29% rates are included in Appendix D.

High school diploma comparison data were taken from the U.S. Census Bureau's 2000 census, 2001 Current Population Study, and 2002 Current Population Study (U.S. Census Bureau, 2004). As demonstrated in Table 4-5, the 2000 census data provide salary information for Oklahoma residents separated by age and gender for FY1999. Unfortunately, the data were not separated by ethnicity, thus limiting comparisons to age and gender only. Tables 4-6 and 4-7 show national salary information separated by age, gender and ethnicity. According to the 2000 census the median salaries in Oklahoma for 1999 were approximately 10% below the national salaries. As a result, the national salaries used for comparison in this study, (included in Tables 4-6 and 4-7), were adjusted downward by 10%. Due to the limitations of the Current Population Studies, and the fact that full census results are only published every 10 years, no Oklahoma specific comparison data are available for 2000 and 2001, limiting comparisons to adjusted national data only. All lifetime tax payment calculations in this study were based upon estimating lifetime working years by deducting the mean age of each group by age 64 and multiplying by the estimated annual tax payment at a particular tax rate.

Table 4-5 includes estimated lifetime tax payment comparisons of Oklahoma CareerTech completers and high school diploma and/or equivalent students in Oklahoma

at the 17% Tax Rate for FY1999. The median salary of high school diploma and/or equivalent students of both sexes age 21 to 64 is $23,468 while the median salary of the Oklahoma *Career*Tech completers is $20,800, a difference of -$2,668. Over the course of an estimated thirty-year work life the high school diploma and/or equivalent students estimated lifetime tax payments is $119,687 while the *Career*Tech completers is $106,080, a difference of -$13,607. These differences in lifetime tax payments for both sexes vary greatly depending upon age. The median salary of male high school diploma and/or equivalent students age 21 to 64 in the state of Oklahoma is $27,453 while the median salary of the male *Career*Tech completers age 21-64 is $22,880, a difference of -$4,573. Over the course of an estimated thirty-year work life the male high school diploma and/or equivalent students estimated lifetime tax payments is $135,343 while the male *Career*Tech completers is $112,798, a difference of -$22,545. Differences in lifetime tax payments for males also vary greatly depending upon age.

The median salary of female high school diploma and/or equivalent students age 21 to 64 the state of Oklahoma is $19,225 while the median salary of the female *Career*Tech completers age 21-64 is $17,680, a difference of -$1,545. Over the course of an estimated thirty-year work life the female high school diploma and/or equivalent students estimated lifetime tax payments is $104,584 while the female *Career*Tech completers is $96,179, a difference of -$8,405. These differences in lifetime tax payments vary greatly depending upon age and gender. The 21 to 24 year olds of both genders reported the greatest positive difference in lifetime tax payments The 25 to 34 year old females also showed a positive difference, though it was much less than the 21 to 25 year olds.

Table 4-5 Estimated Lifetime Tax Payments Comparisons of Oklahoma *Career*Tech Completers and HS Diploma and/or Equivalent Students in Oklahoma at the 17% Tax Rate, 1999

	Wage Comparisons				Lifetime Tax Payments at 17%		
	HS Diploma and/or Equivalent	Oklahoma *Career*Tech Completer	Difference	Number of Years	HS Diploma and/or Equivalent	Oklahoma *Career*Tech Completer	Difference
Both Sexes	$23,468	$20,800	-$2,668	30	$119,687	$106,080	-$13,607
21 to 24 years	$17,375	$18,720	$1,345	41	$121,104	$130,478	$9,375
25 to 34 years	$21,663	$19,760	-$1,903	34	$125,212	$114,213	-$10,999
35 to 44 years	$25,521	$20,800	-$4,721	24	$104,126	$84,864	-$19,262
45 to 54 years	$25,737	$21,840	-$3,897	14	$61,254	$51,979	-$9,275
55 to 64 years	$24,941	$23,358	-$1,583	4	$16,960	$15,883	-$1,076
Male	$27,453	$22,880	-$4,573	29	$135,343	$112,798	-$22,545
21 to 24 years	$19,225	$20,706	$1,481	41	$133,998	$144,321	$10,323
25 to 34 years	$24,722	$21,840	-$2,882	34	$142,893	$126,235	-$16,658
35 to 44 years	$30,276	$23,358	-$6,918	24	$123,526	$95,301	-$28,225
45 to 54 years	$31,587	$23,358	-$8,229	14	$75,177	$55,592	-$19,585
55 to 64 years	$30,312	$23,358	-$6,954	4	$20,612	$15,883	-$4,729
Female	$19,225	$17,680	-$1,545	32	$104,584	$96,179	-$8,405
21 to 24 years	$15,368	$17,742	$2,374	41	$107,115	$123,662	$16,547
25 to 34 years	$17,247	$17,680	$433	34	$99,688	$102,190	$2,503
35 to 44 years	$19,833	$18,720	-$1,113	24	$80,919	$76,378	-$4,541
45 to 54 years	$20,679	$18,720	-$1,959	14	$49,216	$44,554	-$4,662
55 to 64 years	$20,687	$15,600	-$5,087	4	$14,067	$10,608	-$3,459

NOTE: Economic Benefit data at the 5% and 29% tax rates are included in Appendix D

Table 4-6 includes the estimated lifetime tax payments comparison of Oklahoma CareerTech completers and high school diploma and/or equivalent students nationally, at the 17% Tax Rate, for FY1999 with a 10% geographical adjustment. As seen in Table 4-6, the median salary of high school diploma and/or equivalent students of both sexes, all races age 18 to 64 is $23,575 while the median salary of the Oklahoma *Career*Tech completers is $18,200 for a difference of -$5,375. Over the course of an estimated thirty-seven year work life the high school diploma and/or equivalent students estimated lifetime tax payments is $148,287 while the *Career*Tech completers is $114,478 for a difference of -$33,809. Differences in lifetime tax payments for both sexes, all races varied greatly depending upon age.

Table 4-6 Estimated Lifetime Tax Payments Comparison of Oklahoma *Career*Tech Completers and HS Diploma and/or Equivalent Students Nationally at the 17% Tax Rate, 1999 (10% ADJ)

	Wage Comparisons			Lifetime Tax Payments at 17%			
	HS Diploma and/or Equivalent	Oklahoma *Career*Tech Completer	Difference	Number of Years	HS Diploma and/or Equivalent	Oklahoma *Career*Tech Completer	Difference
Both Sexes, All Races 18 to 64 years	$23,575	$18,200	-$5,375	37	$148,287	$114,478	-$33,809
25 to 34 years	$22,565	$19,760	-$2,805	35	$134,262	$117,572	-$16,690
35 to 44 years	$25,457	$20,800	-$4,657	25	$108,192	$88,400	-$19,792
45 to 54 years	$26,480	$21,840	-$4,640	15	$67,524	$55,692	-$11,832
55 to 64 years	$25,601	$23,358	-$2,243	5	$21,761	$19,854	-$1,907
Both Sexes, Caucasian 18 to 64 years	$24,090	$18,720	-$5,370	37	$151,526	$117,749	-$33,777
Both Sexes, African Am. 18 to 64 years	$20,630	$16,640	-$3,990	36	$126,256	$101,837	-$24,419
Both Sexes, Hispanic 18 to 64 years	$19,380	$17,680	-$1,700	39	$128,489	$117,218	-$11,271
Male, All Races 18 to 64 years	$27,862	$20,800	-$7,062	37	$175,252	$130,832	-$44,420
Caucasian	$28,399	$20,800	-$7,599	35	$168,974	$123,760	-$45,214
African-Am.	$23,732	$17,680	-$6,052	35	$141,205	$105,196	-$36,009
Hispanic	$20,884	$18,720	-$2,164	38	$134,911	$120,931	-$13,979
Female, All Races 18 to 64 years	$19,260	$16,640	-$2,620	37	$121,145	$104,666	-$16,480
Caucasian	$19,473	$16,640	-$2,833	37	$122,485	$104,666	-$17,820
African-Am.	$18,275	$15,600	-$2,675	37	$114,950	$98,124	-$16,826
Hispanic	$17,114	$16,515	-$599	40	$116,375	$112,302	-$4,073

NOTE: Economic Benefit data at the 5% and 29% tax rates are included in Appendix D

The median salary of Caucasian high school diploma and/or equivalent students of both sexes, age 18 to 64 is $24,090 while the median salary of *Career*Tech completers is $18,720, a difference of -$5,370. Over the course of an estimated thirty-seven year work life the high school diploma and/or equivalent students estimated lifetime tax payments is $151,526 while *Career*Tech completers is $117,749 for a difference of -33,777. The median salary of African-American high school diploma and/or equivalent students of both sexes, age 18 to 64 is $20,630 while the median salary of *Career*Tech

completers is $16,640, a difference of -$3,990. Over the course of an estimated thirty-six year work life the high school diploma and/or equivalent students estimated lifetime tax payments is $126,256 while the *Career*Tech completers is $101,837, a difference of -$24,419. The median salary of Hispanic high school diploma and/or equivalent students of both sexes, age 18 to 64 is $19,380 while the median salary of *Career*Tech completers is $17,680, a difference of -$1,700. Over the course of an estimated thirty-nine year work life the high school diploma and/or equivalent students estimated lifetime tax payments is $128,489 while *Career*Tech completers is $117,218, a difference of -$11,271.

The median salary of the male high school diploma and/or equivalent students of all races, age 18 to 64 is $27,862 while the median salary of *Career*Tech completers is $20,800, a difference of -$7,062. Over the course of an estimated thirty-seven year work life the high school diploma and/or equivalent students estimated lifetime tax payments is $175,252 while the *Career*Tech completers is $130,832, a difference of -$44,420. The median salary of the female high school diploma and/or equivalent students of all races, age 18 to 64 is $19,260 while the median salary of *Career*Tech completers is $16,640, a difference of -$2,620. Over the course of an estimated thirty-seven year work life the high school diploma and/or equivalent students estimated lifetime tax payments is $121,145 while *Career*Tech completers is $104,666, a difference of -$16,480.

Table 4-7 includes the estimated lifetime tax payments comparison of Oklahoma *Career*Tech completers and high school diploma and/or equivalent students nationally, at the 17% Tax Rate, for FY2000 with a 10% geographical adjustment. As seen in Table 4-7, the median salary of high school diploma and/or equivalent students of both sexes, all

races, age 18 to 64 is $24,277 while the median salary of *Career*Tech completers is $18,720, a difference of -$5,557. Over the course of an estimated thirty-seven year work life the high school diploma and/or equivalent students estimated lifetime tax payments is $152,702 while *Career*Tech completers is $117,749, a difference of -$34,954. Differences in lifetime tax payments for both sexes, all races varied greatly depending upon age.

The median salary of Caucasian high school diploma and/or equivalent students of both sexes, age 18 to 64 is $25,016 while the median salary of *Career*Tech completers is $19,240, a difference of -$5,776. Over the course of an estimated thirty-seven year work life the high school diploma and/or equivalent students estimated lifetime tax payments is $157,351 while *Career*Tech completers is $121,020, a difference of -$36,331. The median salary of African-American high school diploma and/or equivalent students of both sexes, age 18 to 64 is $21,113 while the median salary of *Career*Tech completers is $17,056, a difference of -$4,057. Over the course of an estimated thirty-eight year work life the high school diploma and/or equivalent students estimated lifetime tax payments is $136,390 while *Career*Tech completers is $110,182, a difference of -$26,208. The median salary of Hispanic high school diploma and/or equivalent students of both sexes, age 18 to 64 is $20,165 while the median salary of *Career*Tech completers is $17,680, a difference of -$2,485. Over the course of an estimated forty-one year work life the high school diploma and/or equivalent students estimated lifetime tax payments is $140,550 while the *Career*Tech completers is $123,230, a difference of -$17,320. Results for lifetime earnings also vary by age, yet none of the age groups report a positive difference.

Table 4-7 Estimated Lifetime Tax Payments Comparison of Oklahoma *Career*Tech Completers and HS Diploma and/or Equivalent Students Nationally at the 17% Tax Rate, 2000 (10% ADJ)

	Wage Comparisons				Lifetime Tax Payments at 17%		
	HS Diploma and/or Equivalent	Oklahoma *Career*Tech Completer	Difference	Number of Years	HS Diploma and/or Equivalent	Oklahoma *Career*Tech Completer	Difference
Both Sexes, All Races 18 to 64 years	$24,277	$18,720	-$5,557	37	$152,702	$117,749	-$34,954
25 to 34 years	$23,442	$20,280	-$3,162	35	$139,480	$120,666	-$18,814
35 to 44 years	$27,047	$20,800	-$6,247	25	$114,950	$88,400	-$26,550
45 to 54 years	$27,382	$21,320	-$6,062	15	$69,824	$54,366	-$15,458
55 to 64 years	$26,463	$22,880	-$3,583	5	$22,494	$19,448	-$3,046
Both Sexes, Caucasian 18 to 64 years	$25,016	$19,240	-$5,776	37	$157,351	$121,020	-$36,331
Both Sexes, African Am. 18 to 64 years	$21,113	$17,056	-$4,057	38	$136,390	$110,182	-$26,208
Both Sexes, Hispanic 18 to 64 years	$20,165	$17,680	-$2,485	41	$140,550	$123,230	-$17,320
Male, All Races 18 to 64 years	$28,267	$20,800	-$7,467	38	$182,605	$134,368	-$48,237
Caucasian	$28,804	$20,800	-$8,004	38	$186,074	$134,368	-$51,706
African-Am.	$23,897	$18,720	-$5,177	38	$154,375	$120,931	-$33,443
Hispanic	$22,672	$17,826	-$4,846	42	$161,878	$127,278	-$34,600
Female, All Races 18 to 64 years	$20,207	$17,680	-$2,527	36	$123,667	$108,202	-$15,465
Caucasian	$20,801	$18,720	-$2,081	36	$127,302	$114,566	-$12,736
African-Am.	$18,573	$16,640	-$1,933	38	$119,982	$107,494	-$12,487
Hispanic	$17,934	$16,640	-$1,294	39	$118,902	$110,323	-$8,579

NOTE: Economic Benefit data at the 5% and 29% tax rates are included in Appendix D

The median salary of the male high school diploma and/or equivalent students of all races age 18 to 64 is $28,267 while the median salary of *Career*Tech completers is $20,800, a difference of -$7,467. Over the course of an estimated thirty-eight year work life the High School Diploma and/or equivalent students estimated lifetime tax payments is $182,605 while *Career*Tech completers is $134,368, a difference of -$48,237. The median salary of the female high school diploma and/or equivalent students of all races,

age 18 to 64 is $20,207 while the median salary of *Career*Tech completers is $17,680, a difference of -$2,527. Over the course of an estimated thirty-six year work life the high school diploma and/or equivalent students estimated lifetime tax payments is $123,667 while the *Career*Tech completers is $108,202, a difference of -$15,465.

Table 4-8 Estimated Tax Payments Comparison of Oklahoma *Career*Tech Completers and HS Diploma and/or Equivalent Students Nationally at the 17% Tax Rate, 2001 (10% ADJ)

	Wage Comparisons			Lifetime Tax Payments at 17%			
	HS Diploma and/or Equivalent	Oklahoma *Career*Tech Completer	Difference	Number of Years	HS Diploma and/or Equivalent	Oklahoma *Career*Tech Completer	Difference
Both Sexes, All Races 18 to 64 years	$24,582	$18,720	-$5,862	39	$162,979	$124,114	-$38,865
25 to 34 years	$23,547	$20,800	-$2,747	35	$140,105	$123,760	-$16,345
35 to 44 years	$27,126	$20,800	-$6,326	25	$115,286	$88,400	-$26,886
45 to 54 years	$27,634	$20,800	-$6,834	15	$70,467	$53,040	-$17,427
55 to 64 years	$27,346	$20,800	-$6,546	5	$23,244	$17,680	-$5,564
Both Sexes, Caucasian 18 to 64 years	$25,519	$18,720	-$6,799	39	$169,191	$124,114	-$45,077
Both Sexes, African Am. 18 to 64 years	$22,210	$18,200	-$4,010	38	$143,477	$117,572	-$25,905
Both Sexes, Hispanic 18 to 64 years	$20,521	$18,720	-$1,801	41	$143,031	$130,478	-$12,553
Male, All Races 18 to 64 years	$28,440	$20,550	-$7,890	40	$193,392	$139,740	-$53,652
Caucasian	$28,942	$20,800	-$8,142	40	$196,806	$141,440	-$55,366
African-Am.	$23,961	$18,720	-$5,241	37	$150,715	$117,749	-$32,966
Hispanic	$22,720	$20,800	-$1,920	40	$154,496	$141,440	-$13,056
Female, All Races 18 to 64 years	$20,782	$17,680	-$3,102	38	$134,252	$114,213	-$20,039
Caucasian	$21,188	$17,680	-$3,508	37	$133,273	$111,207	-$22,065
African-Am.	$19,672	$17,680	-$1,992	39	$130,425	$117,218	-$13,207
Hispanic	$18,662	$15,600	-$3,062	42	$133,247	$111,384	-$21,863

NOTE: Economic Benefit data at the 5% and 29% tax rates are included in Appendix D

Table 4-8 portrays the estimated lifetime tax payments comparison of Oklahoma *Career*Tech completers and high school diploma and/or equivalent students nationally, at

the 17% Tax Rate, for FY2001 with a 10% geographical adjustment. As seen in Table 4-8, the median salary of high school diploma and/or equivalent students of both sexes, all races age 18 to 64 is $24,582 while the median salary of *Career*Tech completers is $18,720, a difference of -$5,862. Over the course of an estimated thirty-nine year work life the high school diploma and/or equivalent students estimated lifetime tax payments is $162,979 while *Career*Tech completers is $124,114, a difference of -$38,865. Differences in lifetime tax payments for both sexes, all races varied greatly depending upon age.

The median salary of Caucasian high school diploma and/or equivalent students of both sexes, age 18 to 64 is $25,519 while the median salary of *Career*Tech completers is $18,720, a difference of -$6,799. Over the course of an estimated thirty-nine year work life the high school diploma and/or equivalent students estimated lifetime tax payments is $169,191 while *Career*Tech completers is $124,114, a difference of -$45,077. The median salary of African-American high school diploma and/or equivalent students of both sexes, age 18 to 64 is $22,210 while the median salary of *Career*Tech completers is $18,200, a difference of -$4,010. Over the course of an estimated thirty-eight year work life the high school diploma and/or equivalent students estimated lifetime tax payments is $143,477 while *Career*Tech completers is $117,572, a difference of -$25,905. The median salary of Hispanic high school diploma and/or equivalent students of both sexes, age 18 to 64 is $20,521 while the median salary of *Career*Tech completers is $18,720, a difference of -$1,801. Over the course of an estimated forty-one year work life the high school diploma and/or equivalent students estimated lifetime tax payments is $143,031 while *Career*Tech completers is $130,478, a difference of -$12,553.

The median salary of the male high school diploma and/or equivalent students of all races age 18 to 64 is $28,440 while the median salary of *Career*Tech completers is $20,550, a difference of -$7,890. Over the course of an estimated forty year work life the high school diploma and/or equivalent students estimated lifetime tax payments is $193,392 while *Career*Tech completers is $139,740, a difference of -$53,652. The median salary of the female high school diploma and/or equivalent students of all races age 18 to 64 is $20,782 while the median salary of *Career*Tech completers is $17,680, a difference of -$3,102. Over the course of an estimated thirty-eight year work life the high school diploma and/or equivalent students estimated lifetime tax payments is $134,252 while the Oklahoma *Career*Tech completers is $114,213, a difference of -$20,039.

Cost Benefit Analysis

Cost-benefit analysis (CBA) represents an important tool for analyzing the desirability of social investments. CBA refers to the evaluation of alternatives according to their costs and benefits when each is measured in monetary terms. CBA has been applied widely to educational investments at the national and international levels, particularly in evaluating the ability of such investments to raise productivity and earnings. Since CBA assesses alternatives in terms of their monetary costs and the monetary values of its benefits, alternatives can be examined on their own merits to see if they are worthwhile with the idea that alternatives must show benefits in excess of costs. In selecting from among several alternatives, such as competing educational programs, one would choose the one that had the highest benefit-cost ratio, net benefit, or rate of return.

The benefit-cost ratio for this study was calculated by dividing the cost of educating an FTE student into the economic benefits of the *Career*Tech certificate as determined by taking the difference of estimated lifetime tax payments between those completing the high school diploma only and those also completing the *Career*Tech certificate. The net benefits for this study were calculated by subtracting the cost of educating an FTE from the benefits of the *Career*Tech certificate as determined by taking the difference of lifetime tax payments between those completing the high school diploma only and those also completing the *Career*Tech certificate. The rate of return for this study was calculated by taking the benefit-cost ratio and subtracting one, which represents the removal of the initial one-dollar of investment, leaving the percentage of return on the investment. For all three calculations, lifetime payments were estimated by taking the mean age of each demographic group and subtracting it from age 64 and then multiplying that by the estimated annual tax payments as determined by the groups salary and the 5, 17, and 29 % tax brackets.

The resulting benefit-cost ratio can be interpreted as the number of monetary units of benefit for each unit of cost, with each monetary unit represented by one dollar. With this interpretation, the ratio will represent the number of dollars received as benefit for each dollar invested. If the ratio is greater than one, it implies that benefits outweigh costs and the Oklahoma *Career*Tech certificate is a desirable investment. Net benefits represent the return on investment to the Oklahoma taxpayers in more absolute terms, which in the current study are represented in total dollars received, beyond those dollars invested. If the net benefit dollar amount is more than zero, then the implication is that benefits outweigh costs and the Oklahoma *Career*Tech certificate is a desirable

investment. For the rate of return, this figure represents the rate by which the benefits can be discounted to equal zero. This figure is in direct relationship to the benefit-cost ratio as it represents the percentage of return, whereby the benefit-cost represents the ratio of return. A rate of return greater than zero indicates that benefits outweigh costs and the Oklahoma *Career*Tech certificate is a desirable investment.

Table 4-9 Estimated Net Benefits, Benefit-Cost Ratio and Rate of Return Comparison of Oklahoma *Career*Tech Completers and HS Diploma and/or Equivalent Students in Oklahoma, 1999

	Lifetime Tax Payments at 17%				Cost-Benefit Analysis			
	Years	HS Diploma and/or Equivalent	Oklahoma *Career*Tech Completer	Difference	Cost Per FTE	Net Benefits	Benefit-Cost Ratio	Rate of Return
Both Sexes	30	$119,687	$106,080	-$13,607	$11,430	-$25,037	-1.19	-2.19
21 to 24 years	41	$121,104	$130,478	$9,375	$11,430	-$2,055	0.82	-0.18
25 to 34 years	34	$125,212	$114,213	-$10,999	$11,430	-$22,429	-0.96	-1.96
35 to 44 years	24	$104,126	$84,864	-$19,262	$11,430	-$30,692	-1.69	-2.69
45 to 54 years	14	$61,254	$51,979	-$9,275	$11,430	-$20,705	-0.81	-1.81
55 to 64 years	4	$16,960	$15,883	-$1,076	$11,430	-$12,506	-0.09	-1.09
Male	29	$135,343	$112,798	-$22,545	$11,430	-$33,975	-1.97	-2.97
21 to 24 years	41	$133,998	$144,321	$10,323	$11,430	-$1,107	0.90	-0.10
25 to 34 years	34	$142,893	$126,235	-$16,658	$11,430	-$28,088	-1.46	-2.46
35 to 44 years	24	$123,526	$95,301	-$28,225	$11,430	-$39,655	-2.47	-3.47
45 to 54 years	14	$75,177	$55,592	-$19,585	$11,430	-$31,015	-1.71	-2.71
55 to 64 years	4	$20,612	$15,883	-$4,729	$11,430	-$16,159	-0.41	-1.41
Female	32	$104,584	$96,179	-$8,405	$11,430	-$19,835	-0.74	-1.74
21 to 24 years	41	$107,115	$123,662	$16,547	$11,430	$5,117	1.45	0.45
25 to 34 years	34	$99,688	$102,190	$2,503	$11,430	-$8,927	0.22	-0.78
35 to 44 years	24	$80,919	$76,378	-$4,541	$11,430	-$15,971	-0.40	-1.40
45 to 54 years	14	$49,216	$44,554	-$4,662	$11,430	-$16,092	-0.41	-1.41
55 to 64 years	4	$14,067	$10,608	-$3,459	$11,430	-$14,889	-0.30	-1.30

NOTE: Cost-Benefit Analysis data at the 5% and 29% tax rates are included in Appendix E

For the current study net benefits, benefit-cost ratio, and social rate of return estimates for FY 1999-2001 were calculated separately based upon age, gender and ethnicity at 5, 17, and 29 % tax rates as shown in Tables 4-9 through 4-12 and Appendix E. Table 4-9 includes the estimated net-benefits, benefit-cost ratio and rate of return

comparisons of Oklahoma CareerTech completers and high school diploma and/or equivalent students in Oklahoma for FY1999. The net benefits of the Oklahoma *Career*Tech completers of both sexes age 21 to 64 is -$25,037, with a benefit-cost ratio of -1.19 and a rate of return of -2.19. Net benefits of the male *Career*Tech completers age 21 to 64 is -$33,975, with a benefit-cost ratio of -1.97 and a rate of return of -2.97. Net benefits of the female *Career*Tech completers age 21 to 64 is -$19,835 with a benefit-cost ratio of -0.74 and a rate of return of -1.74. Differences in net benefits, benefit-cost ratio and rate of return estimates varied greatly depending upon age with 21–24 year old females having a net benefit of $5,117, a benefit-cost ratio of 1.45 and a rate of return of 0.45.

Table 4-10 includes the estimated net-benefits, benefit-cost ratio and rate of return comparisons of *Career*Tech completers and high school diploma and/or equivalent students nationally for FY1999. The net benefits of the Oklahoma *Career*Tech completers of both sexes, all races age 18 to 64 is -$45,239, with a benefit-cost ratio of -2.96 and a rate of return of -3.96. Net benefits of both sexes of Caucasian *Career*Tech completers age 18 to 64 is -$45,207, with a benefit-cost ratio of -2.96 and a rate of return of -3.96. Net benefits of both sexes of African-American *Career*Tech completers age 18 to 64 is -$35,849, with a benefit-cost ratio of -2.14 and a rate of return of -3.14. Net benefits of both sexes of Hispanic *Career*Tech completers age 18 to 64 is -$22,701, with a benefit-cost ratio of -0.99 and a rate of return of -1.99. Net benefits of male *Career*Tech completers of all races age 18 to 64 is -$55,850, with a benefit-cost ratio of -3.89 and a rate of return of -4.89. Net benefits of female *Career*Tech completers of all

races age 18 to 64 is -$27,910, with a benefit-cost ratio of -1.44 and a rate of return of -2.44.

Table 4-10 Estimated Net Benefits, Benefit-Cost Ratio and Rate of Return Comparison of Oklahoma *Career*Tech Completers and HS Diploma and/or Equivalent Students Nationally, 1999 (10% ADJ)

	Lifetime Tax Payments at 17%				Oklahoma CareerTech Completer			
	Years	HS Diploma and/or Equivalent	Oklahoma *Career*Tech Completer	Difference	Cost Per FTE	Net Benefits	Benefit-Cost Ratio	Rate of Return
Both Sexes, All Races 18 to 64 years	37	$148,287	$114,478	-$33,809	$11,430	-$45,239	-2.96	-3.96
25 to 34 years	35	$134,262	$117,572	-$16,690	$11,430	-$28,120	-1.46	-2.46
35 to 44 years	25	$108,192	$88,400	-$19,792	$11,430	-$31,222	-1.73	-2.73
45 to 54 years	15	$67,524	$55,692	-$11,832	$11,430	-$23,262	-1.04	-2.04
55 to 64 years	5	$21,761	$19,854	-$1,907	$11,430	-$13,337	-0.17	-1.17
Both Sexes, Caucasian 18 to 64 years	37	$151,526	$117,749	-$33,777	$11,430	-$45,207	-2.96	-3.96
Both Sexes, African Am. 18 to 64 years	36	$126,256	$101,837	-$24,419	$11,430	-$35,849	-2.14	-3.14
Both Sexes, Hispanic 18 to 64 years	39	$128,489	$117,218	-$11,271	$11,430	-$22,701	-0.99	-1.99
Male, All Races 18 to 64 years	37	$175,252	$130,832	-$44,420	$11,430	-$55,850	-3.89	-4.89
Caucasian	35	$168,974	$123,760	-$45,214	$11,430	-$56,644	-3.96	-4.96
African-Am.	35	$141,205	$105,196	-$36,009	$11,430	-$47,439	-3.15	-4.15
Hispanic	38	$134,911	$120,931	-$13,979	$11,430	-$25,409	-1.22	-2.22
Female, All Races 18 to 64 years	37	$121,145	$104,666	-$16,480	$11,430	-$27,910	-1.44	-2.44
Caucasian	37	$122,485	$104,666	-$17,820	$11,430	-$29,250	-1.56	-2.56
African-Am.	37	$114,950	$98,124	-$16,826	$11,430	-$28,256	-1.47	-2.47
Hispanic	40	$116,375	$112,302	-$4,073	$11,430	-$15,503	-0.36	-1.36

NOTE: Cost-Benefit Analysis data at the 5% and 29% tax rates are included in Appendix E

Table 4-11 includes the estimated net-benefits, benefit-cost ratio and rate of return comparisons of Oklahoma *Career*Tech completers and high school diploma and/or equivalent students nationally for FY2000. The net benefits of *Career*Tech completers of both sexes, all races age 18 to 64 is -$47,069, with a benefit-cost ratio of -2.89 and a rate of return of -3.89.

Table 4-11 Estimated Net Benefits, Benefit-Cost Ratio and Rate of Return Comparison of Oklahoma *Career*Tech Completers and HS Diploma and/or Equivalent Students Nationally, 2000 (10% ADJ)

	Lifetime Tax Payments at 17%				Oklahoma CareerTech Completer			
	Years	HS Diploma and/or Equivalent	Oklahoma *Career*Tech Completer	Difference	Cost Per FTE	Net Benefits	Benefit-Cost Ratio	Rate of Return
Both Sexes, All Races 18 to 64 years	37	152,702	117,749	-34,954	$12,115	-$47,069	-2.89	-3.89
25 to 34 years	35	139,480	120,666	-18,814	$12,115	-$30,929	-1.55	-2.55
35 to 44 years	25	114,950	88,400	-26,550	$12,115	-$38,665	-2.19	-3.19
45 to 54 years	15	69,824	54,366	-15,458	$12,115	-$27,573	-1.28	-2.28
55 to 64 years	5	22,494	19,448	-3,046	$12,115	-$15,161	-0.25	-1.25
Both Sexes, Caucasian 18 to 64 years	37	157,351	121,020	-36,331	$12,115	-$48,446	-3.00	-4.00
Both Sexes, African Am. 18 to 64 years	38	136,390	110,182	-26,208	$12,115	-$38,323	-2.16	-3.16
Both Sexes, Hispanic 18 to 64 years	41	140,550	123,230	-17,320	$12,115	-$29,435	-1.43	-2.43
Male, All Races 18 to 64 years	38	182,605	134,368	-48,237	$12,115	-$60,352	-3.98	-4.98
Caucasian	38	186,074	134,368	-51,706	$12,115	-$63,821	-4.27	-5.27
African-Am.	38	154,375	120,931	-33,443	$12,115	-$45,558	-2.76	-3.76
Hispanic	42	161,878	127,278	-34,600	$12,115	-$46,715	-2.86	-3.86
Female, All Races 18 to 64 years	36	123,667	108,202	-15,465	$12,115	-$27,580	-1.28	-2.28
Caucasian	36	127,302	114,566	-12,736	$12,115	-$24,851	-1.05	-2.05
African-Am.	38	119,982	107,494	-12,487	$12,115	-$24,602	-1.03	-2.03
Hispanic	39	118,902	110,323	-8,579	$12,115	-$20,694	-0.71	-1.71

NOTE: Cost-Benefit Analysis data at the 5% and 29% tax rates are included in Appendix E

Net benefits of both sexes of Caucasian *Career*Tech completers age 18 to 64 is -$48,446, with a benefit-cost ratio of -3.00 and a rate of return of -4.00. Net benefits of both sexes of African-American *Career*Tech completers age 18 to 64 is -$38,323, with a benefit-cost ratio of -2.16 and a rate of return of -3.16. Net benefits of both sexes of Hispanic *Career*Tech completers age 18 to 64 is -$29,435, with a benefit-cost ratio of -1.43 and a rate of return of -2.43. Net benefits of male *Career*Tech completers of all races age 18 to

64 is -$60,352, with a benefit-cost ratio of -3.98 and a rate of return of -4.98. Net benefits of female *Career*Tech completers of all races age 18 to 64 is -$27,580, with a benefit-cost ratio of -1.28 and a rate of return of -2.28.

Table 4-12 Estimated Net Benefits, Benefit-Cost Ratio and Rate of Return Comparison of Oklahoma *Career*Tech Completers and HS Diploma and/or Equivalent Students Nationally, 2001 (10% ADJ)

	Lifetime Tax Payments at 17%				Oklahoma CareerTech Completer			
	Years	HS Diploma and/or Equivalent	Oklahoma *Career*Tech Completer	Difference	Cost Per FTE	Net Benefits	Benefit-Cost Ratio	Rate of Return
Both Sexes, All Races 18 to 64 years	39	$162,979	$124,114	-$38,865	$13,789	-$52,654	-2.82	-3.82
25 to 34 years	35	$140,105	$123,760	-$16,345	$13,789	-$30,134	-1.19	-2.19
35 to 44 years	25	$115,286	$88,400	-$26,886	$13,789	-$40,675	-1.95	-2.95
45 to 54 years	15	$70,467	$53,040	-$17,427	$13,789	-$31,216	-1.26	-2.26
55 to 64 years	5	$23,244	$17,680	-$5,564	$13,789	-$19,353	-0.40	-1.40
Both Sexes, Caucasian 18 to 64 years	39	$169,191	$124,114	-$45,077	$13,789	-$58,866	-3.27	-4.27
Both Sexes, African Am. 18 to 64 years	38	$143,477	$117,572	-$25,905	$13,789	-$39,694	-1.88	-2.88
Both Sexes, Hispanic 18 to 64 years	41	$143,031	$130,478	-$12,553	$13,789	-$26,342	-0.91	-1.91
Male, All Races 18 to 64 years	40	$193,392	$139,740	-$53,652	$13,789	-$67,441	-3.89	-4.89
Caucasian	40	$196,806	$141,440	-$55,366	$13,789	-$69,155	-4.02	-5.02
African-Am.	37	$150,715	$117,749	-$32,966	$13,789	-$46,755	-2.39	-3.39
Hispanic	40	$154,496	$141,440	-$13,056	$13,789	-$26,845	-0.95	-1.95
Female, All Races 18 to 64 years	38	$134,252	$114,213	-$20,039	$13,789	-$33,828	-1.45	-2.45
Caucasian	37	$133,273	$111,207	-$22,065	$13,789	-$35,854	-1.60	-2.60
African-Am.	39	$130,425	$117,218	-$13,207	$13,789	-$26,996	-0.96	-1.96
Hispanic	42	$133,247	$111,384	-$21,863	$13,789	-$35,652	-1.59	-2.59

NOTE: Cost-Benefit Analysis data at the 5% and 29% tax rates are included in Appendix E

Table 4-12 includes the estimated net-benefits, benefit-cost ratio and rate of return comparisons of Oklahoma *Career*Tech completers and high school diploma and/or equivalent students nationally for FY2001. The net benefits of *Career*Tech completers of

both sexes, all races age 18 to 64 is -$52,654, with a benefit-cost ratio of -2.82 and a rate of return of -3.82. Net benefits of both sexes of Caucasian *Career*Tech completers age 18 to 64 is -$58,866, with a benefit-cost ratio of -3.27 and a rate of return of -4.27. Net benefits of both sexes of African-American *Career*Tech completers age 18 to 64 is -$39,694, with a benefit-cost ratio of -1.88 and a rate of return of -2.88. Net benefits of both sexes of Hispanic *Career*Tech completers age 18 to 64 is -$26,342, with a benefit-cost ratio of -0.91 and a rate of return of -1.91. Net benefits of male *Career*Tech completers of all races age 18 to 64 is -$67,441, with a benefit-cost ratio of -3.89 and a rate of return of -4.89. Net benefits of female *Career*Tech completers of all races age 18 to 64 is -$33,828, with a benefit-cost ratio of -1.45 and a rate of return of -2.45.

Demographic Wage Comparisons

Differences in wages among demographic groups based upon gender and ethnicity were analyzed utilizing a factoral ANOVA, including a post hoc Games and Howell (GH) multiple comparison procedure, with wages as the dependent variable and gender and ethnicity as the independent variables. Gender was a 2 level assigned variable either (male or female) while ethnicity was a 5 level (American Indian, African American, Hispanic, Caucasian, and Asian) assigned variable. The interaction effect between gender and ethnicity was also tested. The GH multiple comparison procedure was used because it is robust under unequal sample sizes and variance; the .05 alpha level was selected. Tables 4-13 through 4-21 show ANOVA summary tables, descriptive statistics and Games Howell post hoc comparison matrices for 1-year follow-up wages of Oklahoma *Career*Tech completers for FY1999, 2000, and 2001.

Tables 4-13, 4-14 and 4-15 present findings for the FY1999. The interaction between gender and race was not significant but all of the main effects *were* significant. Male *Career*Tech completers made a significantly higher wage than females. Caucasians made a significantly higher wage than American-Indians and African-Americans. Asians also made a significantly higher wage than African-Americans.

Table 4-13 Descriptive Statistics for One Year Follow-Up Wages of Oklahoma *Career*Tech Completers, 1999

	N	Mean Wage	Std Dev
Total	4619	$9.29	3.21
Male	2372	$9.95	3.28
Female	2247	$8.60	2.98
Am. Indian	532	$8.80	2.89
African Am.	301	$8.39	2.57
Hispanic	118	$8.79	2.62
Caucasian	3621	$9.45	3.29
Asian	47	$9.87	3.45

Table 4-14 ANOVA Summary Table for One Year Follow-Up Wages of Oklahoma *Career*Tech Completers, 1999

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	25745345.300	9	2860593.922	29.366	.000
Intercept	513460453.435	1	513460453.435	5270.986	.000
GENDER	2234091.013	1	2234091.013	22.934	*.000
RACE	3927671.814	4	981917.954	10.080	*.000
GENDER * RACE	655178.115	4	163794.529	1.681	.151
Error	448974717.818	4609	97412.610		
Total	4463347505.000	4619			
Corrected Total	474720063.119	4618			

*p < .05

Table 4-15 GH Post Hoc Comparison Matrix for Demographic Groups on Wages, 1999.

	Significance Level			
Ethnicity	African Am.	Hispanic	Caucasian	Asian
Am. Indian	ns	ns	*.000	ns
African Am.	- -	ns	*.000	*.049
Hispanic	ns	- -	ns	ns
Caucasian	*.000	ns	- -	ns
Asian	*.049	ns	ns	- -

*p<.05, ns = non-significant (p>.05)

Tables 4-16, 4-17 and 4-18 present findings for the FY2000 analysis. The interaction between gender and race was not significant but all of the main effects *were* significant. Male *Career*Tech completers made a significantly higher wage than females. Caucasians made a significantly higher wage than American-Indians, African-Americans and Hispanics. Asians also made a significantly higher wage than African-Americans.

Table 4-16 Descriptive Statistics for One Year Follow-Up Wages of Oklahoma *Career*Tech Completers, 2000

	N	Mean Wage	Std Dev
Total	4805	$9.89	4.17
Male	2256	$10.58	4.30
Female	2549	$9.29	3.94
Am. Indian	604	$8.96	3.36
African Am.	300	$8.74	2.86
Hispanic	158	$9.22	3.16
Caucasian	3680	$10.16	4.37
Asian	63	$10.60	4.08

Table 4- 17 ANOVA Summary Table for One Year Follow-Up Wages of Oklahoma *Career*Tech Completers, 2000

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	31025760.286	9	3447306.698	20.592	.000
Intercept	813632018.348	1	813632018.348	4860.141	.000
GENDER	8829053.180	4	2207263.295	13.185	*.000
RACE	1820943.249	1	1820943.249	10.877	*.001
GENDER * RACE	1106900.746	4	276725.187	1.653	.158
Error	802726878.727	4795	167409.151		
Total	5537367165.000	4805			
Corrected Total	833752639.013	4804			

*p < .05

Table 4-18 GH Post Hoc Comparison Matrix for Demographic Groups on Wages, 2000.

	Significance Level			
Ethnicity	African Am.	Hispanic	Caucasian	Asian
Am. Indian	ns	ns	*.000	ns
African Am.	- -	ns	*.000	*.009
Hispanic	ns	- -	*.004	ns
Caucasian	*.000	*.004	- -	ns
Asian	*.009	ns	ns	- -

*p<.05, ns = non-significant (p>.05)

Tables 4-19, 4-20 and 4-21 present findings for the FY2001 analysis. The interaction between gender and race was not significant but all of the main effects *were* significant. Male *Career*Tech completers made a significantly higher wage than females. Caucasians made a significantly higher wage than American-Indians and African-Americans.

Table 4-19 Descriptive Statistics for One Year Follow-Up Wages of Oklahoma *Career*Tech Completers, 2001

	N	Mean Wage	Std Dev
Total	4207	$10.15	4.61
Male	2037	$10.91	4.88
Female	2170	$9.43	4.22
Am. Indian	543	$9.41	4.76
African Am.	301	$9.59	3.83
Hispanic	150	$9.62	4.21
Caucasian	3157	$10.34	4.67
Asian	56	$10.74	3.37

Table 4-20 ANOVA Summary Table for One Year Follow-Up Wages of Oklahoma *Career*Tech Completers, 2001

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	27766094.893	9	3085121.655	14.945	.000
Intercept	767123763.410	1	767123763.410	3716.033	.000
GENDER	3498974.333	1	3498974.333	16.949	*.000
RACE	4201506.619	4	1050376.655	5.088	*.000
GENDER * RACE	620689.652	4	155172.413	.752	.557
Error	866412708.755	4197	206436.195		
Total	5226376650.000	4207			
Corrected Total	894178803.649	4206			

*p < .05

Table 4-21 GH Post Hoc Comparison Matrix for Demographic Groups on Wages, 2001.

	Significance Level			
Ethnicity	African Am.	Hispanic	Caucasian	Asian
Am. Indian	ns	ns	*.000	ns
African Am.	- -	ns	*.013	ns
Hispanic	ns	- -	ns	ns
Caucasian	*.013	ns	- -	ns
Asian	ns	ns	ns	- -

*p<.05, ns = non-significant (p>.05)

Conclusion

This chapter reported the results from a cost-benefit analysis of the Oklahoma *Career*Tech system. The Oklahoma *Career*Tech system was analyzed for FY1999, 2000 and 2001. In FY1999 4,619 *Career*Tech completers salary surveys were analyzed. In FY2000, 4,805 were analyzed, and in FY2001 4,207 were analyzed. Revenue and expenditure data for the same three years was analyzed with total costs totaling 398.591 million, 400.940 million, and 431.194 million respectively. Economic benefits were estimated by comparing lifetime tax payments between Oklahoma *Career*Tech system completers and high school graduates and/or equivalent students. From a national comparison perspective, benefits in FY1999, 2000, and 2001 were -$33,809, -$34,954, and -$38,865 respectively.

The results of the cost-benefit analysis report net benefit, benefit-cost ratios, and rate of return estimates for FY1999, 2000, and 2001. In FY1999 from a national perspective, the net benefit was -$45,239 with a benefit-cost ratio of -2.96 and a rate of return of -3.96. In FY2000 the net benefit was -$47,069 with a benefit-cost ratio of -2.89 and a rate of return of -3.89. In FY2001 the net benefit was -$52,654 with a benefit-cost ratio of -2.82 and a rate of return of -3.82.

Demographic wage comparisons were also completed, indicating a statistically significant difference in wages based upon gender with males earning more than woman for FY1999, 2000, and 2001. Differences in wages due to ethnicity were also significant with Caucasians earning more than American Indian and African-American, while Asians earning more than African-Americans in FY1999. In FY2000 Caucasians earned more than American Indians, African-Americans and Hispanics, while Asians earned more than African-Americans. For FY2001 Caucasians made more than American

Indians and African-Americans. For FY1999, 2000, and 2001 no significant interaction effects between gender and ethnicity were found.

Chapter 5: Conclusions and Discussion

The exciting and often frustrating fact about research is that it often brings up more questions and issues than it solves, and this study appears to be no different. The human capital theory describes how human beings invest in themselves by means of education, training, or other activities with the idea that these investments in turn raise their productivity and future income potential. This study attempted to explore the human capital theory through a cost-benefit analysis of the Oklahoma *Career*Tech system. In this chapter a summary of the results will be presented in relation to each of the four research questions of this study. A discussion of the results of the cost-benefit analysis and wage comparisons will follow. This chapter will conclude with the authors' recommendations for practice and future research.

Statement of the Problem

Educational policy-makers must allocate scarce resources among competing options. A major problem policy-makers face in this task is the lack of high quality quantitative research to assist in the process. The purpose of this study was to contribute to the existing educational literature by performing a cost-benefit analysis of the Oklahoma *Career*Tech system.

Review of Methodology

This research study was completed in two parts, the cost-benefit analysis and the descriptive comparison of wages earned by various demographic groups. The cost-benefit analysis involved the estimation of program costs, the identification and estimation of economic benefits, and the computation of the benefit-cost ratio, net benefit, and social (external) rate of return for the Oklahoma *Career*Tech system. The

wage comparisons involved performing a factoral Analysis of Variance (ANOVA) and post hoc multiple comparison procedure to test for differences in wages between demographic groups based upon gender and ethnicity.

The resulting benefit-cost ratio may be interpreted as the number of monetary units of benefit for each unit of cost, with each monetary unit represented by one dollar. With this interpretation, the ratio represents the number of dollars received as benefit for each dollar invested. If the ratio is greater than one, the implication is that benefits outweigh costs and that the Oklahoma *Career*Tech certificate is a desirable investment. Net benefits represent the return on investment to the Oklahoma taxpayers in more absolute terms, which in this study is represented by total dollars received, beyond those dollars invested. If the net benefit dollar amount is more than zero, then the implication is that benefits outweigh costs and the Oklahoma *Career*Tech certificate is a desirable investment. For the rate of return, this figure represents the rate by which the benefits can be discounted to equal zero. This figure is in direct relationship to the benefit-cost ratio as it represents the percentage of return, whereby the benefit-cost represents the ratio of return. For this study, a rate of return greater than zero would indicate that benefits outweigh costs and the Oklahoma *Career*Tech certificate is a desirable investment.

Conclusions

Due to the overwhelming impact of the chosen tax rate on the outcome of this study's cost-benefit analysis, a sensitivity analysis was completed utilizing a 5, 17, and 29% tax rate. For the sake of simplicity, results from only the 17% analysis were reported, and likewise, will only be summarized here. The 5 and 29% results are

included in Appendix C, D, and E. The results of this study will be summarized as they relate to each of the research questions of this study.

Research question one.

What is the net benefit, benefit-cost ratio, and social rate of return for the Oklahoma *Career*Tech system completers for fiscal years 1999, 2000, and 2001?

For FY1999, the net benefits of the Oklahoma *Career*Tech completers of both sexes when compared to high school diploma and/or equivalent students in Oklahoma, age 21 to 64 was -$25,037, with a benefit-cost ratio of -1.19 and a rate of return of -2.19. Net benefits of the male *Career*Tech completers age 21 to 64 was -$33,975, with a benefit-cost ratio of -1.97 and a rate of return of -2.97. Net benefits of the female *Career*Tech completers age 21 to 64 was -$19,835 with a benefit-cost ratio of -0.74 and a rate of return of -1.74. Differences in net benefits, benefit-cost ratio and rate of return estimates did vary greatly depending upon age with 21 –24 year old females having a net benefit of $5,117, a benefit-cost ratio of 1.45 and a rate of return of 0.45.

In FY1999, the net benefits of the Oklahoma *Career*Tech completers of both sexes, when compared to high school diploma and/or equivalent students nationally, of all races age 18 to 64 was -$45,239, with a benefit-cost ratio of -2.96 and a rate of return of -3.96. Net benefits of both sexes of Caucasian *Career*Tech completers age 18 to 64 was -$45,207, with a benefit-cost ratio of -2.96 and a rate of return of -3.96. Net benefits of both sexes of African-American *Career*Tech completers age 18 to 64 was -$35,849, with a benefit-cost ratio of -2.14 and a rate of return of -3.14. Net benefits of both sexes of Hispanic *Career*Tech completers age 18 to 64 was -$22,701, with a benefit-cost ratio of -0.99 and a rate of return of -1.99. Net benefits of male *Career*Tech completers of all races age 18 to 64 was -$55,850, with a benefit-cost ratio of -3.89 and a rate of return of

-4.89. Net benefits of female *Career*Tech completers of all races age 18 to 64 was -$27,910, with a benefit-cost ratio of -1.44 and a rate of return of -2.44.

In FY2000, the net benefits of *Career*Tech completers of both sexes, when compared to high school diploma and/or equivalent students nationally, of all races age 18 to 64 was -$47,069, with a benefit-cost ratio of -2.89 and a rate of return of -3.89. Net benefits of both sexes of Caucasian *Career*Tech completers age 18 to 64 was -$48,446, with a benefit-cost ratio of -3.00 and a rate of return of -4.00. Net benefits of both sexes of African-American *Career*Tech completers age 18 to 64 was -$38,323, with a benefit-cost ratio of -2.16 and a rate of return of -3.16. Net benefits of both sexes of Hispanic *Career*Tech completers age 18 to 64 was -$29,435, with a benefit-cost ratio of -1.43 and a rate of return of -2.43. Net benefits of male *Career*Tech completers of all races age 18 to 64 was -$60,352, with a benefit-cost ratio of -3.98 and a rate of return of -4.98. Net benefits of female *Career*Tech completers of all races age 18 to 64 was -$27,580, with a benefit-cost ratio of -1.28 and a rate of return of -2.28.

In FY2001, the net benefits of *Career*Tech completers of both sexes, when compared to high school diploma and/or equivalent students nationally, of all races age 18 to 64 was -$52,654, with a benefit-cost ratio of -2.82 and a rate of return of -3.82. Net benefits of both sexes of Caucasian *Career*Tech completers age 18 to 64 was -$58,866, with a benefit-cost ratio of -3.27 and a rate of return of -4.27. Net benefits of both sexes of African-American *Career*Tech completers age 18 to 64 was -$39,694, with a benefit-cost ratio of -1.88 and a rate of return of -2.88. Net benefits of both sexes of Hispanic *Career*Tech completers age 18 to 64 was -$26,342, with a benefit-cost ratio of -0.91 and a rate of return of -1.91. Net benefits of male *Career*Tech completers of all races age 18

to 64 was -$67,441, with a benefit-cost ratio of -3.89 and a rate of return of -4.89. Net benefits of female *Career*Tech completers of all races age 18 to 64 was -$33,828, with a benefit-cost ratio of -1.45 and a rate of return of -2.45.

Research question two.

> Were there statistically significant differences in wages between male and female completers of the Oklahoma *Career*Tech system for fiscal years 1999, 2000, and 2001?

Yes, for fiscal years 1999, 2000, and 2001, at an alpha level of .05, male *Career*Tech completers made a significantly higher wage than females. In FY1999 male *Career*Tech completers mean wage was $9.95 compared to $8.60 for females. In FY2000 male *Career*Tech completers mean wage was $10.58 compared to $9.29 for females. In FY2001 male *Career*Tech completers mean wage was $10.91 compared to $9.43 for females.

Research question three.

> Were there statistically significant differences in wages among American Indian, African American, Hispanic, Caucasian, and Asian completers of the Oklahoma *Career*Tech system for fiscal years 1999, 2000, and 2001?

Yes, at an alpha level of .05 there were significant ethnicity based differences in wages for Oklahoma *Career*Tech system completers for fiscal years 1999, 2000, and 2001. In FY1999, Caucasians made a significantly higher wage than American-Indians and African-Americans with mean wages of $9.45, $8.80, and $8.39 respectively, while Asians also made a significantly higher wage than African-Americans with a mean wage of $9.87. In FY2000, Caucasians made a significantly higher wage than American-Indians, African-Americans and Hispanics with mean wages of $10.16, $8.96, $8.74, and $9.22 respectively, while Asians also made a significantly higher wage than African-

Americans with a mean wage of $10.60. In FY2001, Caucasians also made a significantly higher wage than American-Indians and African-Americans with mean wages of $10.34, $9.41, and $9.59 respectively.

Although the Asian *Career*Tech completers mean wages for fiscal years 1999, 2000, and 2001 were $9.87, $10.60, and $10.74 respectively, their mean wages were not significantly higher than some other ethnic groups as would be expected. Likely this is due to the fact that the sample sizes of the Asian participants for those same three years were only 47, 63, and 56, representing approximately 1% of the total sample. With such small sample sizes, there was not enough power to detect all of the differences that were detected with the Caucasian completers, although the Caucasian mean wages for those three years were lower than the Asian completers.

Research question four.

> Were there statistically significant interaction effects between the variables of gender and ethnicity as compared by wages for fiscal years 1999, 2000, and 2001?

No, at an alpha level of .05 there were no significant interaction effects between the variables of gender and ethnicity as compared by wages for fiscal years 1999, 2000, and 2001. In FY1999 there were 256 American-Indian males with a mean wage of $9.72, 123 African-American males with a mean wage of $9.12, 66 Hispanic males with a mean wage of $8.89, 1894 Caucasian males with a mean wage of 10.06, and 33 Asian males with a mean wage of 10.28. For the same year, there were 276 American-Indian females with a mean wage of $7.93, 178 African-American females with a mean wage of $7.88, 52 Hispanic females with a mean wage of $8.65, 1727 Caucasian females with a mean wage of $8.78, and 14 Asian females with a mean wage of $8.90.

In FY2000 there were 239 American-Indian males with a mean wage of $10.05, 89 African-American males with a mean wage of $9.62, 77 Hispanic males with a mean wage of $9.73, 1815 Caucasian males with a mean wage of $10.74, and 36 Asian males with a mean wage of $10.32. For the same year, there were 365 American-Indian females with a mean wage of $8.24, 211 African-American females with a mean wage of $8.37, 81 Hispanic females with a mean wage of $8.73, 1865 Caucasian females with a mean wage of $9.59, and 27 Asian females with a mean wage of $10.96.

In FY2001 there were 238 American-Indian males with a mean wage of $10.23, 99 African-American males with a mean wage of $10.34, 73 Hispanic males with a mean wage of $10.88, 1590 Caucasian males with a mean wage of $11.05, and 37 Asian males with a mean wage of $10.83. For the same year, there were 305 American-Indian females with a mean wage of $8.78, 202 African-American females with a mean wage of $9.22, 77 Hispanic females with a mean wage of $8.42, 1567 Caucasian females with a mean wage of $9.62, and 19 Asian females with a mean wage of $10.54.

Discussion of Cost-Benefit Analysis Results

According to the human capital theory education and skills accumulate to individuals and become economic commodities in the workplace, subject to the laws of supply and demand, translating into higher earnings for those with higher levels and higher quality educations. From a social perspective these higher earnings often translate into higher tax payments, providing a return to a publicly supported system of education. The findings from this study do not appear to fully support the basic tenets of the human capital theory, indicating the Oklahoma *Career*Tech system may not be providing an education that is at a level and/or quality that is in high demand in today's workplace. In

addition to failing to provide higher earnings to individuals who complete *Career*Tech programs, returns to society for the massive financial investment in the *Career*Tech system also appear to be less than desirable.

Cost and benefit factors.

In the most basic sense, the cost-benefit analysis is an economic calculation, representing the relationship between economic benefits and costs. A closer examination of the specific costs and benefits found within this study could illuminate the issue of economic effectiveness within the Oklahoma *Career*Tech system. As evidenced in Table 4-4 the total costs for the Oklahoma *Career*Tech system for FY1999, 2000, and 2001 totaled $398.591 million, $400.940 million, and $431.194 million, respectively. The number of FTE students for FY1999, 2000, and 2001 were 34,873, 33,094, and 31,272, respectively. Thus, the total cost per FTE student was $11,430, $12,115, and $13,789, more than twice what is commonly reported for the Oklahoma K-12 system. One might legitimately inquire as to why the *Career*Tech system is so expensive.

It is commonly understood that career and technical education is relatively more expensive than other types of more academic types of education, predominately due to the increased equipment costs and specialized skills of the instructors. Perhaps this assumption does not completely explain the high costs of the Oklahoma *Career*Tech system. Other issues such as administrative overhead and employee salaries may point to unique characteristics within this particular system.

In determining administrative overhead, this study combined the state level expenditures with those of the local districts. In order to get a clearer picture of administrative overhead, it may be useful to separate the state level costs from the local

district level costs. State level costs were $149.397 million for FY1999, $152.298 million for FY2000 and $161.240 million for FY2001. These figures represent 37.48, 37.98, and 37.39% of total system costs. In real terms, this means that almost 38% of the total cost of the Oklahoma *Career*Tech system is comprised of state level administrative overhead. Another area of concern to expenses is the salaries of system employees at the local district level. As seen in Table 5-3, the average salaries of administrative staff were between $75,806 and $80,733, superintendents were between $100,417 and $105,463, professional staff were between $50,377 and $55,751, and instructional staff were between $43,442 and $47,819. To the extent that these figures are higher in comparison to comparable positions in the K-12 and/or higher education systems, the Oklahoma *Career*Tech system could be spending too much on salaries, inflating overall system costs.

Table 5-1 Average Salaries for District Level Oklahoma *Career*Tech System Employees

	Administrative Staff		Superintendents		Professional Staff		Instructional Staff	
	Number	*Average Salary*	*Number*	*Average Salary*	*Number*	*Average Salary*	*Number*	*Average Salary*
FY1999	47	$75,806	28	$100,417	534	$50,377	1112	$43,442
FY2000	50	$77,923	28	$101,612	519	$52,272	1048	$44593
FY2001	46	$80,733	28	$105,463	545	$55,751	1062	$47,819

(State of Oklahoma, 2002)

While it is apparent the Oklahoma *Career*Tech system is an expensive operation, the primary purpose of this study was not to examine how relatively expensive the system is, but rather to ascertain to the extent which these expenses were justified in relation to their economic benefits. The results of this cost-benefit analysis indicate that indeed, the *Career*Tech system does not appear to be a good economic investment. The larger issue beyond high system costs though may be the minimal economic benefits evidenced in the

wages of *Career*Tech completers. As seen in Tables 4-5 through 4-8, *Career*Tech completers salaries were from $2,668 and $5,862 less per year than high school diploma and/or equivalent students. There may be some serious issues with a career and technical educational system which costs in excess of $400 million dollars per year yet does not appear to show evidence of value added through an increase in the salaries of its completers.

Market-based factors.

The historical purpose of vocational education has been to prepare students for entry-level jobs in occupations requiring less than a baccalaureate degree. It appears the Oklahoma *Career*Tech system's mission is consistent with this mission of vocational education. This may be part of the reason why this study found a negative result from the cost-benefit analysis; over the last 15 years the purpose of vocational education has been shifting towards a broader preparation that develops academic skills as well as vocational and technical skills. This new preparation involves integrating academic and vocational education, emphasizing all aspects of an industry while incorporating academic performance measures. According to the NCES (2000) the traditional focus of vocational education is giving away to a broader purpose, one that includes a greater emphasis on academic preparation and provides a wider range of career choices. To the extent that the Oklahoma *Career*Tech system is failing to update their services to include more academic preparation and broader sets of skills, they may be preparing students which are not able to compete in a modern job market.

With all the rhetoric of changing times and missions aside, the Oklahoma *Career*Tech system may be offering a certificate that is just not as marketable as other

types of academic credentials. Research reported by the Oklahoma State Regents for Higher Education (1999), shows that through the year 2006, occupations that require bachelor's or associate degrees are projected to grow the fastest at 25.4% and 22.2% respectively. This research also projects bachelor and associate degrees to earn higher than average earnings.

Table 5-2 Educational Services Offered in the State of Oklahoma

Services	K-12	Higher Education	Oklahoma *Career*tech
1000, 2000 Level College credit	Yes, by Concurrent Enrollment	Yes	Yes, by Articulation Agreements
3000, 4000 Level College credit	No	Yes	No
Adult and Career Development	No	Yes	Yes
Distance education Learning Network	No	Yes	Yes
Industry Specific Training	No	Yes	Yes
Training for Industry (TIP)	No	Yes	Yes
Skills Centers	No	No	Yes
Secondary Career Development	Yes, Comprehensive Schools	No	Yes, Comprehensive Schools & Tech Centers

(Oklahoma Careertech, 2003)

Along with a seemingly outdated mission, it appears the Oklahoma *Career*Tech system may be suffering from an inability to compete within the educational marketplace as well. Within the State of Oklahoma there are three branches of public education: elementary and secondary (commonly known as K-12), career and technical (commonly known as *Career*Tech), and higher education. Within K-12, there are also separate tracks for college preparation, career-technical, and general education. As seen in Table 5-2, there is a tremendous amount of duplication, and thus, competition within the State of Oklahoma between the K-12 system, the *Career*Tech system, and the higher education

system. According to the enrollment figures for FY2002, of the 450,081 students enrolled in *Career*Tech programs, 99.6% could have been served by the K-12 or higher education systems. Even within the K-12 system there is competition for students between the college preparation, career-technical, and general education tracks. This competition for students is particularly significant because as the enrollment numbers increase up to full capacity within the *Career*Tech system, the cost per FTE decreases, with a proportional impact on the rate of return. To the extent the *Career*Tech system is able to compete for students, they will be more or less economically efficient.

Limitations.

This study suffered from several limitations and deliminations. The net benefits, benefit-cost ratio, and rate of return for the Oklahoma *Career*Tech system were estimated very conservatively. Due to a lack of available data, the only benefit variable utilized for this study was the economic benefit of increased tax payments through increased wages. There are a number of monetary and non-monetary benefits to education beyond wages. Unfortunately, this study did not allow for the collection of data to factor those benefits into the cost-benefit analysis, undoubtedly affecting the outcomes obtained.

A major delimitation of this study which may have also contributed to a conservative outcome involved the sampling and collection procedures of the salary surveys themselves. The data were collected for wages 1-year after completion of a *Career*Tech program, which may have been too soon to realize the full economic benefits of the *Career*Tech certificate. According to research, when follow-up surveys were done 12, 24, and 36 months upon completion of an educational program, it was usually closer to the 36th month before wages were more fully impacted. Because the Oklahoma

*Career*Tech system only gathers wage information at the 1-year point, they may be collecting too early and not able to fully see the impact of their programs in their completer's wages.

Relationship of the current study to previous research.

This study appears to have produced mixed results in relationship to previous cost-benefit analysis research. In general terms, most previous cost-benefit analysis have shown evidence for a positive internal and external return to education; a finding which seems to support the human capital theory. There is some evidence reported which indicates minimal returns, or even zero or declining returns to vocational education, particularly from the national data sets. The following discussion will explore how this study compares to previous research reported from international, federal, state and national level data.

This study did not produce results which are consistent with those from international rate of return studies. As seen in Table 2-3 of Appendix A, the World Bank (2004) shows a mean social return on academic/general education of 15.5% and 10.9% on technical/vocational education. The first explanation for this inconsistency could be a matter of how technical/vocational education is defined. From an international perspective, vocational and technical education is considered a specialized subject track, separate from the general academic track, yet it is unclear as to whether there are any separate credentials conferred for vocational and technical completers. For this reason, it is unclear whether the results from international vocational/technical studies can be directly compared with this study of a career and technical certificate.

Meta-analysis of cost-benefit studies of federally sponsored programs show evidence indicating that earnings increased by less than $2,000 a year for a typical trainee. Even though this does not seem like a large amount, at an average cost of about $6,600 per trainee, the training programs still show evidence of a positive rate of return (Greenberg, Michalopolous & Robins, 2003). Outcomes from Oklahoma *Career*Tech system were not consistent with Greenberg, Michalopolous & Robins from an earnings or cost perspective. Oklahoma *Career*Tech system completers did not show an increase in earnings over high school diploma and/or equivalent students, though it is unclear whether the studies used in the meta-analysis of federally funded programs had a separate comparison group or compared wages in a pre and post-training manner. This current study is also not consistent from a cost perspective as the federally funded programs average costs were approximately half the cost per trainee than the costs found in this study for the *Career*Tech system completers.

Results from Vanderheyden's (1994) study in North Carolina seem to give some credibility to a plausible explanation for the negative findings in this current study. In North Carolina data indicated earnings differences among those with varying credentials were minimal for those 21–24 and even for those 25–29. In the latter group, individuals with A.A.S. degrees earned more than those with baccalaureate degrees, probably because of the extra years spent working versus being in school. The expected patterns of increased earnings with higher credentials did begin to emerge in the 30-34 age group and continued to differentiate themselves up through those 40 and over. These results appear to indicate the problems of relying on earnings too soon after leaving postsecondary education, and of examining earnings without disentangling the effects of

experience, two problems which may have contributed to lower rates of return in this current study.

As reported in Table 2-4, utilizing national 1990 SIPP data, Grubb (1995a) found evidence for positive yet insignificant effects for men and significantly positive effects for women for the completion of a vocational certificate. Based upon the NLS72 data for the high school class of 1972, Grubb (1995b) found negative returns for men and women for the vocational certificate for annual earnings in 1985 and positive yet insignificant results for men and women for wages in 1986. With the same NLS72 data Hollenbeck (1993) found a negative effect for men and an insignificantly positive effect for women on wages. Utilizing NALS data Rivera-Batiz (1998) found negative effects for men and positive yet insignificant effects for women for wages and earnings. Surette (1997) utilized the NLS-Youth data for men 18-30 and found a significant effect for hours of vocational training, though it is unclear what type of credential was conferred if any. The results from these five studies of the effects of vocational certificates show three to have negative effects, two with positive yet insignificant effects, while only one indicated significant effects for men, and one for women. With these mixed results, the negative results from this current study do not appear to be inconsistent and may be further evidence of the possible decreasing value of a vocational certificate.

Discussion of Wage Comparison Results

According to the 2000 U. S. Census, the median yearly earnings of year-round male workers in 1999 were $38,000 while female workers median earnings were $28,000. For the same year, American Indian workers median earnings were $30,000, African-American workers median earnings were $28,000, Caucasian workers median

earnings were $35,000, Hispanic workers median earnings were $24,000 and Asian workers median earnings were $36,000. Earnings by the Oklahoma *Career*Tech completers appear to be somewhat consistent with these figures with the most notable difference coming from the higher than expected earnings of the Hispanic *Career*Tech completers.

It appears that although the female *Career*Tech completers are only averaging 83.6% of the male completers earnings, they seem to fair better than the national average where women are only averaging 73.6% of males earnings. Consistent with national data the Asian *Career*Tech completers had the highest of the average median earnings with $9.67, while the Caucasian completers were second highest as well with $9.08. The *Career*Tech completer's only divergence from the national data is with the Hispanic completers who averaged higher median earnings than the American Indian and African-American completers with an average median wage of $8.50 versus $8.35 and $8.32, respectively. There does not appear to be a clear explanation for why female and Hispanic *Career*Tech completers fair better than expected based off of current national trends, though further research in this area may be helpful in assisting these minority groups in improving their wages in general, as well as improving the overall efficiency of the Oklahoma *Career*Tech system in specific.

Recommendations

The resplendent and yet frustrating thing about research is that it can often lead to the need for more research as the sweater of knowledge continues to unravel. Research can also point to possible changes in policy and/or practice, or at least give some indications of where to proceed next. In this author's opinion, this study could have

some implications on the practice of providing career and technical education, as well as point to areas of further research and refinement.

Recommendations for practice.

Considering this study was a cost-benefit analysis of the Oklahoma *Career*Tech system, any implications for practice would undoubtedly involve the costs and benefits associated with career and technical education. From a cost perspective, it appears the *Career*Tech system is just too expensive, with costs per FTE well over $13,000; reductions in overall costs would go far to improving the effectiveness of the system as a whole. When cost cutting measures are explored, the 38% administrative overhead at the state level of government may be a good place to start.

This current study also appears to indicate a lack of demand within the marketplace for the programs currently offered by the *Career*Tech system. The evidence from this study actually suggests that students who only go through High School are more marketable, giving rise to serious curriculum questions within the *Career*Tech system. It appears something needs to be done in order to provide an added value to the students of the *Career*Tech system that puts them at an advantage in the increasingly competitive workplace of tomorrow.

Recommendations for further research.

The obvious starting point for further research would be to design studies which would alleviate or even eliminate the limitations of this study. Particularly, collecting wage information beyond one year of completion of *Career*Tech programs, and including other variables which provide additional monetary and non-monetary benefits. A second area of potential research includes an exploration of a possible connection between the

*Career*Tech System and economic development. According to the *Career*Tech system they are a key resource for Oklahoma's economic recovery, yet the State of Oklahoma ranks 6th out of the 7 states in their region in per capita income and 42nd out of all 50 states in median income (Oklahoma Department of Libraries, 2001). The third area of further research would explore in greater detail the gender and ethnicity differences in wages of vocational and technical students. Although this study did not find positive social returns for any of the gender or ethnic groups, the female and Hispanic students appeared to fair better than expected. The final area of research this study signals is one of a policy nature, particularly the continued support of a three part system of educational delivery in Oklahoma where resources are split and competition exists between common education, higher education, and career and technical education. Other states have decided to update their educational systems of delivery by consolidating them into common education and higher education systems only; maybe it is time to research the possibility of a similar consolidation within the State of Oklahoma.

Conclusion

This study completed a narrowly focused economic study by performing a cost-benefit analysis and comparison of wages across demographic groups within career/technical institutes by analyzing the Oklahoma *Career*Tech system. This study began by providing an in depth exploration of cost-benefit analysis and rate of return methods within education. Educational rate of return literature was then reviewed within the areas of: international studies, federally funded program studies, national studies, and state specific studies.

The Oklahoma *Career*Tech system was then analyzed for FY1999, 2000 and 2001. In FY1999, 4,619 *Career*Tech completers salary surveys were analyzed. In FY2000, 4,805 were analyzed, and in FY2001 4,207 were analyzed. Revenue and expenditure data for the same three years was analyzed with total costs totaling $398.591 million, $400.940 million, and $431.194 million respectively. Economic benefits were estimated by comparing lifetime tax payments between *Career*Tech system completers and high school graduates and/or equivalent students. From a national comparison perspective, benefits in FY1999, 2000, and 2001 were -$33,809, -$34,954, and -$38,865 respectively.

The results of the cost-benefit analysis reported net benefit, benefit-cost ratios, and rate of return estimates for FY1999, 2000, and 2001. In FY1999, from a national perspective, the net benefit was -$45,239 with a benefit-cost ratio of -2.96 and a rate of return of -3.96. In FY2000 the net benefit was -$47,069 with a benefit-cost ratio of -2.89 and a rate of return of -3.89. In FY2001 the net benefit was -$52,654 with a benefit-cost ratio of -2.82 and a rate of return of -3.82.

Demographic wage comparisons were also completed, indicating a statistically significant difference in wages based upon gender with males earning more than woman for FY1999, 2000, and 2001. Differences in wages due to ethnicity were also significant with Caucasians earning more than American Indian and African-American, while Asians earned more than African-Americans in FY1999. In FY2000 Caucasians earned more than American Indians, African-Americans and Hispanics, while Asians earned more than African-Americans. For FY2001 Caucasians made more than American

Indians and African-Americans. For FY1999, 2000, and 2001 no significant interaction effects between gender and ethnicity were found.

This study ended with conclusions to the research questions, a discussion of the cost-benefit analysis results, a discussion of the wage comparison results, and recommendations for future practice and further research. It appears that in spite of the inherent limitations to this study, the results are very remarkable and should warrant consideration by all of those who have a stake in public career and technical education in general, and those with a stake in public education in the State of Oklahoma in particular. With a price tag in excess of over 400 million dollars per year, almost 38% state level administrative overhead, a cost per FTE student in excess of $13,000, and questionable benefits for those who complete; there are many questions this study raises about the Oklahoma *Career*Tech system.

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Appendix A

International Rate of Return Estimates in Education

Table A1 Returns to Investment in Education by Level, Full Method, Latest Year

		Social			Private			
Country	Year	Prim.	Sec.	Higher	Prim.	Sec.	Higher	Source
Mean		18.9	13.1	10.8	26.6	17.0	19.0	
Mean (OECD)		9.4	9.2	9.0	11.4	10.9	12.5	OECD Countries denoted with *
Argentina	1989	8.4	7.1	7.6	10.1	14.2	14.9	Psacharopoulos (1994)
Australia*	1976	..	..	16.3	..	8.1	21.1	Psacharopoulos (1994)
Austria*	1981	..	..	..	..	11.3	4.2	Psacharopoulos (1994)
Bahamas	1970	..	20.6	..	..	26.1	..	Psacharopoulos (1994)
Belgium*	1960	..	17.1	6.7	..	21.2	8.7	Psacharopoulos (1994)
Bolivia	1990	13.0	6.0	13.0	20.0	6.0	19.0	Psacharopoulos *et al*. (1997)
Botswana	1983	42.0	41.0	15.0	99.0	76.0	38.0	Psacharopoulos (1994)
Brazil	1989	35.6	5.1	21.4	36.6	5.1	28.2	Psacharopoulos (1994)
Burkina Faso	1982	20.1	14.9	21.3	..	..	..	Psacharopoulos (1994)
Canada*	1994	..	..	..	..	7.8	13.0	Cohn (1997)
Chile	1989	8.1	11.1	14.0	9.7	12.9	20.7	Psacharopoulos (1994)
China	1993	14.4	12.9	11.3	18.0	13.4	15.1	Hossain (1997)
Colombia	1989	20.0	11.4	14.0	27.7	14.7	21.7	Psacharopoulos (1994)
Costa Rica	1989	11.2	14.4	9.0	12.2	17.6	12.9	Psacharopoulos (1994)
Cyprus	1979	7.7	6.8	7.6	15.4	7.0	5.6	Psacharopoulos (1994)
Denmark*	1964	..	..	7.8	..	..	10.0	Psacharopoulos (1994)
Dominican Republic	1989	..	..	..	85.1	15.1	19.4	Psacharopoulos (1994)
Ecuador	1987	14.7	12.7	9.9	17.1	17.2	12.7	Psacharopoulos (1994)
El Salvador	1990	16.4	13.3	8.0	18.9	14.5	9.5	Psacharopoulos (1994)
Estonia	1995	14.0	2.2	10.3	..	..	..	Noorkoiv *et al*. (1998)
Ethiopia	1996	14.9	14.4	11.9	24.7	24.2	26.6	World Bank (1998)
France*	1976	..	..	..	..	14.8	20.0	Psacharopoulos (1994)
Germany (West) *	1978	..	..	..	..	6.5	10.5	Psacharopoulos (1994)
Ghana	1967	18.0	13.0	16.5	24.5	17.0	37.0	Psacharopoulos (1994)
Greece*	1993	..	6.5	5.7	..	8.3	8.1	Magoula and Psacharopoulos (1999)
Guatemala	1989	..	..	..	33.8	17.9	22.2	Psacharopoulos (1994)
Honduras	1989	18.2	19.7	18.9	20.8	23.3	25.9	Psacharopoulos (1994)
Hong Kong	1976	..	15.0	12.4	..	18.5	25.2	Psacharopoulos (1994)
Hungary*	1993	..	6.0	2.6	..	8.2	13.4	Varga (1995)
India	1995	..	..	..	2.6	17.6	18.2	Kingdon (1998)
Indonesia	1989	..	11.0	5.0	..	..	..	Psacharopoulos (1994)
Iran	1976	15.2	17.6	13.6	..	21.2	18.5	Psacharopoulos (1994)
Israel	1958	16.5	6.9	6.6	27.0	6.9	8.0	Psacharopoulos (1994)
Italy*	1969	..	..	..	..	17.3	18.3	Psacharopoulos (1994)
Ivory Coast	1984	..	..	..	25.7	30.7	25.1	Psacharopoulos (1994)
Jamaica	1989	17.7	7.9	..	20.4	15.7	..	Psacharopoulos (1994)
Japan*	1976	9.6	8.6	6.9	13.4	10.4	8.8	Psacharopoulos (1994)
Kenya	1980	..	10.0	..	..	16.0	..	Psacharopoulos (1994)
Korea*	1986	..	8.8	15.5	..	10.1	17.9	Psacharopoulos (1994)

Lesotho	1980	10.7	18.6	10.2	15.5	26.7	36.5	Psacharopoulos (1994)
Liberia	1983	41.0	17.0	8.0	99.0	30.5	17.0	Psacharopoulos (1994)
Malawi	1982	14.7	15.2	11.5	15.7	16.8	46.6	Psacharopoulos (1994)
Malaysia	1978	..	..	..	..	32.6	34.5	Psacharopoulos (1994)
Mexico*	1992	11.8	14.6	11.1	18.9	20.1	15.7	Cohn and Addison (1998)
Morocco	1970	50.5	10.0	13.0	..	..	..	Psacharopoulos (1994)
Nepal	1999	15.7	8.1	9.1	16.6	8.5	12.0	Parajuli (1999)
Netherlands*	1965	..	5.2	5.5	..	8.5	10.4	Psacharopoulos (1994)
New Zealand*	1991	..	12.4	9.5	..	13.8	11.9	Maani (1996)
Nicaragua	1996	13.6	10.4	14.7	..	..	..	Belli and Ayadi (1998)
Nigeria	1966	23.0	12.8	17.0	30.0	14.0	34.0	Psacharopoulos (1994)
Norway*	1966	..	7.2	7.5	..	7.4	7.7	Psacharopoulos (1994)
Pakistan	1991	..	..	..	8.4	13.7	31.2	Katsis *et al*. (1999)
Panama	1989	..	..	..	5.7	21.0	21.0	Psacharopoulos (1994)
Papua New Guinea	1986	12.8	19.4	8.4	37.2	41.6	23.0	Psacharopoulos (1994)
Paraguay	1990	20.3	12.7	10.8	23.7	14.6	13.7	Psacharopoulos (1994)
Peru	1990	..	..	..	13.2	6.6	40.0	Psacharopoulos (1994)
Philippines	1988	13.3	8.9	10.5	18.3	10.5	11.6	Psacharopoulos (1994)
Puerto Rico	1959	24	3	15.5	68.2	52.1	29.0	Psacharopoulos (1994)
Senegal	1985	23.0	8.9	..	33.7	21.3	..	Psacharopoulos (1994)
Sierra Leone	1971	20.0	22.0	9.5	..	..	..	Psacharopoulos (1994)
Singapore	1998	16.7	10.1	13.9	22.2	12.9	18.7	Sakellariou (2001)
Somalia	1983	20.6	10.4	19.9	59.9	13.0	33.2	Psacharopoulos (1994)
South Africa	1980	22.1	17.7	11.8	..	..	..	Psacharopoulos (1994)
Spain*	1991	7.4	8.5	13.5	..	..	..	Lassibille and Navarro (1998)
Sri Lanka	1981	..	..	..	..	12.6	16.1	Psacharopoulos (1994)
Sudan	1974	..	8.0	4.0	..	13.0	15.0	Psacharopoulos (1994)
Sweden*	1967	..	10.5	9.2	..	..	10.3	Psacharopoulos (1994)
Taiwan	1972	27.0	12.3	17.7	50.0	12.7	15.8	Psacharopoulos (1994)
Tanzania	1991	..	..	..	7.9	8.8		Mason and Khandker (1997)
Thailand	1989	..	..	..	16.0	12.9	11.8	Schultz (1994)
The Gambia	1997	33.5	12.1	..	37.1	12.7	..	EdInvest (1999)
Turkey*	1987	..	..	8.5	1.9	8.6	16.2	Tansel (1994)
Uganda	1965	66.0	28.6	12.0	..	..	..	Psacharopoulos (1994)
United Kingdom*	1986	8.6	7.5	6.5	..	..	..	Cohn and Addison (1998)
United States*	1987	..	10.0	12.0	..	..	..	Psacharopoulos (1994)
Uruguay	1989	21.6	8.1	10.3	27.8	10.3	12.8	Psacharopoulos (1994)
Venezuela	1989	23.4	10.2	6.2	36.3	14.6	11.0	Psacharopoulos (1994)
Vietnam	1992	13.5	4.5	6.2	10.8	3.8	3.0	Moock *et al*. (1998)
Yemen	1985	2.0	26.0	24.0	10.0	41.0	56.0	Psacharopoulos (1994)
Yugoslavia	1986	3.3	2.3	3.1	14.6	3.1	5.3	Psacharopoulos (1994)
Zambia	1983	..	..	5.7	..	..	19.2	Psacharopoulos (1994)
Zimbabwe	1987	11.2	47.6	-4.3	16.6	48.5	5.1	Psacharopoulos (1994)

(World Bank, 2004, Table)

Table A2 Returns to Secondary Education by Curriculum Type

		Academic/ General		Technical/Vocational		
Country	Year	Social	Private	Social	Private	Source
Mean		15.5	10.6	10.9	11.5	
Argentina	1989	..	12.3	..	11.0	Psacharopoulos (1993)
Bolivia	1989	..	6.6	..	10.4	Psacharopoulos (1993)
Botswana	1986	35.0	..	25.0	..	Psacharopoulos (1993)
Brazil	1980	..	12.0	..	10.0	Psacharopoulos (1993)
Cameroon	1985	..	..	6.9	9.9	Psacharopoulos (1993)
Canada	1980	9.5	..	2.0	..	Psacharopoulos (1993)
Chile	1989	..	9.4		13.1	Psacharopoulos (1993)
Colombia	1981	9.1	..	10.0	..	Psacharopoulos (1993)
Costa Rica	1989	..	11.8	..	12.3	Psacharopoulos (1993)
Cote d'Ivoire	1985	..	..	3.9	15.8	Psacharopoulos (1993)
Cyprus	1975	10.5	..	7.4	..	Psacharopoulos (1993)
Cyprus	1979	6.8	..	5.5	..	Psacharopoulos (1993)
Dominican Rep.	1989	..	10.8	..	10.3	Psacharopoulos (1993)
France	1970	10.1	..	7.6	..	Psacharopoulos (1993)
France	1977	8.1	..	5.4	11.0	Psacharopoulos (1993)
Honduras	1989	..	19.8	..	28.1	Psacharopoulos (1993)
Indonesia	1978	32.0	..	18.0	..	Psacharopoulos (1993)
Indonesia	1982	23.0	..	19.0	..	Psacharopoulos (1993)
Indonesia	1986	19.0	..	6.0	..	Psacharopoulos (1993)
Indonesia	1986	12.0	..	14.0	..	Psacharopoulos (1993)
Indonesia	1986	11.0	..	9.0	..	Psacharopoulos (1993)
Liberia	1983	20.0	..	14.0	..	Psacharopoulos (1993)
Mexico	1984	..	12.4	..	12.3	Psacharopoulos (1993)
Panama	1989	..	15.0	..	9.9	Psacharopoulos (1993)
Peru	1985	..	6.0	..	5.9	Psacharopoulos (1993)
Peru	1990	..	4.0	..	6.4	Psacharopoulos (1993)
Taiwan	1970	26.0	..	27.4	..	Psacharopoulos (1993)
Tanzania	1982	6.3	..	3.7	..	Psacharopoulos (1993)
Togo	1985	..	..	4.0	6.3	Psacharopoulos (1993)
Uruguay	1989	..	8.2	..	10.2	Psacharopoulos (1993)
Venezuela	1975	14.3	..	17.6	..	Psacharopoulos (1993)
Venezuela	1984	10.5	..	12.0	..	Psacharopoulos (1993)
Venezuela	1989	..	8.9	..	13.1	Psacharopoulos (1993)
Vietnam	1992	..	3.3	..	2.1	Moock, Patrinos & Venkatavaman (1998)

(World Bank, 2004, Table 5)

Appendix B

University of Oklahoma Institutional Review Board Approval Letter

The University of Oklahoma

OFFICE OF HUMAN RESEARCH PARTICIPANT PROTECTION

May 10, 2004

Mr. Jeff Baenziger
OU-Tulsa, Organizational Leadership
4502 E. 41st St
Tulsa, OK. 74135

Dear Mr. Baenziger:

Your research application, "Career /Technical Institutes: A Cost-Benefit Analysis of the Oklahoma Careertech System," has been reviewed according to the policies of the Institutional Review Board and found to be exempt from the requirements for full board review. Your project is approved under the regulations of the University of Oklahoma - Norman campus Policies and Procedures for the Protection of Human Subjects in Research Activities.

Should you wish to deviate from the described protocol, you must notify this office, in writing, noting any changes or revisions in the protocol and/or informed consent document, and obtain prior approval. Changes may include but are not limited to adding data collection sites, adding or removing investigators, revising the research protocol, and changing the subject selection criteria. A copy of the approved informed consent document(s) is attached for your use.

Should you have any questions, please contact me at 325-8110 or irb@ou.edu.

Cordially,

E. Laurette Taylor, Ph.D.
Chair
Institutional Review Board – Norman Campus (FWA #00003191)

FY2004-354

cc: Dr. Jeffrey Maiden, Educational Leadership & Policy Studies

Appendix C

Cost Tables

Table C1 Oklahoma *Career*Tech Revenues and Expenditures, 5% Tax Rate

Amounts Expressed In Thousands	FY 1999	FY 2000	FY 2001
Salaries	$141,195	$147,275	$158,920
Employee Benefits	$36,385	$37,958	$42,943
Operation, Repair & Maintenance	$27,066	$19,131	$26,482
Supplies	$29,623	$32,260	$36,953
Property, Furniture & Equipment	$43,377	$40,132	$35,421
Travel	$3,804	$3,858	$4,255
Other-District Level	$36,913	$37,988	$40,166
State Level Professional Services	$1,390	$965	$570
State Level Administrative Expenses	$3,368	$3,358	$3,236
State Level Payments to Local Governments	$120,628	$123,527	$131,406
Other State Level Disbursements	$1,195	$919	$1,447
SUBTOTALS	$22,350	$21,394	$23,589
Tuition, Fees, Licenses, Permits, Sales and Services	$7,060	$7,364	$7,946
Taxes paid by system Employees	$415,534	$418,613	$450,264
TOTAL COSTS	$22,350	$21,394	$23,589
# FTE Students	34,873	33,094	31,272
Cost Per FTE	$11,916	$12,649	$14,398

Table C2 Oklahoma *Career*Tech Revenues and Expenditures, 29% Tax Rate

Amounts Expressed In Thousands	FY 1999	FY 2000	FY 2001
Salaries	$141,195	$147,275	$158,920
Employee Benefits	$36,385	$37,958	$42,943
Operation, Repair & Maintenance	$27,066	$19,131	$26,482
Supplies	$29,623	$32,260	$36,953
Property, Furniture & Equipment	$43,377	$40,132	$35,421
Travel	$3,804	$3,858	$4,255
Other-District Level	$36,913	$37,988	$40,166
State Level Professional Services	$1,390	$965	$570
State Level Administrative Expenses	$3,368	$3,358	$3,236
State Level Payments to Local Governments	$120,628	$123,527	$131,406
Other State Level Disbursements	$1,195	$919	$1,447
SUBTOTALS	$444,944	$447,371	$481,799
Tuition, Fees, Licenses, Permits, Sales and Services	$22,350	$21,394	$23,589
Taxes paid by system Employees	$40,947	$42,710	$46,087
TOTAL COSTS	$381,647	$383,267	$412,123
# FTE Students	34,873	33,094	31,272
Cost Per FTE	$10,944	$11,581	$13,179

Appendix D

Economic Benefit Tables

Table D1 Estimated Lifetime Tax Payments Comparisons of Oklahoma *Career*Tech Completers and HS Diploma and/or Equivalent Students in Oklahoma at the 5% Tax Rate, 1999

	Wage Comparisons				Lifetime Tax Payments at 5%		
	HS Diploma and/or Equivalent	Oklahoma *Career*Tech Completer	Difference	Number of Years	HS Diploma and/or Equivalent	Oklahoma *Career*Tech Completer	Difference
Both Sexes	$23,468	$20,800	-$2,668	30	$35,202	$31,200	-$4,002
21 to 24 years	$17,375	$18,720	$1,345	41	$35,619	$38,376	$2,757
25 to 34 years	$21,663	$19,760	-$1,903	34	$36,827	$33,592	-$3,235
35 to 44 years	$25,521	$20,800	-$4,721	24	$30,625	$24,960	-$5,665
45 to 54 years	$25,737	$21,840	-$3,897	14	$18,016	$15,288	-$2,728
55 to 64 years	$24,941	$23,358	-$1,583	4	$4,988	$4,672	-$317
Male	$27,453	$22,880	-$4,573	29	$39,807	$33,176	-$6,631
21 to 24 years	$19,225	$20,706	$1,481	41	$39,411	$42,447	$3,036
25 to 34 years	$24,722	$21,840	-$2,882	34	$42,027	$37,128	-$4,899
35 to 44 years	$30,276	$23,358	-$6,918	24	$36,331	$28,030	-$8,302
45 to 54 years	$31,587	$23,358	-$8,229	14	$22,111	$16,351	-$5,760
55 to 64 years	$30,312	$23,358	-$6,954	4	$6,062	$4,672	-$1,391
Female	$19,225	$17,680	-$1,545	32	$30,760	$28,288	-$2,472
21 to 24 years	$15,368	$17,742	$2,374	41	$31,504	$36,371	$4,867
25 to 34 years	$17,247	$17,680	$433	34	$29,320	$30,056	$736
35 to 44 years	$19,833	$18,720	-$1,113	24	$23,800	$22,464	-$1,336
45 to 54 years	$20,679	$18,720	-$1,959	14	$14,475	$13,104	-$1,371
55 to 64 years	$20,687	$15,600	-$5,087	4	$4,137	$3,120	-$1,017

Table D2 Estimated Lifetime Tax Payments Comparisons of Oklahoma *Career*Tech Completers and HS Diploma and/or Equivalent Students in Oklahoma at the 29% Tax Rate, 1999

	Wage Comparisons			Lifetime Tax Payments at 29%			
	HS Diploma and/or Equivalent	Oklahoma *Career*Tech Completer	Difference	Number of Years	HS Diploma and/or Equivalent	Oklahoma *Career*Tech Completer	Difference
Both Sexes	$23,468	$20,800	-$2,668	30	$204,172	$180,960	-$23,212
21 to 24 years	$17,375	$18,720	$1,345	41	$206,589	$222,581	$15,992
25 to 34 years	$21,663	$19,760	-$1,903	34	$213,597	$194,834	-$18,764
35 to 44 years	$25,521	$20,800	-$4,721	24	$177,626	$144,768	-$32,858
45 to 54 years	$25,737	$21,840	-$3,897	14	$104,492	$88,670	-$15,822
55 to 64 years	$24,941	$23,358	-$1,583	4	$28,932	$27,095	-$1,836
Male	$27,453	$22,880	-$4,573	29	$230,880	$192,421	-$38,459
21 to 24 years	$19,225	$20,706	$1,481	41	$228,585	$246,194	$17,609
25 to 34 years	$24,722	$21,840	-$2,882	34	$243,759	$215,342	-$28,417
35 to 44 years	$30,276	$23,358	-$6,918	24	$210,721	$162,572	-$48,149
45 to 54 years	$31,587	$23,358	-$8,229	14	$128,243	$94,833	-$33,410
55 to 64 years	$30,312	$23,358	-$6,954	4	$35,162	$27,095	-$8,067
Female	$19,225	$17,680	-$1,545	32	$178,408	$164,070	-$14,338
21 to 24 years	$15,368	$17,742	$2,374	41	$182,726	$210,952	$28,227
25 to 34 years	$17,247	$17,680	$433	34	$170,055	$174,325	$4,269
35 to 44 years	$19,833	$18,720	-$1,113	24	$138,038	$130,291	-$7,746
45 to 54 years	$20,679	$18,720	-$1,959	14	$83,957	$76,003	-$7,954
55 to 64 years	$20,687	$15,600	-$5,087	4	$23,997	$18,096	-$5,901

Table D3 Estimated Lifetime Tax Payments Comparison of Oklahoma *Career*Tech Completers and HS Diploma and/or Equivalent Students Nationally at the 5% Tax Rate, 1999 (10% Adjustment)

	Wage Comparisons			Lifetime Tax Payments at 5%			
	HS Diploma and/or Equivalent	Oklahoma *Career*Tech Completer	Difference	Number of Years	HS Diploma and/or Equivalent	Oklahoma *Career*Tech Completer	Difference
Both Sexes, All Races 18 to 64 years	$23,575	$18,200	-$5,375	37	$43,614	$33,670	-$9,944
25 to 34 years	$22,565	$19,760	-$2,805	35	$39,489	$34,580	-$4,909
35 to 44 years	$25,457	$20,800	-$4,657	25	$31,821	$26,000	-$5,821
45 to 54 years	$26,480	$21,840	-$4,640	15	$19,860	$16,380	-$3,480
55 to 64 years	$25,601	$23,358	-$2,243	5	$6,400	$5,840	-$561
Both Sexes, Caucasian 18 to 64 years	$24,090	$18,720	-$5,370	37	$44,567	$34,632	-$9,935
Both Sexes, African Am. 18 to 64 years	$20,630	$16,640	-$3,990	36	$37,134	$29,952	-$7,182
Both Sexes, Hispanic 18 to 64 years	$19,380	$17,680	-$1,700	39	$37,791	$34,476	-$3,315
Male, All Races 18 to 64 years	$27,862	$20,800	-$7,062	37	$51,545	$38,480	-$13,065
Caucasian	$28,399	$20,800	-$7,599	35	$49,698	$36,400	-$13,298
African-Am.	$23,732	$17,680	-$6,052	35	$41,531	$30,940	-$10,591
Hispanic	$20,884	$18,720	-$2,164	38	$39,680	$35,568	-$4,112
Female, All Races 18 to 64 years	$19,260	$16,640	-$2,620	37	$35,631	$30,784	-$4,847
Caucasian	$19,473	$16,640	-$2,833	37	$36,025	$30,784	-$5,241
African-Am.	$18,275	$15,600	-$2,675	37	$33,809	$28,860	-$4,949
Hispanic	$17,114	$16,515	-$599	40	$34,228	$33,030	-$1,198

Table D3 Estimated Lifetime Tax Payments Comparison of Oklahoma *Career*Tech Completers and HS Diploma and/or Equivalent Students Nationally at the 29% Tax Rate, 1999 (10% Adjustment)

	Wage Comparisons			Lifetime Tax Payments at 29%			
	HS Diploma and/or Equivalent	Oklahoma *Career*Tech Completer	Difference	Number of Years	HS Diploma and/or Equivalent	Oklahoma *Career*Tech Completer	Difference
Both Sexes, All Races 18 to 64 years	$23,575	$18,200	-$5,375	37	$252,960	$195,286	-$57,674
25 to 34 years	$22,565	$19,760	-$2,805	35	$229,035	$200,564	-$28,471
35 to 44 years	$25,457	$20,800	-$4,657	25	$184,563	$150,800	-$33,763
45 to 54 years	$26,480	$21,840	-$4,640	15	$115,188	$95,004	-$20,184
55 to 64 years	$25,601	$23,358	-$2,243	5	$37,121	$33,869	-$3,252
Both Sexes, Caucasian 18 to 64 years	$24,090	$18,720	-$5,370	37	$258,486	$200,866	-$57,620
Both Sexes, African Am. 18 to 64 years	$20,630	$16,640	-$3,990	36	$215,377	$173,722	-$41,656
Both Sexes, Hispanic 18 to 64 years	$19,380	$17,680	-$1,700	39	$219,188	$199,961	-$19,227
Male, All Races 18 to 64 years	$27,862	$20,800	-$7,062	37	$298,959	$223,184	-$75,775
Caucasian	$28,399	$20,800	-$7,599	35	$288,250	$211,120	-$77,130
African-Am.	$23,732	$17,680	-$6,052	35	$240,880	$179,452	-$61,428
Hispanic	$20,884	$18,720	-$2,164	38	$230,142	$206,294	-$23,847
Female, All Races 18 to 64 years	$19,260	$16,640	-$2,620	37	$206,660	$178,547	-$28,113
Caucasian	$19,473	$16,640	-$2,833	37	$208,945	$178,547	-$30,398
African-Am.	$18,275	$15,600	-$2,675	37	$196,091	$167,388	-$28,703
Hispanic	$17,114	$16,515	-$599	40	$198,522	$191,574	-$6,948

Table D5 Estimated Lifetime Tax Payments Comparison of Oklahoma *Career*Tech Completers and HS Diploma and/or Equivalent Students Nationally at the 5% Tax Rate, 2000 (10% Adjustment)

	Wage Comparisons				Lifetime Tax Payments at 5%		
	HS Diploma and/or Equivalent	Oklahoma *Career*Tech Completer	Difference	Number of Years	HS Diploma and/or Equivalent	Oklahoma *Career*Tech Completer	Difference
Both Sexes, All Races 18 to 64 years	$24,277	$18,720	-$5,557	37	$44,912	$34,632	-$10,280
25 to 34 years	$23,442	$20,280	-$3,162	35	$41,024	$35,490	-$5,534
35 to 44 years	$27,047	$20,800	-$6,247	25	$33,809	$26,000	-$7,809
45 to 54 years	$27,382	$21,320	-$6,062	15	$20,537	$15,990	-$4,547
55 to 64 years	$26,463	$22,880	-$3,583	5	$6,616	$5,720	-$896
Both Sexes, Caucasian 18 to 64 years	$25,016	$19,240	-$5,776	37	$46,280	$35,594	-$10,686
Both Sexes, African Am. 18 to 64 years	$21,113	$17,056	-$4,057	38	$40,115	$32,406	-$7,708
Both Sexes, Hispanic 18 to 64 years	$20,165	$17,680	-$2,485	41	$41,338	$36,244	-$5,094
Male, All Races 18 to 64 years	$28,267	$20,800	-$7,467	38	$53,707	$39,520	-$14,187
Caucasian	$28,804	$20,800	-$8,004	38	$54,728	$39,520	-$15,208
African-Am.	$23,897	$18,720	-$5,177	38	$45,404	$35,568	-$9,836
Hispanic	$22,672	$17,826	-$4,846	42	$47,611	$37,435	-$10,177
Female, All Races 18 to 64 years	$20,207	$17,680	-$2,527	36	$36,373	$31,824	-$4,549
Caucasian	$20,801	$18,720	-$2,081	36	$37,442	$33,696	-$3,746
African-Am.	$18,573	$16,640	-$1,933	38	$35,289	$31,616	-$3,673
Hispanic	$17,934	$16,640	-$1,294	39	$34,971	$32,448	-$2,523

Table D6 Estimated Lifetime Tax Payments Comparison of Oklahoma *Career*Tech Completers and HS Diploma and/or Equivalent Students Nationally at the 29% Tax Rate, 2000 (10% Adjustment)

	Wage Comparisons				Lifetime Tax Payments at 29%		
	HS Diploma and/or Equivalent	Oklahoma *Career*Tech Completer	Difference	Number of Years	HS Diploma and/or Equivalent	Oklahoma *Career*Tech Completer	Difference
Both Sexes, All Races 18 to 64 years	$24,277	$18,720	-$5,557	37	$260,492	$200,866	-$59,627
25 to 34 years	$23,442	$20,280	-$3,162	35	$237,936	$205,842	-$32,094
35 to 44 years	$27,047	$20,800	-$6,247	25	$196,091	$150,800	-$45,291
45 to 54 years	$27,382	$21,320	-$6,062	15	$119,112	$92,742	-$26,370
55 to 64 years	$26,463	$22,880	-$3,583	5	$38,371	$33,176	-$5,195
Both Sexes, Caucasian 18 to 64 years	$25,016	$19,240	-$5,776	37	$268,422	$206,445	-$61,976
Both Sexes, African Am. 18 to 64 years	$21,113	$17,056	-$4,057	38	$232,665	$187,957	-$44,708
Both Sexes, Hispanic 18 to 64 years	$20,165	$17,680	-$2,485	41	$239,762	$210,215	-$29,547
Male, All Races 18 to 64 years	$28,267	$20,800	-$7,467	38	$311,502	$229,216	-$82,286
Caucasian	$28,804	$20,800	-$8,004	38	$317,420	$229,216	-$88,204
African-Am.	$23,897	$18,720	-$5,177	38	$263,345	$206,294	-$57,051
Hispanic	$22,672	$17,826	-$4,846	42	$276,145	$217,121	-$59,024
Female, All Races 18 to 64 years	$20,207	$17,680	-$2,527	36	$210,961	$184,579	-$26,382
Caucasian	$20,801	$18,720	-$2,081	36	$217,162	$195,437	-$21,726
African-Am.	$18,573	$16,640	-$1,933	38	$204,674	$183,373	-$21,302
Hispanic	$17,934	$16,640	-$1,294	39	$202,834	$188,198	-$14,635

Table D7 Estimated Tax Payments Comparison of Oklahoma *Career*Tech Completers and HS Diploma and/or Equivalent Students Nationally at the 5% Tax Rate, 2001 (10% Adjustment)

	Wage Comparisons				Lifetime Tax Payments at 5%		
	HS Diploma and/or Equivalent	Oklahoma *Career*Tech Completer	Difference	Number of Years	HS Diploma and/or Equivalent	Oklahoma *Career*Tech Completer	Difference
Both Sexes, All Races 18 to 64 years	$24,582	$18,720	-$5,862	39	$47,935	$36,504	-$11,431
25 to 34 years	$23,547	$20,800	-$2,747	35	$41,207	$36,400	-$4,807
35 to 44 years	$27,126	$20,800	-$6,326	25	$33,908	$26,000	-$7,908
45 to 54 years	$27,634	$20,800	-$6,834	15	$20,726	$15,600	-$5,126
55 to 64 years	$27,346	$20,800	-$6,546	5	$6,837	$5,200	-$1,637
Both Sexes, Caucasian 18 to 64 years	$25,519	$18,720	-$6,799	39	$49,762	$36,504	-$13,258
Both Sexes, African Am. 18 to 64 years	$22,210	$18,200	-$4,010	38	$42,199	$34,580	-$7,619
Both Sexes, Hispanic 18 to 64 years	$20,521	$18,720	-$1,801	41	$42,068	$38,376	-$3,692
Male, All Races 18 to 64 years	$28,440	$20,550	-$7,890	40	$56,880	$41,100	-$15,780
Caucasian	$28,942	$20,800	-$8,142	40	$57,884	$41,600	-$16,284
African-Am.	$23,961	$18,720	-$5,241	37	$44,328	$34,632	-$9,696
Hispanic	$22,720	$20,800	-$1,920	40	$45,440	$41,600	-$3,840
Female, All Races 18 to 64 years	$20,782	$17,680	-$3,102	38	$39,486	$33,592	-$5,894
Caucasian	$21,188	$17,680	-$3,508	37	$39,198	$32,708	-$6,490
African-Am.	$19,672	$17,680	-$1,992	39	$38,360	$34,476	-$3,884
Hispanic	$18,662	$15,600	-$3,062	42	$39,190	$32,760	-$6,430

Table D8 Estimated Tax Payments Comparison of Oklahoma *Career*Tech Completers and HS Diploma and/or Equivalent Students Nationally at the 29% Tax Rate, 2001 (10% Adjustment)

	Wage Comparisons				Lifetime Tax Payments at 29%		
	HS Diploma and/or Equivalent	Oklahoma *Career*Tech Completer	Difference	Number of Years	HS Diploma and/or Equivalent	Oklahoma *Career*Tech Completer	Difference
Both Sexes, All Races 18 to 64 years	$24,582	$18,720	-$5,862	39	$278,022	$211,723	-$66,299
25 to 34 years	$23,547	$20,800	-$2,747	35	$239,002	$211,120	-$27,882
35 to 44 years	$27,126	$20,800	-$6,326	25	$196,664	$150,800	-$45,864
45 to 54 years	$27,634	$20,800	-$6,834	15	$120,208	$90,480	-$29,728
55 to 64 years	$27,346	$20,800	-$6,546	5	$39,652	$30,160	-$9,492
Both Sexes, Caucasian 18 to 64 years	$25,519	$18,720	-$6,799	39	$288,620	$211,723	-$76,897
Both Sexes, African Am. 18 to 64 years	$22,210	$18,200	-$4,010	38	$244,754	$200,564	-$44,190
Both Sexes, Hispanic 18 to 64 years	$20,521	$18,720	-$1,801	41	$243,995	$222,581	-$21,414
Male, All Races 18 to 64 years	$28,440	$20,550	-$7,890	40	$329,904	$238,380	-$91,524
Caucasian	$28,942	$20,800	-$8,142	40	$335,727	$241,280	-$94,447
African-Am.	$23,961	$18,720	-$5,241	37	$257,102	$200,866	-$56,236
Hispanic	$22,720	$20,800	-$1,920	40	$263,552	$241,280	-$22,272
Female, All Races 18 to 64 years	$20,782	$17,680	-$3,102	38	$229,018	$194,834	-$34,184
Caucasian	$21,188	$17,680	-$3,508	37	$227,347	$189,706	-$37,641
African-Am.	$19,672	$17,680	-$1,992	39	$222,490	$199,961	-$22,530
Hispanic	$18,662	$15,600	-$3,062	42	$227,303	$190,008	-$37,295

Appendix E

Cost-Benefit Analysis Tables

Table E1 Estimated Net Benefits, Benefit-Cost Ratio and Rate of Return Comparison of Oklahoma *Career*Tech Completers and HS Diploma and/or Equivalent Students in Oklahoma, 1999

	Lifetime Tax Payments at 5%				Cost-Benefit Analysis			
	Years	HS Diploma and/or Equivalent	Oklahoma *Career*Tech Completer	Difference	Cost Per FTE	Net Benefits	Benefit-Cost Ratio	Rate of Return
Both Sexes	30	$35,202	$31,200	-$4,002	$11,916	-$15,918	-0.34	-1.34
21 to 24 years	41	$35,619	$38,376	$2,757	$11,916	-$9,159	0.23	-0.77
25 to 34 years	34	$36,827	$33,592	-$3,235	$11,916	-$15,151	-0.27	-1.27
35 to 44 years	24	$30,625	$24,960	-$5,665	$11,916	-$17,581	-0.48	-1.48
45 to 54 years	14	$18,016	$15,288	-$2,728	$11,916	-$14,644	-0.23	-1.23
55 to 64 years	4	$4,988	$4,672	-$317	$11,916	-$12,233	-0.03	-1.03
Male	29	$39,807	$33,176	-$6,631	$11,916	-$18,547	-0.56	-1.56
21 to 24 years	41	$39,411	$42,447	$3,036	$11,916	-$8,880	0.25	-0.75
25 to 34 years	34	$42,027	$37,128	-$4,899	$11,916	-$16,815	-0.41	-1.41
35 to 44 years	24	$36,331	$28,030	-$8,302	$11,916	-$20,218	-0.70	-1.70
45 to 54 years	14	$22,111	$16,351	-$5,760	$11,916	-$17,676	-0.48	-1.48
55 to 64 years	4	$6,062	$4,672	-$1,391	$11,916	-$13,307	-0.12	-1.12
Female	32	$30,760	$28,288	-$2,472	$11,916	-$14,388	-0.21	-1.21
21 to 24 years	41	$31,504	$36,371	$4,867	$11,916	-$7,049	0.41	-0.59
25 to 34 years	34	$29,320	$30,056	$736	$11,916	-$11,180	0.06	-0.94
35 to 44 years	24	$23,800	$22,464	-$1,336	$11,916	-$13,252	-0.11	-1.11
45 to 54 years	14	$14,475	$13,104	-$1,371	$11,916	-$13,287	-0.12	-1.12
55 to 64 years	4	$4,137	$3,120	-$1,017	$11,916	-$12,933	-0.09	-1.09

Table E2 Estimated Net Benefits, Benefit-Cost Ratio and Rate of Return Comparison of Oklahoma *Career*Tech Completers and HS Diploma and/or Equivalent Students in Oklahoma, 1999

	Lifetime Tax Payments at 29%				Cost-Benefit Analysis			
	Years	HS Diploma and/or Equivalent	Oklahoma *Career*Tech Completer	Difference	Cost Per FTE	Net Benefits	Benefit-Cost Ratio	Rate of Return
Both Sexes	30	$204,172	$180,960	-$23,212	$10,944	-$34,156	-2.12	-3.12
21 to 24 years	41	$206,589	$222,581	$15,992	$10,944	$5,048	1.46	0.46
25 to 34 years	34	$213,597	$194,834	-$18,764	$10,944	-$29,708	-1.71	-2.71
35 to 44 years	24	$177,626	$144,768	-$32,858	$10,944	-$43,802	-3.00	-4.00
45 to 54 years	14	$104,492	$88,670	-$15,822	$10,944	-$26,766	-1.45	-2.45
55 to 64 years	4	$28,932	$27,095	-$1,836	$10,944	-$12,780	-0.17	-1.17
Male	29	$230,880	$192,421	-$38,459	$10,944	-$49,403	-3.51	-4.51
21 to 24 years	41	$228,585	$246,194	$17,609	$10,944	$6,665	1.61	0.61
25 to 34 years	34	$243,759	$215,342	-$28,417	$10,944	-$39,361	-2.60	-3.60
35 to 44 years	24	$210,721	$162,572	-$48,149	$10,944	-$59,093	-4.40	-5.40
45 to 54 years	14	$128,243	$94,833	-$33,410	$10,944	-$44,354	-3.05	-4.05
55 to 64 years	4	$35,162	$27,095	-$8,067	$10,944	-$19,011	-0.74	-1.74
Female	32	$178,408	$164,070	-$14,338	$10,944	-$25,282	-1.31	-2.31
21 to 24 years	41	$182,726	$210,952	$28,227	$10,944	$17,283	2.58	1.58
25 to 34 years	34	$170,055	$174,325	$4,269	$10,944	-$6,675	0.39	-0.61
35 to 44 years	24	$138,038	$130,291	-$7,746	$10,944	-$18,690	-0.71	-1.71
45 to 54 years	14	$83,957	$76,003	-$7,954	$10,944	-$18,898	-0.73	-1.73
55 to 64 years	4	$23,997	$18,096	-$5,901	$10,944	-$16,845	-0.54	-1.54

Table E3 Estimated Net Benefits, Benefit-Cost Ratio and Rate of Return Comparison of Oklahoma *Career*Tech Completers and HS Diploma and/or Equivalent Students Nationally, 1999 (10% Adjustment)

	Lifetime Tax Payments at 5%				Oklahoma CareerTech Completer			
	Years	HS Diploma and/or Equivalent	Oklahoma *Career*Tech Completer	Difference	Cost Per FTE	Net Benefits	Benefit-Cost Ratio	Rate of Return
Both Sexes, All Races 18 to 64 years	37	$43,614	$33,670	-$9,944	$11,916	-$21,860	-0.83	-1.83
25 to 34 years	35	$39,489	$34,580	-$4,909	$11,916	-$16,825	-0.41	-1.41
35 to 44 years	25	$31,821	$26,000	-$5,821	$11,916	-$17,737	-0.49	-1.49
45 to 54 years	15	$19,860	$16,380	-$3,480	$11,916	-$15,396	-0.29	-1.29
55 to 64 years	5	$6,400	$5,840	-$561	$11,916	-$12,477	-0.05	-1.05
Both Sexes, Caucasian 18 to 64 years	37	$44,567	$34,632	-$9,935	$11,916	-$21,851	-0.83	-1.83
Both Sexes, African Am. 18 to 64 years	36	$37,134	$29,952	-$7,182	$11,916	-$19,098	-0.60	-1.60
Both Sexes, Hispanic 18 to 64 years	39	$37,791	$34,476	-$3,315	$11,916	-$15,231	-0.28	-1.28
Male, All Races 18 to 64 years	37	$51,545	$38,480	-$13,065	$11,916	-$24,981	-1.10	-2.10
Caucasian	35	$49,698	$36,400	-$13,298	$11,916	-$25,214	-1.12	-2.12
African-Am.	35	$41,531	$30,940	-$10,591	$11,916	-$22,507	-0.89	-1.89
Hispanic	38	$39,680	$35,568	-$4,112	$11,916	-$16,028	-0.35	-1.35
Female, All Races 18 to 64 years	37	$35,631	$30,784	-$4,847	$11,916	-$16,763	-0.41	-1.41
Caucasian	37	$36,025	$30,784	-$5,241	$11,916	-$17,157	-0.44	-1.44
African-Am.	37	$33,809	$28,860	-$4,949	$11,916	-$16,865	-0.42	-1.42
Hispanic	40	$34,228	$33,030	-$1,198	$11,916	-$13,114	-0.10	-1.10

Table E4 Estimated Net Benefits, Benefit-Cost Ratio and Rate of Return Comparison of Oklahoma *Career*Tech Completers and HS Diploma and/or Equivalent Students Nationally, 1999 (10% Adjustment)

	Lifetime Tax Payments at 29%				Oklahoma CareerTech Completer			
	Years	HS Diploma and/or Equivalent	Oklahoma *Career*Tech Completer	Difference	Cost Per FTE	Net Benefits	Benefit-Cost Ratio	Rate of Return
Both Sexes, All Races 18 to 64 years	37	$252,960	$195,286	-$57,674	$10,944	-$68,618	-5.27	-6.27
25 to 34 years	35	$229,035	$200,564	-$28,471	$10,944	-$39,415	-2.60	-3.60
35 to 44 years	25	$184,563	$150,800	-$33,763	$10,944	-$44,707	-3.09	-4.09
45 to 54 years	15	$115,188	$95,004	-$20,184	$10,944	-$31,128	-1.84	-2.84
55 to 64 years	5	$37,121	$33,869	-$3,252	$10,944	-$14,196	-0.30	-1.30
Both Sexes, Caucasian 18 to 64 years	37	$258,486	$200,866	-$57,620	$10,944	-$68,564	-5.26	-6.26
Both Sexes, African Am. 18 to 64 years	36	$215,377	$173,722	-$41,656	$10,944	-$52,600	-3.81	-4.81
Both Sexes, Hispanic 18 to 64 years	39	$219,188	$199,961	-$19,227	$10,944	-$30,171	-1.76	-2.76
Male, All Races 18 to 64 years	37	$298,959	$223,184	-$75,775	$10,944	-$86,719	-6.92	-7.92
Caucasian	35	$288,250	$211,120	-$77,130	$10,944	-$88,074	-7.05	-8.05
African-Am.	35	$240,880	$179,452	-$61,428	$10,944	-$72,372	-5.61	-6.61
Hispanic	38	$230,142	$206,294	-$23,847	$10,944	-$34,791	-2.18	-3.18
Female, All Races 18 to 64 years	37	$206,660	$178,547	-$28,113	$10,944	-$39,057	-2.57	-3.57
Caucasian	37	$208,945	$178,547	-$30,398	$10,944	-$41,342	-2.78	-3.78
African-Am.	37	$196,091	$167,388	-$28,703	$10,944	-$39,647	-2.62	-3.62
Hispanic	40	$198,522	$191,574	-$6,948	$10,944	-$17,892	-0.63	-1.63

Table E5 Estimated Net Benefits, Benefit-Cost Ratio and Rate of Return Comparison of Oklahoma *Career*Tech Completers and HS Diploma and/or Equivalent Students Nationally, 2000 (10% Adjustment)

	Lifetime Tax Payments at 5%				Oklahoma CareerTech Completer			
	Years	HS Diploma and/or Equivalent	Oklahoma *Career*Tech Completer	Difference	Cost Per FTE	Net Benefits	Benefit-Cost Ratio	Rate of Return
Both Sexes, All Races 18 to 64 years	37	$44,912	$34,632	-$10,280	$12,649	-$22,929	-0.81	-1.81
25 to 34 years	35	$41,024	$35,490	-$5,534	$12,649	-$18,183	-0.44	-1.44
35 to 44 years	25	$33,809	$26,000	-$7,809	$12,649	-$20,458	-0.62	-1.62
45 to 54 years	15	$20,537	$15,990	-$4,547	$12,649	-$17,196	-0.36	-1.36
55 to 64 years	5	$6,616	$5,720	-$896	$12,649	-$13,545	-0.07	-1.07
Both Sexes, Caucasian 18 to 64 years	37	$46,280	$35,594	-$10,686	$12,649	-$23,335	-0.84	-1.84
Both Sexes, African Am. 18 to 64 years	38	$40,115	$32,406	-$7,708	$12,649	-$20,357	-0.61	-1.61
Both Sexes, Hispanic 18 to 64 years	41	$41,338	$36,244	-$5,094	$12,649	-$17,743	-0.40	-1.40
Male, All Races 18 to 64 years	38	$53,707	$39,520	-$14,187	$12,649	-$26,836	-1.12	-2.12
Caucasian	38	$54,728	$39,520	-$15,208	$12,649	-$27,857	-1.20	-2.20
African-Am.	38	$45,404	$35,568	-$9,836	$12,649	-$22,485	-0.78	-1.78
Hispanic	42	$47,611	$37,435	-$10,177	$12,649	-$22,826	-0.80	-1.80
Female, All Races 18 to 64 years	36	$36,373	$31,824	-$4,549	$12,649	-$17,198	-0.36	-1.36
Caucasian	36	$37,442	$33,696	-$3,746	$12,649	-$16,395	-0.30	-1.30
African-Am.	38	$35,289	$31,616	-$3,673	$12,649	-$16,322	-0.29	-1.29
Hispanic	39	$34,971	$32,448	-$2,523	$12,649	-$15,172	-0.20	-1.20

Table E6 Estimated Net Benefits, Benefit-Cost Ratio and Rate of Return Comparison of Oklahoma *Career*Tech Completers and HS Diploma and/or Equivalent Students Nationally, 2000 (10% Adjustment)

	Lifetime Tax Payments at 29%				Oklahoma CareerTech Completer			
	Years	HS Diploma and/or Equivalent	Oklahoma *Career*Tech Completer	Difference	Cost Per FTE	Net Benefits	Benefit-Cost Ratio	Rate of Return
Both Sexes, All Races 18 to 64 years	37	$260,492	$200,866	-$59,627	$11,581	-$71,208	-5.15	-6.15
25 to 34 years	35	$237,936	$205,842	-$32,094	$11,581	-$43,675	-2.77	-3.77
35 to 44 years	25	$196,091	$150,800	-$45,291	$11,581	-$56,872	-3.91	-4.91
45 to 54 years	15	$119,112	$92,742	-$26,370	$11,581	-$37,951	-2.28	-3.28
55 to 64 years	5	$38,371	$33,176	-$5,195	$11,581	-$16,776	-0.45	-1.45
Both Sexes, Caucasian 18 to 64 years	37	$268,422	$206,445	-$61,976	$11,581	-$73,557	-5.35	-6.35
Both Sexes, African Am. 18 to 64 years	38	$232,665	$187,957	-$44,708	$11,581	-$56,289	-3.86	-4.86
Both Sexes, Hispanic 18 to 64 years	41	$239,762	$210,215	-$29,547	$11,581	-$41,128	-2.55	-3.55
Male, All Races 18 to 64 years	38	$311,502	$229,216	-$82,286	$11,581	-$93,867	-7.11	-8.11
Caucasian	38	$317,420	$229,216	-$88,204	$11,581	-$99,785	-7.62	-8.62
African-Am.	38	$263,345	$206,294	-$57,051	$11,581	-$68,632	-4.93	-5.93
Hispanic	42	$276,145	$217,121	-$59,024	$11,581	-$70,605	-5.10	-6.10
Female, All Races 18 to 64 years	36	$210,961	$184,579	-$26,382	$11,581	-$37,963	-2.28	-3.28
Caucasian	36	$217,162	$195,437	-$21,726	$11,581	-$33,307	-1.88	-2.88
African-Am.	38	$204,674	$183,373	-$21,302	$11,581	-$32,883	-1.84	-2.84
Hispanic	39	$202,834	$188,198	-$14,635	$11,581	-$26,216	-1.26	-2.26

Table E7 Estimated Net Benefits, Benefit-Cost Ratio and Rate of Return Comparison of Oklahoma *Career*Tech Completers and HS Diploma and/or Equivalent Students Nationally, 2001 (10% Adjustment)

	Lifetime Tax Payments at 5%				Oklahoma CareerTech Completer			
	Years	HS Diploma and/or Equivalent	Oklahoma *Career*Tech Completer	Difference	Cost Per FTE	Net Benefits	Benefit-Cost Ratio	Rate of Return
Both Sexes, All Races 18 to 64 years	39	$47,935	$36,504	-$11,431	$14,398	-$25,829	-0.79	-1.79
25 to 34 years	35	$41,207	$36,400	-$4,807	$14,398	-$19,205	-0.33	-1.33
35 to 44 years	25	$33,908	$26,000	-$7,908	$14,398	-$22,306	-0.55	-1.55
45 to 54 years	15	$20,726	$15,600	-$5,126	$14,398	-$19,524	-0.36	-1.36
55 to 64 years	5	$6,837	$5,200	-$1,637	$14,398	-$16,035	-0.11	-1.11
Both Sexes, Caucasian 18 to 64 years	39	$49,762	$36,504	-$13,258	$14,398	-$27,656	-0.92	-1.92
Both Sexes, African Am. 18 to 64 years	38	$42,199	$34,580	-$7,619	$14,398	-$22,017	-0.53	-1.53
Both Sexes, Hispanic 18 to 64 years	41	$42,068	$38,376	-$3,692	$14,398	-$18,090	-0.26	-1.26
Male, All Races 18 to 64 years	40	$56,880	$41,100	-$15,780	$14,398	-$30,178	-1.10	-2.10
Caucasian	40	$57,884	$41,600	-$16,284	$14,398	-$30,682	-1.13	-2.13
African-Am.	37	$44,328	$34,632	-$9,696	$14,398	-$24,094	-0.67	-1.67
Hispanic	40	$45,440	$41,600	-$3,840	$14,398	-$18,238	-0.27	-1.27
Female, All Races 18 to 64 years	38	$39,486	$33,592	-$5,894	$14,398	-$20,292	-0.41	-1.41
Caucasian	37	$39,198	$32,708	-$6,490	$14,398	-$20,888	-0.45	-1.45
African-Am.	39	$38,360	$34,476	-$3,884	$14,398	-$18,282	-0.27	-1.27
Hispanic	42	$39,190	$32,760	-$6,430	$14,398	-$20,828	-0.45	-1.45

Table E8 Estimated Net Benefits, Benefit-Cost Ratio and Rate of Return Comparison of Oklahoma *Career*Tech Completers and HS Diploma and/or Equivalent Students Nationally, 2001 (10% Adjustment)

	Lifetime Tax Payments at 29%				Oklahoma CareerTech Completer			
	Years	HS Diploma and/or Equivalent	Oklahoma *Career*Tech Completer	Difference	Cost Per FTE	Net Benefits	Benefit-Cost Ratio	Rate of Return
Both Sexes, All Races 18 to 64 years	39	$278,022	$211,723	-$66,299	$13,179	-$79,478	-5.03	-6.03
25 to 34 years	35	$239,002	$211,120	-$27,882	$13,179	-$41,061	-2.12	-3.12
35 to 44 years	25	$196,664	$150,800	-$45,864	$13,179	-$59,043	-3.48	-4.48
45 to 54 years	15	$120,208	$90,480	-$29,728	$13,179	-$42,907	-2.26	-3.26
55 to 64 years	5	$39,652	$30,160	-$9,492	$13,179	-$22,671	-0.72	-1.72
Both Sexes, Caucasian 18 to 64 years	39	$288,620	$211,723	-$76,897	$13,179	-$90,076	-5.83	-6.83
Both Sexes, African Am. 18 to 64 years	38	$244,754	$200,564	-$44,190	$13,179	-$57,369	-3.35	-4.35
Both Sexes, Hispanic 18 to 64 years	41	$243,995	$222,581	-$21,414	$13,179	-$34,593	-1.62	-2.62
Male, All Races 18 to 64 years	40	$329,904	$238,380	-$91,524	$13,179	-$104,703	-6.94	-7.94
Caucasian	40	$335,727	$241,280	-$94,447	$13,179	-$107,626	-7.17	-8.17
African-Am.	37	$257,102	$200,866	-$56,236	$13,179	-$69,415	-4.27	-5.27
Hispanic	40	$263,552	$241,280	-$22,272	$13,179	-$35,451	-1.69	-2.69
Female, All Races 18 to 64 years	38	$229,018	$194,834	-$34,184	$13,179	-$47,363	-2.59	-3.59
Caucasian	37	$227,347	$189,706	-$37,641	$13,179	-$50,820	-2.86	-3.86
African-Am.	39	$222,490	$199,961	-$22,530	$13,179	-$35,709	-1.71	-2.71
Hispanic	42	$227,303	$190,008	-$37,295	$13,179	-$50,474	-2.83	-3.83