

1-1-2006

# Employment Success of Community and Technical College Program Graduates as an Indicator of Economic Development in West Virginia

Kristin L. Mallory  
kmallory@bridgemont.edu

Follow this and additional works at: <http://mds.marshall.edu/etd>

 Part of the [Community College Education Administration Commons](#), [Community College Leadership Commons](#), [Growth and Development Commons](#), and the [Health Economics Commons](#)

---

## Recommended Citation

Mallory, Kristin L., "Employment Success of Community and Technical College Program Graduates as an Indicator of Economic Development in West Virginia" (2006). *Theses, Dissertations and Capstones*. Paper 314.

This Dissertation is brought to you for free and open access by Marshall Digital Scholar. It has been accepted for inclusion in Theses, Dissertations and Capstones by an authorized administrator of Marshall Digital Scholar. For more information, please contact [zhangj@marshall.edu](mailto:zhangj@marshall.edu).

**EMPLOYMENT SUCCESS OF COMMUNITY AND TECHNICAL COLLEGE  
PROGRAM GRADUATES AS AN INDICATOR OF ECONOMIC  
DEVELOPMENT IN WEST VIRGINIA**

Kristin L. Mallory, EdD

Marshall University  
Graduate College

Dissertation submitted to the Faculty of the  
Marshall University Graduate College  
in partial fulfillment of the  
requirements for the degree of

Doctor of Education  
in  
Educational Leadership

Committee Chairperson, Dennis M. Anderson, EdD  
Jerry Jones, EdD  
Fred Pauley, PhD  
Samuel Securro, Jr., EdD

Huntington, West Virginia, 2006

Keywords: community college, economic development

Copyright 2006 by Kristin L. Mallory

## **ABSTRACT**

### **Employment Success of Community and Technical College Program Graduates as an Indicator of Economic Development in West Virginia**

The purpose of this study was to analyze existing wage data to quantify the employment success of community and technical college graduates by program as an indicator of economic development in West Virginia. Data for the variables were obtained from archival databases and a cooperative agreement between state agencies. Descriptive statistics were utilized to examine employment rates, range of earnings, and employment in-industry of community and technical college graduates from 23 programs from 1997 to 2002.

Graduates in the health fields demonstrated both the highest and lowest ratios of employment, with the mean employment rate for all programs of 68.12 percent. The average annual wage of all programs was \$24,993.41, with six of the seven programs in the health professions reporting earnings over the mean. Electrical Engineering Technology graduates also reported high range, \$123,155.91, and mean, \$40,432.46, earnings. The highest percentages of graduates working in-industry were in the Health Professions and Related Clinical Sciences area. The research thus indicates a higher level of economic development, or earnings, from graduates in the Health Professions and Related Clinical Sciences and Engineering Technology areas.

## **DEDICATION**

This dissertation is dedicated to my loving and supportive family: my wonderful husband Greg, son Donald, and daughter Katie. Thank you for all you have unselfishly given during this educational journey.

## ACKNOWLEDGEMENTS

To all of the wonderful people listed below, I wish to acknowledge and thank you for your involvement in the completion of this dissertation.

Dr. Dennis M. Anderson, committee chairperson-- for your support, encouragement, and honesty which guided, pushed, and pulled me through the doctoral program and dissertation completion;

Dr. Fred Pauley, minor committee chairperson—for providing insight, assistance, and advice;

Dr. Jerry Jones, committee member—for your willing, calming, and reassuring presence;

Dr. Samuel Securro, Jr., committee member—for your statistical ingenuity, patience, and special ability to help me understand and apply statistical methods;

Dr. Beverly Jo Harris, President, CTC at WVU Tech—for being such a wonderful boss and mentor, encouraging me during this entire process and offering me many opportunities for professional growth and experience;

Mr. Jim Barton, Director of Research and Technology, HEPC—for your understanding and willingness to assist me in the data acquisition;

Ms. Rebecca Dover—for being my enthusiastic technical assistant;

Ms. Deborah Lundahl, my sister—for always being so supportive, providing encouragement, proofreading skills, and “Aunt Debbie” time for my family; and,

To my mother and father, Mary Ellen and Paul Lundahl, I thank you for your unending love, support, compassion, and direction.

## TABLE OF CONTENTS

ABSTRACT.....	i
Dedication.....	iii
Acknowledgements.....	iv
Table of Contents.....	v
List of Tables.....	vii
CHAPTER One: Introduction.....	1
Programs.....	2
Economic Development.....	3
Human Capital.....	4
Quality of Life.....	5
Promoting Economic Development.....	6
Purpose of the Study.....	7
Research Questions.....	9
Operational Definitions.....	9
Significance.....	11
Limitations.....	13
Summary.....	14
CHAPTER Two: Literature Review.....	15
Introduction.....	15
Community Colleges in West Virginia.....	15
Programs.....	18
Economic Development.....	21
Human Capital.....	25
Quality of Life.....	27
Promoting Economic Development.....	29
Significance of Study.....	34
Summary of Review.....	36
CHAPTER Three: Research Methods.....	38
Research Design.....	38
Population.....	38
Data Collection.....	39
Data Analysis.....	40
Research Questions.....	41
Summary.....	42
CHAPTER Four:.....	43
Results, Presentation, And Analysis Of Data.....	43
Data Collection.....	43
Research Questions.....	47
Data Analysis.....	47
Major Findings.....	52
Finding One.....	52
Finding Two.....	53
Finding Three.....	54

Finding Four. ....	58
Ancillary Findings .....	60
Summary .....	62
CHAPTER Five: Conclusions, Implications, and Recommendations.....	65
Summary of Purpose.....	65
Summary of Procedures.....	66
Summary of Descriptive Data.....	66
Summary of Findings.....	67
Summary of Ancillary Findings.....	69
Limitations .....	69
Conclusions.....	70
Implications.....	72
Recommendations.....	74
References.....	76
Appendices.....	83
APPENDIX A.....	84
SUPPLEMENTAL COOPERATIVE AGREEMENT .....	84
APPENDIX B .....	87
CURRICULUM VITAE.....	87

## LIST OF TABLES

Table 1. Program name and number of graduates from WV CTC .....	46
Table 2. Ratio of employed to unemployed CTC program graduates in WV .....	48
Table 3. Salary ranges of employed program graduates overall, out-of-industry, and in-industry .....	50
Table 4. Percent of graduates employed in-industry, not-in-industry, and no-income per program with Chi-square test of significance values .....	52
Table 5. Mean and median wages by program with program area .....	57
Table 6. Mean and Median Wages in-industry and not-in-industry .....	60

# **EMPLOYMENT SUCCESS OF COMMUNITY AND TECHNICAL COLLEGE PROGRAM GRADUATES AS AN INDICATOR OF ECONOMIC DEVELOPMENT IN WEST VIRGINIA**

## **CHAPTER ONE: INTRODUCTION**

Community colleges nationwide have been the focus of economic development improvement strategies. Historically, economic and workforce development have been included in the mission of community colleges (Eells, 1931; Koos, 1924). Community colleges, through vocational and contract education, have assisted economic development for more than forty years (Grubb, Badway, Bell, Bragg & Russman, 1997; Young, 1997). Levin (2001) and Monroe (1972) note the expanding mission of community colleges, placing more emphasis on occupational and workforce training. Concurring with this role of community and technical colleges, Cohen and Brawer (1996) suggest that these institutions should be considered an investment for the community. Through the mission of providing post-secondary vocational education, community and technical colleges are inherently involved in the economic development of the institution's service region (Ingram, 1999).

Community and technical colleges have evolved as institutions of higher education during the last century. Often housed in high schools, early community colleges were referred to as junior colleges offering two years of post-secondary instruction (Cohen & Brawer, 1996; Eells, 1931; Koos, 1924). While the name and physical structure have changed over the last 100 years, the multiple missions of community and technical colleges have remained essentially the same. The various missions of these institutions include transfer to four-year institutions or preparatory education, remedial education, occupational and technical terminal degree function, and

later, adult and continuing education (Bailey, 2003; Cohen & Brawer; Eaton, 1994; Eels; Koos; Monroe, 1972).

### **Programs**

The community and technical colleges in West Virginia offer a variety of associate degree and certificate programs, many of which are occupationally specific. The West Virginia Community and Technical College System (2005) degree inventory lists 138 programs, both certificate and associate degree, offered by community and technical colleges in West Virginia. When grouping the programs by Classification of Instructional Programs (CIP) codes utilized by the Higher Education Policy Commission, the ten community and technical colleges currently offer 87 associate degree programs (West Virginia Higher Education Policy Commission, 2004).

Grubb's (1997) research offers evidence that graduates with associate degrees or certificates demonstrate higher earnings than individuals without such credentials. More specifically, completion of formalized associate degree and certificate programs is positively related to gains in income three years after graduation (Laanan, 1998). Previous studies have confirmed differences in earnings dependent on the baccalaureate degree earned (Fitzgerald & Burns, 2000; Grubb, 1997; Sanchez & Laanan, 1998). Grehan (2003) identified several programs which are associated with increased earnings three years following graduation, as compared to the first year of earnings. Available data has been limited distinguishing the differences in economic returns for the various programs of associate degree earners (Grubb). Sanchez (1998) suggests further research be employed to identify if a significant difference in student earnings is dependent on the program of study.

## **Economic Development**

Economic developers can more effectively address the needs of the community by targeting occupations to fill these needs (Markusen, 2004). Markusen suggests that, “occupations, rather than industries, more directly capture the increasingly important human capital contribution to local economic development” (p. 256). Specific educational programs can therefore be linked with recruitment efforts for bringing industries to areas that can provide the necessary training (Markusen). Unfortunately, efforts to promote this type of linking are often hampered by lack of industry data available on the county or city level (Markusen).

Economic development is a term not singularly defined. When applied to community and technical college education, economic development frequently refers to industry specified training and education to meet the local business needs (Kirshenmann & Lane, 2001). Authors often provide a specific definition of economic development to suit a particular study. Different institutions may use the term workforce or community development interchangeably with economic development, which further compounds the difficulty in defining economic development (Grubb, Badway, Bell, Bragg, & Russman, 1997). This lack of consensus of a definition is thought to be the result of several factors, including the various types of activities encompassing economic development and the newness of economic development as a profession (Young, 1997).

The International Economic Development Council acknowledges the difficulty in defining economic development, instead offering objectives that describe the desired outcome. Grubb, Badway, Bell, Bragg, and Russman (1997) list proactive economic and occupational goals as the focus of economic development. Ingram (1999) defines

economic development as "organized activities intended to promote, sustain, and/or enhance the economic vitality of a locality, region, or state" (p. 16). Most commonly, economic development refers to development of jobs and personal wealth while improving the quality of life (Economic Development Reference Guide, 2004). However defined, economic development centers around a public-private partnership, such as the relationship between community and technical colleges and business (Hlavana, 1992; Young, 1997).

### *Human Capital*

Success of the economic development role of community and technical colleges depends partly on the human capital of the institution (Grubb, Badway, Bell, Bragg, & Russman, 1997). Grubb (1999) describes human capital as "investing in education for the economic benefits it will generate in the future" (p. 1). Human capital is the result of education and training of an individual, which produces those characteristics that can not be separated from that person, such as values, skills, knowledge and health (Baldwin, 1966; Becker, 1992; Schultz, 1961).

Paulsen (1998) identifies income as the quantifiable measure typically attributed to human capital. Expenses necessary to increase income are therefore investments in human capital (Paulsen). "Schooling is an investment in human capital in the form of acquiring greater earning abilities" (Baldwin, 1966, p. 65). Thus, education produces a direct link to economic growth through human capital (Becker, 1992; Schultz, 1961).

Ideally, the creation of human capital should benefit the companies using that capital, rather than only increasing the income of the program graduate, or where the "human capital is embedded" (Kirshenmann & Lane, 2001, p. 16). Success of the

companies in the community and technical college's service area, along with the success of the student graduate, or "human capital," is a more precise measure of economic development (Kirshenmann & Lane). In addition, previous life experiences such as earlier educational attainment and family environment affect the human capital of the student prior to entering a post secondary degree program (Fitzgerald & Burns, 2000). Yet, the difference in earnings from high school graduates to graduates with a college degree is the most significant indicator that post-secondary education is required to meet the demands of the economy (Carnevale & Desrocher, 2004). Human capital can therefore most readily be measured by the income or wages of the program graduate.

### *Quality of Life*

Education is an essential factor in the measurement of quality of life of an area (Law & Pittman, 1989; Liu, 1977). Through increased abilities of the workforce, counties and states are able to attract business and thus improve the economic standings of the region (Law & Pittman). Liu defines quality of life as "a set of wants, the satisfaction of which makes people happy" (p. 226). The Economic Development Reference Guide (2004) describes quality of life as a series of goals, such as well paying jobs, entertainment and recreational activities, low crime and cost of living rates, and proper medical facilities. Ultimately, the objective of economic development programs is to improve the quality of life of an area (Economic Development Reference Guide).

The measurement of quality of life as an economic indicator has been controversial because of the ambiguity and lack of finite measures for this multidimensional variable (Liu, 1997). Quality of life consists of both those measures that are quantifiable such as income, where income assists with the physical needs, and

the qualitative subjective factors such as "community belongingness, love, affection, esteem, self actualization, etc." (Lui, p. 229). Researchers have used a variety of qualitative and quantitative measures to determine the quality of life in a specified region. Unfortunately, many measures reported are dated and are only separated into regions and states, such as the indicators listed in the Places Rated Almanac (Coomes, 1998).

In a report completed by the Institute for Higher Education Policy (2005), researchers explained the various indicators available for identifying improvement in the quality of life. These indicators can include a reduced demand for welfare assistance and improvement in personal health (Institute for Higher Education Policy). While identifying acceptable, quantifiable quality of life indicators would assist community and technical colleges with assessing the effectiveness of economic development efforts, other than income, quality of life indicators will not be a part of this study.

### ***Promoting Economic Development***

Numerous studies have been conducted involving community and technical colleges and economic development in states, such as California (Kirshenmann & Lane, 2001; Laanan, 1998; Wiseley, 1998), Florida (Pfeiffer, 1998), North Carolina (Gracie, 1998; Pennington, Pittman, & Hurley, 2001; Smith, 1996), Tennessee (AACC, 2004; Grehan, 2003), and Washington (Seppanen, 1998). These previously conducted studies have included different variables for determining community and technical college impact on economic development, such as graduation rates, job creation, and individual earnings.

Smith (1996) found a direct and indirect link between community and technical college education and economic development. The direct benefit to the economy is a

result of the productivity of the worker, while indirectly, the worker has gained the advantage of "stock of knowledge" to contribute to the earner's problem solving techniques (Smith, p. 168). Simply, Smith's research links a positive relationship between the earnings and education of a community and technical college graduate.

A study for the Tennessee Board of Regents concluded that higher education not only produces economic benefits, but also provides benefits for the state, society, and student (American Association of Community Colleges, 2004). Hoping to provide more quantitative data on earnings of community and technical college graduates, Grehan (2003) utilized existing data files from the Tennessee Higher Education Commission and from the State Unemployment Insurance Division to identify the differences in earnings by degree majors. Students who graduated with degrees in health related fields, engineering, information and physical sciences, trades and industrial arts had all recorded earnings above \$30,000 one to three years following graduation (Grehan).

### **Purpose of the Study**

The purpose of this study was to analyze existing wage data to quantify the employment success of community and technical college graduates by program as an indicator of economic development in West Virginia. The positive relation of the income of baccalaureate and graduate degree earners has been studied; however, less is known about the economic benefit of students graduating with certificates and associate degrees (Grubb, 1997; Sanchez, 1998). In addition, Grubb, Badway, Bell, Bragg, and Russman (1997) recognize the lack of a general understanding of the results of economic development efforts. Young suggests, "Ongoing research needs to be done on the actual involvement of two-year colleges in economic development..." (1997, p. 82).

Young (1997) suggests community and technical colleges utilize data maintained by the U.S. Department of Commerce as part of the assessment of the effectiveness of local economic development efforts. Use of state collected data from employment records will avoid temptation of biased reporting and provide institutions with a method for assessing one aspect of institutional effectiveness. Identifying community and technical college graduates' ability to obtain employment in the program of study will provide powerful data for future economic development in West Virginia.

When investigating the earnings of college graduates as related to the program of study, Walters (2003) recently declared "...the literature lacks a comprehensive assessment of the earnings of community college and university graduates of various fields of study" (p. 465). By examining the occupation or program of study, the contribution of human capital to the economic development of an area can be more directly measured (Markusen, 2004). Attention to occupational analysis provides a basis for promoting economic development, specifically linking education with recruitment of employers to a region (Markusen). In addition, colleges could track industries which hire their graduates per program area (Grehan, 2003).

In West Virginia, the Higher Education Policy Commission (HEPC) compiles a multitude of reports with student and institutional data on completion rates, graduate earnings, and licensure achievement, to name a few. Contracting with the West Virginia Bureau of Employment Programs (BEP), the HEPC creates file matches with the graduate file database that identify the earnings of graduates (J. Barton, personal communication, June 21, 2005). By creating a specific file request, the merging of the two databases offers a multitude of variables for statistical analysis.

Use of the merged databases provides a more accurate and current picture of the earning power of community and technical college graduates rather than analyzing census data. Sanchez (1998) laments that use of merged databases, while providing a valid and reliable measure of earnings, has not been used in many states. Generalities regarding the earning power of community and technical college graduates have been tabulated from census data, while some states have been able to garner more accurate and current data from cooperation with other state agencies (Sanchez). Identifying acceptable, previously collected, non-partisan data sets for income information will assist community and technical colleges with assessing the effectiveness of economic development efforts.

### **Research Questions**

1. What is the ratio of employed to unemployed community and technical college graduates in West Virginia?
2. What are the differences in employment rates among the community and technical college program graduates in West Virginia?
3. What is the range of annual earnings for graduates from each community and technical college program in West Virginia?
4. What percentage of community and technical college graduates are able to find employment in the industry of the program from which they graduated in West Virginia?

### **Operational Definitions**

For the purpose of this study, the following operational definitions are used;

1. Community colleges or community and technical colleges- public institutions of higher education that offer certificate and associate degree programs.
2. Economic Development- employment status and income. Employment status and income are measured through matched employment and wages from the West Virginia Bureau of Employment Programs as provided by the Higher Education Policy Commission. For the purpose of this study, income will be the only measurement of quality of life.
3. Programs- college level courses of study that, upon completion, result in the award of an associate degree, including an associate of arts, an associate of applied science, and an associate of science, as identified by Classification of Instructional Programs (CIP) codes.
4. Classification of Instructional Programs (CIP) codes- six digit numeric codes established by the National Center for Education Statistics for the purpose of classifying instructional programs. CIP codes are designated for each degree granting program in community and technical colleges in West Virginia.
5. Industry of the programs- areas of employment related to the field of study of the program graduate. Industry codes are identified by the North American Industry Classification System Codes (NAICS) for the United States Bureau of the Census.
6. Ratio of employed to unemployed community and technical college graduates- the statistical comparison of the number of program graduates who are employed to the number of program graduates who are not employed, according to the data provided by the West Virginia Higher Education Policy Commission.

## **Significance**

Gulick (1936) defined the functions of an administrator to include planning, organizing, staffing, directing, coordinating, reporting, and budgeting, or POSDCORB. The results of this study may provide application for community and technical college administrators and direction in the majority of Gulick's administrative roles.

Administrators may be able to utilize the findings for program and institutional planning and assessing institutional effectiveness (Carvell, Graham, & Piland, 1998). Grubb (1999) suggests previous studies utilizing the Unemployment Insurance wage data provides information useful for institutional planning, performance-based funding mechanisms, student recruiting and improving local programs.

Seppanen (1998) relates three findings as a result of linking graduates from associate degrees to wages earned in the state of Washington. Community colleges in Washington have similar placement rates compared to national data, students benefit economically as a result of graduating with an associate degree, and "not all programs benefit students equally" (Seppanen, p. 33). From these conclusions, Seppanen reports that community colleges have become more focused on retention rates.

The results of this research could provide support for continued and increased funding of the community and technical colleges in West Virginia. With a direct and positive correlation of occupational and transfer functions of community and technical colleges to jobs and earnings, Smith (1996) suggests additional state investment in community college education. In California, the method established for linking education outcomes with economic development enables administrators to be able to draw inferences between the impact and program effectiveness and funding (Kirshenmann &

Lane, 2001). Institutional administrators may find the results useful in justifying increased budget allocation requests and in increasing consumer awareness and support of these state-funded institutions.

In addition, the results of this study may help guide further legislative initiatives for higher education in West Virginia. States continue to face increased reporting requirements, with a higher emphasis on the economic role of the institution rather than the more traditional academic role (Carnevale & Desrocher, 2003). The American Association of Community Colleges states the necessity of providing “straightforward information to appropriate decision-makers about the resources required to maintain quality programs” (American Association of Community Colleges, 1987, p. 1). Without credible measurement systems, the public may question the use of state funding for economic development programs. By providing data that is measurable regarding program outcomes, the public can justify the use of the budgeted funds for economic development programs (Kirschenmann & Lane, 2001).

Grubb (1997) laments the lack of consideration of program results in state funding mechanisms. Most states receive incentive funding based on higher enrollment rather than success of specific program completion (Grubb). As a result, those higher cost programs that often produce higher income earners, such as health programs, are expected to function on the same amount of funding as the less productive programs or those programs whose graduates earn less (Grubb). Young (1997) concludes the need for "better public policy" on local, state, and federal levels, in addition to improving coordination of said policy among all parties (p. 81).

Gillium and Davies (2003) and Paulsen (1998) suggest studies on economic impact of community colleges can be extremely useful to the administration for effective budgeting requests from legislators. “Such an expanded understanding of the payoffs that result from the public and private expenditures in higher education could go a long way toward improving the prospects for state economic development, social stability, and individual prosperity” (Institute for Higher Education Policy, 2005). Results of this research may help state policy makers consider special funding incentives for those programs associated with greater economic development.

### **Limitations**

Economic development can be defined many ways, including a measure of quality of life. Smith (1996) initially attempted to include a quality of life indicator and subsequently removed the variable when acceptable results were not achieved. For the purpose of this study, income was the only measure of economic development.

As noted by Grubb (1999), individuals who have earned associate degrees are more likely to hold jobs that are considered less stable. As such, these wage earners may have periods of unemployment, which could taint the data recorded by the various sources and result in less significant statistical data. In addition, associate degree earners may not find employment related to their degrees, and thus not demonstrate economic development in the earned field (Grubb). Earnings could be positively or negatively affected by the un-observable, non-quantifiable characteristics of graduates outside of degree attainment. (Fitzgerald & Burns, 2000).

Sanchez and Laanam (1998) report that occupations are not identified in many state databases, thus exposing a limitation of using state databases for matching

employment records to community and technical college graduates. While the databases from the Higher Education Policy Commission do provide the CIP codes of the graduates, the actual employers can not be identified for reasons of confidentiality.

### **Summary**

Community and technical colleges continually face the challenge of meeting the multiple missions of these institutions. More recently, economic development has become a prominent role for community and technical colleges. Increasing educational attainment from post-secondary institutions is paramount to continued economic growth in the United States (Carnevale & Desrocher, 2003).

Many researchers have documented the increase in earnings for baccalaureate and graduate program graduates (Grubb, 1997) while the benefits of earning associate degrees are only more recently being studied by individual states. By utilizing existing databases for statistical analysis, several questions were answered that provide non-biased, quantifiable, key information on the employment success of community and technical college program graduates as an indicator of economic development in West Virginia.

## **CHAPTER TWO: LITERATURE REVIEW**

### **Introduction**

Historically charged with multiple missions in post-secondary education, economic and workforce development have become increasingly important outcomes of community and technical college education. Federal, state and local mandates have encouraged and required additional accountability at higher education institutions. Community and technical colleges have born the brunt of many legislative initiatives with multiple measures of student success, while in college, upon graduation, and in the workforce, being required for institutional survival. Quantifiable demonstration of economic benefit of associate degree programs is essential for continued support of community and technical colleges.

### **Community Colleges in West Virginia**

Potomac and New River colleges were identified by Eels (1931) as the first public junior colleges in West Virginia. Noting a lack of community colleges, Eels reported hopeful anticipation "to the development of public junior colleges in the state" (p. 157). Forty years later, the community and technical college system in West Virginia was initiated (Miller & Dziagwa, 1997).

Miller and Dziagwa (1997) chronicled the various legislative initiatives thrust upon higher education in West Virginia during the past thirty years. By 1979, the public community and technical college system in West Virginia included three "freestanding" and six "component" institutions (Miller & Dziagwa). Public institutions offered 227 associate degree programs and 40 certificates in 1985 (Miller & Dziagwa). Following a

1987 study of West Virginia higher education, the Carnegie Foundation for the Advancement of Teaching recommended a more coordinated community and technical college system to "stimulate economic renewal" (Miller & Dziagwa, p. 3). In 1989, the legislature mandated a reorganization of the public higher education system through Senate Bill 420. Following enactment of Senate Bill 420, the community and technical college system consisted of eleven colleges, both free standing and component institutions (Asbury, 2002). Legislation in 1995 (Senate Bill 547) further defined the role of West Virginia community and technical colleges, establishing an additional community and technical college and specifying workforce and economic development as goals of these two-year institutions (Asbury; Miller & Dziagwa).

Community and technical colleges in West Virginia were initially governed by the West Virginia Board of Regents, which changed into two governing bodies- the State College System Board of Directors and the University Systems Board of Trustees (Skidmore, 1999). The state college system of West Virginia continued to evolve as these governing bodies were merged into the West Virginia Higher Education Policy Commission in 1999 (Senate Bill 653). Senate Bill 653 (1999) required all component community and technical colleges to become independently accredited from the four year institutions to which the colleges were administratively linked. Community and technical colleges were included under this regulatory structure until recent legislation under Senate Bill 448 (2004) created the Community and Technical College System of West Virginia (WVCTCS) in 2004. Currently, WVCTCS governs 10 community and technical colleges with a total of 21 campuses in West Virginia.

Emphasizing the economic development role of community and technical colleges, the mission statement of WVCTCS is “to deliver affordable, accessible, high quality education and training that dynamically advances the economic and social development of West Virginia” (WVCTCS, 2005). Individual institutional mission statements of public community and technical colleges in West Virginia include wording such as "prepares the current and future workforce," "workforce training programs and services," “supports economic and workforce development,” and "economic growth." Noting the role of community and technical colleges serving the community, Liston and Ward (1984) suggest these associate institutions should work to benefit both the economy and intellect of members of that community. Though many of the community and technical colleges have been actively involved in economic development initiatives prior to 1995, Senate Bills 420 (1989), 547 (1995), 653 (1999), and 448 (2004) generated new and continuing commitment to that part of the community and technical college institutional mission (Asbury, 2002).

The West Virginia Council for Community and Economic Development developed a plan for improving the economic condition and increasing the competitiveness of the business climate in West Virginia (West Virginia Council for Community and Economic Development, 2001). In 2000, the Council submitted an Implementation Plan which specifically designates the community and technical colleges in West Virginia as the vehicle for implementing training programs for projected technical degree needs (West Virginia Council for Community and Economic Development, 2000). Recent legislation for higher education specifically names the findings of this report as further justification to involve community and technical college

education in economic development (SB 448, 2004). Legislative directives and findings from a non-academic economic development group illuminate the need for quantitative data on West Virginia community and technical colleges' economic development efforts.

### **Programs**

Associate degree programs are often inherently occupationally specific (Grubb, 1997). Therefore, community and technical college graduates that do not find employment related to their degree program may reap little economic benefit as a result of their education (Grubb, 1997; Grubb, 1999). As such, Grubb cautions against a blanket recommendation to students that they should attend community and technical college solely for the purpose of economic gain.

Identifying the pattern of employment of associate degree earners, Grubb (1997) utilized an existing database to investigate whether or not there were economic benefits to earning sub-baccalaureate degrees from community and technical colleges. The Survey of Income and Program Participation (SIPP) database was studied as it provided the most complete information for sub-baccalaureate earners (Grubb). Yet, the SIPP database was found to be problematic as the data that were gathered were self reported and institutions were not identified by degrees awarded (Grubb).

Even with the obvious issues inherent in the SIPP database, Grubb (1997) was able to substantiate significant economic benefits tied to specific associate degree program areas, while those individuals earning the associate degree strictly for the purpose of transfer to baccalaureate did not realize economic gain if the four year degree was not completed. Grubb concluded economic gain was only evident if the associate degree earner found employment in the field studied, and certain programs provided the

degree earners with higher return, such as health related and engineering technology programs.

Laanan (1998) reviewed a California study on associate degree completers and non-completers earnings. Through a combined effort of the state college system and the Employment Development Department of California, the earnings of graduates were matched by social security number to unemployment insurance wage data (Laanan). The data were reported as median annual earnings, adjusted for inflation, and did not include any self-employed, un-employed or graduates employed by the military or federal government (Laanan).

Results of the California study confirmed a positive relationship between income achievement and completion of a certificate or associate degree, though results did vary by age of the degree earner (Laanan, 1998). Income gains were particularly stronger for students who completed specific occupation programs linked to business and industry (Laanan). Laanan cautioned against using the outcome of this descriptive study as a performance measure, as the data collected do not directly link a student's degree earned to the actual employment of the student.

By merging data from Tennessee community colleges and unemployment records, Grehan (2003) analyzed wage trends of associated degree graduates over a three year period. After matching the graduates' data with the Tennessee Unemployment Insurance Wage data, Grehan compared employment rates and earnings of graduates by programs of study. Associate degree earners who majored in marketing, health professions, physical sciences and business demonstrated the highest employment rate after graduation (Grehan). Tennessee community and technical college programs which

demonstrated the highest earning records for the graduates include engineering, health professions, information sciences, trades and industrial, and technology and industrial arts (Grehan). Thus, most of the graduates from the Tennessee community colleges during the period of study found employment in the services sector (Grehan). Grehan's study combined community college graduates into areas of major, rather than identifying individual degrees, and also examined the wages and employment status by gender and race.

Grubb's (1999) national research has demonstrated an increase in the value of the associate degree over the past thirty years. Limitations to the various studies examined by Grubb include not distinguishing between those individuals who complete and do not complete degree programs, and differentiating between types of institutions granting the sub-baccalaureate degrees. In addition, Grubb noted the variance in employment between associate and baccalaureate degree earners.

To receive measurable benefit from associate degree education, graduates from community colleges should find employment in the field related to the degree earned (Grubb, 1999). Graduates with associate degrees were more likely to be laid-off over a period of time than those who earned baccalaureate degrees, in other words, occupations specific to associate degrees fluctuate more in employment opportunities (Grubb). Grubb reiterated the difficulty in calculating the effects of education on income as a result of a variety of reasons, such as differences in student qualifications and preparation, socioeconomic differences, student purpose of seeking higher education, and differences in institutional quality.

By utilizing the Survey of Income and Program Participation (SIPP) and controlling for all differences other than gender, Grubb (1999) concluded male and female associate degree graduates earn 18 percent and 23 percent more, respectively, than high school graduates. Grubb's research addressed the near absence of investigation into the difference in the earnings of associated degree graduates by area of study. The research demonstrated specific fields by gender, such as engineering for males and health care for females, provide more income return than academic or transfer associate degrees (Grubb).

Canadian researcher Walters (2003) conducted a study examining the earnings of community college and university graduates from different fields of study. Walters determined a difference in earnings and institutions when controlling for student backgrounds. In particular, community college graduates from the fields of engineering and mathematics earn more than university graduates from liberal arts programs (Walters). Graduates' income from other areas of study in the university, such as the social sciences, did exceed the income of most other community college programs (Walters). Results of the Canadian study may lead students to question the economic benefit associated with earning a liberal arts degree verses an associate degree from a community and technical college (Walters).

### **Economic Development**

Through identification of earnings and employment success of community and technical college graduates by areas of study, or program majors, regional and state policymakers can promote economic development. Markusen (2004) argues the importance of targeting occupations, rather than industries, for the purpose of regional

economic development. Rather than attempting to attract industries by specifically targeting firms in those industries, Markusen suggests a more plausible economic development strategy is to target the occupations, and individuals educated for those occupations. Thus, community and technical college graduates' role in economic development, through providing the needed human capital, is best identified by program area.

Sanchez (1998) suggested the need for more states to follow the lead of those such as California, Florida, and Washington to develop earnings measurements for associate degree graduates. Community and technical colleges could better collaborate with the multiple state and federal agencies to develop specific measurements and outcomes for economic benefits, thus enabling these institutions to offer more measurable data to decision makers in the respective states (Sanchez).

While community and technical colleges have been involved with economic development for over forty years, Young (1997) contributes the lack of a consistent definition of economic development to the newness of economic development as a profession. Young suggests the focus of economic development is community improvement, involving all arenas that are identified as part of that community.

In an attempt to de-mystify the various definitions and roles surrounding the economic, community and workforce development of community colleges, Grubb, Badway, Bell, Bragg, and Russman (1997) examined seven selected institutions. Grubb, et al. (1997) catalogued multiple roles of community colleges encompassing both traditional academic and employer specific training. The economic roles of the seven institutions studied varied tremendously, and quantifiably tracking economic

development was difficult given the minimal evaluation efforts currently taking place, the indirect effects realized by these efforts, and the maximum reliance on human capital (Grubb, et al.).

Grubb, Badway, Bell, Bragg, and Russman (1997) identified factors that influence both positively and negatively the expanded role of community colleges, including the existing mission emphasis, business oriented and stable administrators, faculty involvement with employers, faculty governance, boards of trustees, student demographics, district policies, employer development opportunities, un-planned external influences, pressures from the community and business, economic conditions, and cost effectiveness of community colleges. State policy for economic development support in community and technical colleges varied greatly among institutions, with both categorical and formula funding mechanisms (Grubb, et al., 1997). Grubb et al. noted the many tensions that are inherent with community colleges pursuing the economic and workforce development specific missions, including the risk of under-serving the traditional community and technical college population.

Community and technical colleges have become more preoccupied with economic development since the late twentieth century (Ingram, 1999). Responding to a questionnaire, thirty-five states provided information on the college's involvement with economic development (Ingram). The survey identified a function of community colleges as awarding the associate of applied science, a degree designed to prepare students for career-specific employment (Ingram). In addition, all states have been involved in Tech Prep initiatives, partnering high schools with community colleges to provide career-specific training (Ingram). Specifically, Tech Prep partners the faculty of

community colleges and high schools together for articulation of high school curricula to community college curricula to prepare students to enter the workforce in career technical occupations (Ingram).

Ingram (1999) found almost every state involved in multidimensional partnerships with businesses in the surrounding community. The business and industry involvement has often been in an advisory capacity, serving on college and program advisory boards (Ingram). Community colleges frequently benefit from these business relationships by receiving equipment or other types of in-kind donations and providing hands-on learning experiences for students in that field of study (Ingram).

Noting the relationship of business and industry with community colleges as a prime example of the private-public partnerships defined as economic development, Hlavana (1992) investigated the community colleges' mission of economic development as a potential conflict with the institutions' primary mission of providing access to higher education. By examining economic theory, Hlavana questioned whether community colleges should utilize scarce resources to provide specialized training for employees at one firm that would not benefit another firm, should the employee seek employment from the original firm's competitor. While not necessarily true in today's economy, Hlavana concluded that community colleges could justify the expense of industry training by increasing the tax base through increased employment and by improving the human capital of the students seeking the general or specialized training through community and technical colleges.

Using national, regional, and state data sets, along with other measures of analysis, Coomes (1998) demonstrated the ability to blend various databases to produce

valid inferences on economic policy. Examining metropolitan data rather than local data provided a more complete picture of economic performance through multiple indicators (Coomes). The economic performance measures examined included human and physical capital, economic structure and performance, quality of life, geographic and demographic information, cost of business, and cost of living (Coomes). Coomes advocates utilizing multiple, disconnected measures of economic indicators to assist metropolitan areas with analysis of regional performance for the purpose of development and policy making.

In order to truly measure economic development, community colleges need to establish measures of success of the businesses served, rather than simply measuring the success of the student (Kirshenmann & Lane, 2001). Utilizing a quasi-experimental design, California's Economic Development Department was able to gather data from businesses that did and did not receive economic development services from the community colleges and determine the benefit-cost ratio for the sample studied (Kirshenmann & Lane). By measuring the benefit-cost ratio and rate of return for economic development programs through community colleges, Kirshenmann and Lane concluded the necessity of such measurements to demonstrate the importance of all aspects of community college involvement in economic development.

### ***Human Capital***

Historically, human capital has not been totally supported as a means of investment in the economy as economists have not uniformly incorporated human capital into the "formal core of economics" (Schultz, 1961, p. 3). Becker (1992) describes human capital as a person's knowledge gained, skills learned, and values espoused, characteristics that can not be separated from the individual. Increasing human capital

will result in an increase in economic growth (Becker). Investments in human capital often yield economic development results over a period of time (Schultz).

Still true today, the difficulty in measuring human capital is related to the measurable quantitative indicators, such as number of workers and number of hours worked, and non-measurable or qualitative dimension, such as knowledge and skill (Schultz, 1961). Schultz categorized five areas related to improving human output: services and facilities for improvement of health, on-the-job instruction, education at secondary and post-secondary levels, adult education, and re-locating of workers to areas that offer job opportunities.

Fitzgerald and Burns (2000) cautioned against placing too much emphasis on the characteristics of an institution in relation to the potential earnings of college graduates as students enter the work force with varying levels of human capital. The different levels of acquired human capital are a result of the variance in socioeconomic background, efforts expounded by the student during the education process, and motivation in the career (Fitzgerald & Burns).

Questioning whether the United States has under-invested in human capital, Schultz (1961) suggested more investment in education and other forms of human capital to improve the welfare of the public. Noting a twenty percent income growth in the United States from 1929 to 1957, Baldwin (1966) attributes this gain to an investment in education. By investing in education, the economic benefit is realized through greater earning abilities, thus human capital (Baldwin; Paulsen, 1998). Specifically, by increasing education, thus the human capital of a community, the community will benefit from increased economic development (Becker, 1992). Studies have demonstrated the

increase in income as a result of increased education, or human capital (Becker). While the economic theory espoused is more than four decades old, research has continued to demonstrate the validity of the authors' findings.

Investigating the educational and economic trends of the United States, as compared to other nations, Carnevale and Desrocher (2004) decry the need for improving the amount and quality of human capital to remain economically viable. To increase and improve the human capital in the United States, Carnevale and Desrocher suggest an increased reliance on and use of community and technical colleges to produce the educated workforce for global competition. Tight and diminishing institutional budgets create a tension for community and technical college administrators when attempting to meet the demands of increasing the human capital by producing a more educated workforce "cheaper, faster, and better" (Carneval & Desrocher, p. 14).

### *Quality of Life*

Liu (1997) defines quality of life as "a set of wants, the satisfaction of which makes people happy" (p. 226). The wants include both physical, quantifiable goods and qualitative, psychological factors (Liu). Five overall components of quality of life include economic well-being, political involvement and governmental assistance, environmental quality, health and educational investment, and social conditions (Liu).

By ranking metropolitan areas using multiple indicators for the five components of quality of life, Liu concluded "the difficulty in constructing a single index to reflect the overall quality of life" (1997, p. 232). Liu observed a negative correlation between the economic and environmental measures of quality of life, indicating a focus on just improvement of economic factors does not guarantee improvement in other quality of life

factors. Health and education factors were most highly correlated with social and political indexes, prompting the author to recommend the need for “investments in human capital” (Lui, p. 235).

While reviewing a survey of real estate executives, Law and Pittman (1989) listed the key quality of life factors considered by corporations before locating in an area. These factors included both quality of life indicators of immediate importance and those identified as being important five to ten years from when the survey was administered (Law & Pittman). Availability of higher education and secondary education were listed as current and future factors important to quality of life of a region (Law & Pittman). Law and Pittman summarized the role of education in economic development by suggesting that regions focus “their efforts on educational improvement” (p. 7).

The Institute for Higher Education Policy (2005) completed a national study to demonstrate the benefits of postsecondary education, with the intention of increased attention for state policy discussion across the country. Utilizing six indicators of a previously conducted study, the Institute for Higher Education Policy quantified private economic benefits (higher personal income and lower unemployment), public economic benefits (decreased reliance on public assistance), private social benefits (better health), and public social benefits (increased volunteerism and voting participation) of higher education for each state.

While the national study by the Institute for Higher Education Policy provides useful insight for all postsecondary education, the primary focus of the study was on attainment of the baccalaureate degree. Not surprisingly, data demonstrate a direct correlation with the ability to earn more and be employed more consistently the higher

the level of education of the college graduate (Institute for Higher Education Policy). West Virginia demonstrated the value of a baccalaureate degree in the national study by exhibiting a 100% difference in the employment status of high school graduates verses baccalaureate graduates, meaning all baccalaureate degree graduates studied achieved employment (Institute for Higher Education Policy).

### ***Promoting Economic Development***

By building partnerships with the industry and businesses in the community, community and technical colleges have contributed to economic development by meeting the ever changing training and re-training needs of the regions the institutions serve (Young, 1997). Young cautions that institutions must individually evaluate the economic development needs specific to the area, and not attempt a cookie cutter approach when developing the specialized training needs.

By providing customized training, both credit and non-credit, community colleges have responded to the needs of local industry (Ingram, 1999). In concert with the customized training, another economic development role of community colleges is to house the resources that support the high-tech needs of the businesses (Ingram). Many states utilize community and technical colleges as a center for small business development, by assisting business with information and training on developing business plans and fiscal resources (Ingram).

Ingram (1999) found a wide variety of policy and funding issues for community college involvement in economic development. Some states initiated community colleges for the purpose of economic development, while funding for these institutions

varied from state appropriations to receiving additional monies from specified tax revenue (Ingram).

The Carl D. Perkins Vocational and Applied Technology Education Act, passed in 1990, required performance standards which provide student outcome data nationwide (Wisely, 1998). As a result of the federal Carl D. Perkins Act in the early 1990's, California's community college system developed a data collection method to address the mandated accountability legislation (Wiseley). While standard data had been collected, the goal of additional data collection was to better track students following graduation and into the workforce (Wiseley). By gaining cooperation between the California Employment Development Department and the community college system, unemployment insurance records were matched to both college completers and non-completers (Wiseley).

The initial data collection did not gather enough complete information to determine the economic benefit of community college program completers (Wiseley, 1998). Additional data and data refinement measures were employed to correct the information deficiency and provide valuable information for program and instructional improvement (Wiseley). Data collection met Family Educational Rights and Privacy Act (FERPA) requirements to ensure student privacy as student records can be released for research with the intent to improve student instruction (Wiseley). The California study provided valuable insight in collaboration and data collection and interpretation for program and college outcomes (Wiseley).

Florida also initiated a series of performance measures for community college students in response to the Carl D. Perkins Act (Pfeiffer, 1998). Vocational and

community college programs designated as high-demand, high-wage, and high-skill occupations were eligible to receive additional funding through performance-based incentive funding (Pfeiffer). With the determination of funding based on performance measures, Florida's community college system worked to improve the type of data and accuracy of the data collected with higher value and compensation placed on the high-skill programs (Pfeiffer).

North Carolina prepares a multitude of performance measures as mandated by the legislature and the State Board of Community Colleges (Gracie, 1998). The performance measures include students that complete and do not complete college programs, employment information and employer satisfaction (Gracie). Multiple governmental departments work together to create a "Common Follow-up System" which links the community college data with placement and unemployment insurance wage data which provides meaningful data regarding benefits of degree completion (Gracie, p. 56).

North Carolina has been able to utilize the resulting data reports to affect policy and quickly respond to economic initiatives and calculate costs and return on investments by program area (Gracie, 1998). The first analysis on the Common Follow-up System concluded that associate of science degree earners increased mean quarterly income more quickly than other groups investigated (Gracie). In addition, certificate and associate of applied science earners demonstrated higher earnings than associated degree earners, as associate degree earners often transferred to baccalaureate programs rather than finding employment upon completion of the two year degree (Gracie).

Coomes' (1998) research lamented the lack of precise measurement tools to help support economic development decisions. While the researcher acknowledged a plethora

of data available relating to income and population, to name a few, Coomes argues a lack of reliable measures for other economic variables in large metropolitan areas. Though Coomes' research provides a basis for measurement of economic performance in metropolitan areas, his justification reflects the significance of the proposed research. According to Coomes (1998) "when properly blended and interpreted, this data base can be used effectively to guide local economic policy" (p. 158).

The use of unemployment insurance wage data for determining economic gain has been studied in several states, including California, Florida, Texas, and Washington (Grubb, 1999; Laanan, 1998). This type of data evaluation is helpful in guiding the decision-making process for community and technical colleges, as the results provide local data, rather than state-wide information (Grubb). However, states that have adopted the use of unemployment insurance wage data have also encountered several limitations. While the data set is fairly complete, the unemployment insurance wage data do not report information for the self-employed, military, and federal workers (Grubb). In addition, state and local politics can greatly interfere with institutional reporting of data (Grubb).

The economic development status of North Carolina's community colleges was also investigated in a study by Pennington, Pittman, and Hurley (2001). Focusing on the business climate of individual counties rather than college payrolls, Pennington, Pittman, and Hurley studied the impact of the presence of community colleges in each county. Utilizing trend lines over fifty years, several economic variables in counties in North Carolina with community colleges and counties without community colleges were analyzed (Pennington, Pittman, & Hurley). While certain variables were not addressed,

such as the size, budget, and curriculum of the community college in the county, the economic indicators examined by Pennington, Pittman, and Hurley demonstrated economic gain in varying degrees in counties where community colleges resided. In particular, up to eleven percent of the retail sales economic indicator was found to be associated with the presence of a community college in that county (Pennington, Pittman, & Hurley).

Smith's (1996) dissertation also focused on the economic development ability of community colleges in North Carolina. The variables for economic development included the number of jobs, earnings, and poverty level while community college variables included occupational program enrollments, transfer programs, business involvement and community support of the institutions (Smith). Through various regression analyses, Smith demonstrated a positive relationship between occupational education and the number of jobs and earnings. Another significant finding includes the positive relationship between college transfer and the number of jobs and earnings, suggesting that even education in general, rather than just occupational education, can promote economic development (Smith).

While Grehan's (2003) study primarily focused on the ability and ease of using college and unemployment insurance wage data matches as a method of identifying community college graduate outcomes, the findings of the study produce statistical information useful to policymakers and college administrators. By utilizing the Unemployment Insurance data over a period of time, colleges can more readily demonstrate economic development as a result of the associate degree graduates entering

the workforce and “demonstrate the return on investment of college programs to state legislators and the general public” (Grehan, p. 59).

### **Significance of Study**

The results of a California study provided legislators with incentive to add funds for economic development and created a vehicle for additional communication between the community colleges’ governing boards and Economic Development Program (Kirshenmann & Lane, 2001). Funding of higher education could result in more productive graduates if states would focus incentives on completion of specific degree programs rather than funding community and technical colleges based on enrollment or attendance (Grubb, 1997). States could encourage completion of specific associate degree programs rather than rewarding institutions for large enrollments that do not necessarily lead to graduation (Grubb).

Young (1997) emphasized the need for a more coordinated public policy for enabling and encouraging economic development. Specifically, the barriers for community college participation in economic development need to be identified (Young). Young suggests utilizing the databases provided by the U.S. Department of Commerce to glean more information regarding the economic development trends on both the state and regional level.

Southwestern College in California assesses its economic development through three quantifiable factors of income, job creation, and credit bases expansion (Carvell, Graham, & Piland, 1998). With the creation of a new statewide system for reporting data of college graduates, Southwestern College has utilized the data from this system to measure the economic impact of its graduates (Carvell, Graham, & Piland). The results

of the study provides quantifiable data for institutional planning and promoting the value of an associate degree to the public (Carvell, Graham, & Piland). Southwestern College was able to utilize the data from the study to promote community college education, develop goals and indicators of effectiveness of the institution, and define the relevance of specific vocational programs (Carvell, Graham, & Piland).

Similarly, Seppanen (1998) noted the benefit of utilizing unemployment insurance records to analyze the outcomes of associate degree programs in the state of Washington. Economic benefit to community college graduates was evident through this data analysis (Seppanen). In addition, students in various programs received varying degrees of economic benefit, indicating that not all programs produced equivalent results for the graduates (Seppanen).

Grubb (1999) stressed the need for administrators to study local results of associate degrees on earnings for policy guidance, program improvement, identifying employment trends, accountability, and performance-based funding as college systems vary greatly nationwide. Combining the perception of state legislators with student earning power, Gillium and Davies (2003) investigated the human capital and economic value of a community college in an unidentified western state. The authors' intent of the study was to inform the legislators and local citizens of the value of community college education, both in terms of increasing human capital and economic impact (Gillium & Davies).

To ascertain the earning power of this institution's graduates, Gillium and Davies created a file merge with the state's department of employment and the college's data on graduates from 1996 to 1998. Wage data were collected on students prior to entering the

community college, during attendance at the college, and after leaving the college while legislator perceptions were gathered through personal interviews (Gillium & Davies).

A marked increase of earning power was demonstrated by the community college graduates from this institution, ranging from 43.9% to 56.7% for each of the three cohort years studied (Gillium & Davis, 2003). Gillium and Davies concluded the “data indicate that completing a college degree or certificate program at this community college does have a positive association with student earning power” (p. 245). In addition, legislators’ perception of earning power and economic impact of graduates from community colleges are based more on beliefs than quantifiable data (Gillium & Davies).

The Institute for Higher Education Policy (2005) national study solidly demonstrates the benefits of post-secondary education, though not thoroughly investigating the benefits of associate degree earners. Calling for more policy initiatives to increase state budgets for higher education, the Institute for Higher Education Policy asserts such investment in higher education will improve “prospects for state economic development, social stability, and individual prosperity” (p. 19).

### **Summary of Review**

Many studies have been completed over the past ten years that investigate the relationship of continued education and earning potential of the graduates. Most of these studies focus on baccalaureate education, while few have completed a direct assessment related only to associate degree programs. Several states have managed data merges to provide optimal outcome assessment for institutions of higher learning. Utilizing existing data files, states such as California, Tennessee, Florida, and North Carolina have been able to accurately assess and track wage information for the community and technical

college graduates. West Virginia is poised to benefit from such data sharing and file merging, providing much needed outcomes assessment by demonstrating the employment success of community and technical college program graduates as an indicator of economic development in the state.

## **CHAPTER THREE: RESEARCH METHODS**

This chapter will discuss the methods used to analyze existing data to quantify the employment success of community and technical college graduates by program as an indicator of economic development in West Virginia. Data for the study were collected from public agencies to describe the earning and employment status of community and technical college graduates.

### **Research Design**

The research design was non-experimental, quantitative, and descriptive. In non-experimental research, the researcher does not manipulate the independent variable, rather observations are made and interpreted on collected data (Johnson & Christensen, 2004). The study used existing, quantitative data for all variables, which were organized and analyzed using various descriptive statistical measures. An ex post facto design was used to determine if significant differences occur for number of community and technical college graduates employed in-industry in West Virginia.

### **Population**

Purposeful sampling was used to obtain the participant data needed for the study. The “subjects” for this study included associate degree program graduates from the community and technical colleges in West Virginia from 1997 to 2002. Programs analyzed included 100 or more graduates per program over the six year period, yielding a population of 6616 graduates in 23 programs. These subjects represent the human capital

identified as a key component of successful economic development (Becker, 1992; Schultz, 1961).

### **Data Collection**

Data for the variables were secured from Higher Education Policy Commission (HEPC) in cooperation with WORKFORCE West Virginia (WWV), a division of the Department of Commerce, and the West Virginia Bureau of Employment Programs (WVBEP) archival databases. The data were provided through an agreement between WWV, WVBEP, HEPC, and the researcher. See Appendix A for a copy of the signed agreement. This additional agreement was formulated by WWV as a supplement to the existing agreement between WWV, WVBEP, and HEPC, to assure confidentiality in all aspects of the study.

Rather than collecting self-reported data, the data from the WVBEP are submitted by employers in West Virginia. All employers, with few exceptions, must submit quarterly contribution and wage reports to the West Virginia Unemployment Compensation Division (Pardue, 2004). As previous studies have identified the significance of studying archival data for assessing effectiveness of programs and economic development efforts, the wage data gathered by the WVBEP provided the wage variables for the study.

The files from the WVBEP include the data fields which identify the graduates' earnings by quarter, year, match (employed), wages, employer, SIC, county, and zip code. From these files the HEPC builds a wage table by merging with the data in the student file (J. Barton, personal communication, June 21, 2005). Information contained in the student file includes 35 fields, such as institution attended, name, gender, and year

of birth (West Virginia Higher Education Policy Commission, 2005). The resulting file merge data fields are graduates' earnings quarter, wages, institution, CIP code, year, sex, race, citizen, year of birth, RES\_FEES, county, ENR\_F03, ENR\_S03, and ENR\_F-4. Not all data fields were requested for this study, rather, only data relevant to the research questions will be queried by the HEPC to provide the data fields including student identifier, CIP code of the graduate, wages earned by quarter, SIC of employer, institution where degree was earned, sex of the graduates, and year of graduation. The requested data from the file merge from the HEPC and the WVBEP were striped of all individual student identifiers. Privacy was not an issue with the data collection, as no surveys were sent to individuals and information was reported with no personal information identified.

The data files were placed on the HEPC secure web site in the form of an Excel spreadsheet. A pass-code was provided to enable the researcher to download the data files from the HEPC without risk of improper transfer of information or breach of security. Once the data files were retrieved by the researcher, the files were transferred to SPSS 14.0 data fields for statistical analysis. The data files were only analyzed for the purpose of this study, and were not released to other entities or otherwise saved on non-secure computers.

### **Data Analysis**

The study employed descriptive statistics, as existing databases were examined and summarized to answer the research questions. According to Johnson and Christensen, the function of descriptive statistics is "to describe, summarize, or make

sense of a particular set of data” (2004, p. 434). Non-parametric inferential statistics were selected to assess results for the fourth research question.

### **Research Questions**

1. What is the ratio of employed to unemployed community and technical college graduates in West Virginia? Percentage ratios were calculated for each program studied.

2. What are the differences in employment rates among the community and technical college program graduates in West Virginia? Data were analyzed by mean percentage statistics.

3. What is the range of annual earnings for graduates from each community and technical college program in West Virginia? Data were analyzed by use of range statistics.

4. What percentage of community and technical college graduates are able to find employment in the industry of the program from which they graduated in West Virginia? Data were analyzed using frequency and percentage statistics, including employment comparisons to employment in the industry and further analyzed using a 1 x k Chi-square Goodness of Fit Test.

The program majors identified through CIP codes by the Higher Education Policy Commission were cross-referenced with the corresponding Occupational Employment Statistics Classification, used by the Federal and State Bureau of Labor Statistics.

Markusen (2004) stresses the need to study occupations as a measure of human capital, instead of the industries, to determine the levels of economic development. Human capital and quality of life factors of economic development are primarily identified by

wage information. For the purpose of this study, wage information was the only quality of life indicator examined. The cross-referencing with the CIP and Occupational Employment Statistics Classification provided the data to answer research question number four, identifying whether community and technical college graduates secured employment in West Virginia in the industry related to the program area from which they graduated.

### **Summary**

The proposed study of employment success of community and technical college program graduates as an indicator of economic development in West Virginia was analyzed using a non-experimental ex post facto design. Data were collected from HEPC and WVBEP existing databases for all variables. Descriptive and inferential statistics were utilized for computing and analyzing the obtained data, using SPSS 14.0 software.

## **CHAPTER FOUR:**

### **RESULTS, PRESENTATION, AND ANALYSIS OF DATA**

The purpose of this study was to analyze existing wage data to quantify the employment success of community and technical college graduates by program as an indicator of economic development in West Virginia. Data for this study were collected from public agencies to describe the earning and employment status of community and technical college graduates.

#### **Data Collection**

Data for the variables were secured from the Higher Education Policy Commission (HEPC) in cooperation with WORKFORCE West Virginia (WWV), a division of the Department of Commerce, and the West Virginia Bureau of Employment Programs (WVBEP) archival databases. The data exchange was made available through an agreement between WWV, WVBEP, HEPC, and the researcher to ensure confidentiality of records. See Appendix 1 for a copy of the agreement.

The data files were retrieved by the researcher through the HEPC secure web site in the form of an Excel spreadsheet. The transferred Excel spreadsheet contained 37,674 rows of data representing all associate degree graduates in West Virginia public colleges, from both community and technical and baccalaureate colleges, from 1997 to 2002. The wage information was originally presented for each graduate in multiple rows depending on the quarters with earned wages and North American Industry Classification System (NAICS) code.

Data was first sorted by Classification of Instructional Programs (CIP) to obtain an estimate of the number of graduates per program. Program graduates during the six year period ranged from a high of over 1,100 to a low of one. For the purpose of this study, the researcher included those programs with 100 or more graduates over the six year period. By limiting the programs studied to those with 100 or more graduates, observations on the data trends were more reflective of the population from which the sample was drawn.

Prior to analyzing the data, the researcher restricted the data to graduates from the ten community and technical colleges in West Virginia. To determine which associate degree programs were associated with community colleges, the researcher confirmed the program offering through each community and technical college web-site, in conjunction with the program offering identified by the West Virginia Community and Technical College System (WVCTCS) web site. As noted in the literature review, community and technical colleges in West Virginia have evolved under various structures and governances, most recently governed by the WVCTCS. As such, six community and technical colleges had data reported under the “parent” institution for the years 1997-2002. This information was included for analysis provided that the community and technical college awards the degree for the program.

The variables included for analysis were programs identified by CIP code, year, gender, and institution of the graduate, wages by quarter and the industry code (NAICS) reported for the wages earned. The data exchange between the HEPC and WVBEP captures the reported wages of the graduate at the time of the file merge. The researcher added two identifiers to the data: employed and industry. The identifier of employed was

assigned to graduates who had any amount of earned wages the year following graduation. Graduates were identified as unemployed if no wages were reported for any or all quarters. The data set transferred from the HEPC did not indicate whether graduates with no earnings remained in the state and reported no wages, or if those graduates left West Virginia and were employed in another state.

The industry identifier was assigned by the researcher according to the CIP occupational crosswalk for the Bureau of Labor Statistics Occupational Employment Statistics Classification and Standard Occupational Classification (SOC). The data transferred from the HEPC listed the graduates' employers NAICS reported to the WVBEF. The researcher identified graduates as "in-industry" or "no-match" based on the first two digits of the NAICS code (industry sector) in relation to the SOC classification identified on the CIP crosswalk on the National Center for Education Statistics web-site.

The original data set presented wages earned per quarter. To determine annual wages earned for the file-merge year, wage data was subtotaled for each graduate by the industry which provided the wages. Therefore, graduates who worked in more than one industry therefore had several wage subtotals after the first round of wage sorting. Transferring the data to SPSS software resulted in multiple wage lines presented by industry for the same graduate. To rectify this problem, the researcher manually selected one industry for the graduate and totaled all wages for the quarters and industries under one NAICS industry identifier.

The final sample included 6616 graduates in 23 West Virginia community and technical college programs. As such, this study analyzed data from approximately one-

fourth of the community and technical college programs offered in West Virginia. While some of the programs are similar in nature, each program, identified by CIP code, contained more than 100 graduates over the six year period. Table 1 outlines the variety of programs and the variations of graduates among these programs over a six year period.

**Table 1. Program name and number of graduates from WV CTC**

Program	No. of Graduates 1997-2002
Engineering Technology	193
Applied Technology	125
Paralegal	246
Associate in Arts	853
Associate in Science	497
Occupational Development	345
Criminal Justice	233
Criminal Justice/Law Enforcement/Police Science	394
Human Services	142
Dental Hygiene	103
Health Information Technology	176
Physical Therapy Assistant	219
Radiologic Technology	150
Respiratory Therapist	189
Medical Laboratory Technology	172
Nursing	1058
Business Studies	304
Business	233
Business Accounting	127
Accounting	133
Administrative Assistant Technology	279
Business Technology	243
Business Administration	202

## **Research Questions**

1. What is the ratio of employed to unemployed community and technical college graduates in West Virginia?
2. What are the differences in employment rates among the community and technical college program graduates in West Virginia?
3. What is the range of annual earnings for graduates from each community and technical college program in West Virginia?
4. What percentage of community and technical college graduates are able to find employment in the industry of the program from which they graduated in West Virginia?

## **Data Analysis**

Descriptive statistics were utilized to answer the research questions from existing databases. The statistical analysis utilized SPSS 14.0 for Windows software. Ratio statistics were employed to answer research question number one: to determine the number of employed to unemployed community and technical college graduates in West Virginia.

Table 2 contains the various ratios of employed to unemployed graduates across the 23 programs along with related percentages. Graduates from community and technical college programs in West Virginia with degrees in Occupational Development, Dental Hygiene, and Criminal Justice/Law Enforcement/Police Science, demonstrated the highest ratio of employment to unemployment (3.73, 3.68, and 3.53, respectively). For example, the ratio of employed to unemployed graduates with degrees in Occupational Development was 3.73. Graduates with degrees in Respiratory Therapy, Electrical

Engineering Technology, and Business Accounting demonstrated the lowest ratio of employment to unemployment (1.03, 1.51, and 1.54, respectively) of the programs analyzed. For example, the ratio of employed to unemployed graduates with Respiratory Therapy degrees was 1.03, meaning that graduates were as likely to be employed as they were to be unemployed. The overall ratio of employed to unemployed graduates from the 23 community and technical college programs in West Virginia was 2.28.

**Table 2. Ratio of employed to unemployed CTC program graduates in WV**

Program	Ratio employed/unemployed	Percent Employed
Electrical Engineering Technology	1.51	60.1
Dental Hygiene	3.68	78.6
Health Information Technology	2.74	73.3
Medical Laboratory Technology	1.65	62.2
Nursing	2.19	68.6
Physical Therapist Assistant	2.84	74.0
Radiologic Technology	2.75	73.3
Respiratory Therapy	1.03	50.8
Accounting	1.83	64.7
Business	1.77	63.9
Business Accounting	1.54	60.6
Business Administration	2.37	70.3
Business Studies	1.90	65.5
Criminal Justice	2.58	72.1
Criminal Justice/Law Enforcement /Police Science	3.53	77.9
Human Services	1.96	66.2
Paralegal	2.15	68.3
Associate in Arts	1.62	61.8
Associate in Science	1.76	63.8
Occupational Development	3.73	78.8
Applied Technology	2.13	68.0
Administrative Assistant Technology	2.99	74.9
Business Technology	2.24	69.1
Total N	23	
	Mean	2.28
		68.12

Mean percentage statistics were used to answer research question two: to determine the differences in employment rates among community and technical college program graduates. These data are also presented in Table 2. The mean overall percentage of employment between the program graduates studied was 68.12%, or that nearly seven out of 10 graduates were employed. The three programs, Occupational Development, Dental Hygiene, and Criminal Justice/Law Enforcement/Police Science, with the highest ratios of employment to unemployment posted over 77% employment (78.8, 78.6, and 77.9%, respectively). Conversely, the three programs with the lowest ratios of employment, Respiratory Therapy, Electrical Engineering Technology, and Business Accounting, scored the lowest percentage of employment (50.8, 60.1, and 60.6%, respectively) for students following graduation.

Range statistics were used to answer research question number three concerning the range of annual earnings for community and technical college graduates by program area. Table 3 lists the ranges of wages, or difference between the highest and lowest wages, earned for each program, with in-industry and not-in-industry wage ranges identified. Wage data provided through the agreement with HEPC, in cooperation with the WVBEF, were presented in quarters. The researcher calculated the wages only on the basis of data presented in the file merge and did not project wages from one quarter of earnings as Grehan had calculated in 2003. Overall, the range, of wages for graduates was \$176,422.73. Human Services program graduates demonstrated the smallest range in earnings with \$30,566.15 while Business Administration program graduate earnings ranged \$206,978.88. The implications of these wide ranges of earnings are highlighted in the next section.

**Table 3. Salary ranges of employed program graduates overall, out-of-industry, and in-industry**

Program	Range All Wages	Range Not –in- industry	Range In-Industry
Electrical Engineering Technology	123155.91	123155.91	95095.51
Dental Hygiene	54869.60	36956.15	54869.60
Health Information Technology	55751.41	37768.00	55587.12
Medical Laboratory Technology	60291.26	37236.96	60285.92
Nursing	88088.85	64141.90	88088.85
Physical Therapist Assistant	64970.25	43850.64	64339.05
Radiologic Technology	77831.86	64109.41	77831.86
Respiratory Therapy	87542.94	39328.16	87542.94
Accounting	72988.66	55605.12	72653.31
Business	71717.74	71717.74	58863.63
Business Accounting	60517.96	60517.96	43062.49
Business Administration	206978.88	73133.39	206953.59
Business Studies	72130.98	72130.98	53444.48
Criminal Justice	68469.58	68469.58	54861.90
Criminal Justice/ Law Enforcement/ Police Science	119308.81	62847.21	118835.84
Human Services	30556.15	28396.56	30556.15
Paralegal	53986.59	53986.59	48610.90
Associate in Arts	117253.45	.	.
Associate in Science	107740.36	.	.
Occupational Development	91941.89	.	.
Applied Technology	72216.02	.	.
Administrative Assistant Technology	59625.00	.	.
Business Technology	76710.59	.	.
Overall range	176422.73	94759.35	176397.44

Frequency and percentage statistics were used to answer research question number four by identifying the number of community and technical college graduates able to find employment in West Virginia in the industry of the program from which they graduated. The frequency data were further analyzed by using a 1 x k Chi-square Goodness of Fit Test. The percentage of graduates employed in the industry sector associated with the program CIP along with the Chi-square values for in-industry and not-in-industry employment frequency, are listed in Table 4.

These data do not include figures for the six programs with unidentifiable industry employment. Dental Hygiene graduates were the most likely to find employment in-industry while Business Accounting graduates were the least likely to find employment in-industry. Of the 17 programs analyzed, the average percentage of graduates employed in-industry was less than half at 46.8%. As a result of the industry ambiguity of six of the community and technical college programs, “in-industry” and “industry” was not identified for degrees of Associate in Arts, Associate in Science, Occupational Development, Applied Technology, Administrative Assistant Technology, and Business Technology.

**Table 4. Percent of graduates employed in-industry, not-in-industry, and no-income per program with Chi-square test of significance values**

Program	Percent In-industry	Percent Not-in-industry	Percent No-income	Chi-square
Electrical Engineering Technology	40.9	19.2	39.9	15.2*
Dental Hygiene	72.8	5.8	21.4	58*
Health Information Technology	62.5	10.8	26.7	64*
Medical Laboratory Technology	57.6	4.7	37.8	77*
Nursing	66.1	2.6	31.4	622*
Physical Therapist Assistant	62.1	11.9	26	74*
Radiologic Technology	70	3.3	26.7	90*
Respiratory Therapy	44.4	6.3	49.2	54*
Accounting	30.8	33.8	35.3	0.18
Business	35.2	28.8	36.1	1.5
Business Accounting	22.8	37.8	39.4	4.64
Business Administration	38.6	31.7	29.7	1.38
Business Studies	30.9	34.5	34.5	0.61
Criminal Justice	33.5	38.6	27.9	0.86
Criminal Justice/ Law Enforcement/ Police Science	48.7	29.2	2.1	19.26*
Human Services	46.5	19.7	33.8	15.36*
Paralegal	50.8	17.5	31.7	40.02*
17 Mean	47.89	21.27	30.8	

\*Significant at p<.001

### Major Findings

The major findings associated with the research questions addressed above are as follows:

***Finding One.*** The ratio of employed to unemployed community and technical college graduates in West Virginia varies unpredictably according to program. Programs in the health field recorded both the highest and lowest ratios of employed to unemployed graduates. Graduates with degrees in Occupational Development, Dental Hygiene and Criminal Justice/Law Enforcement/Police Science are over three and a half times more

likely to be employed than not employed. Conversely, Respiratory Therapy graduates are about as likely to be employed as not employed.

The ratio of employed to unemployed graduates is skewed for identifying successful employment as the ratio does not account for graduates who find employment outside of West Virginia, or for those who may be continuing for a four-year degree. The low employment ratio of 1.51 and 60.1% employment rate for Engineering Technology graduates may be related to a combination of the above factors. The same may be said for Respiratory Therapy with an employment ratio of 1.03 and 50.8% employment rate. Graduates with lower ratios of employment to unemployment could have found employment out of the state either by necessity or desire. However, the employment success of graduates out-of-state does not provide benefit for the economic development of West Virginia.

***Finding Two.*** As the ratio of employed to unemployed community and technical college graduates in West Virginia varies unpredictably according to program, the employment rate also varies unpredictably according to program. Graduates from all programs averaged 68.12% employment, with employment defined as any earnings reported for the graduate. In comparison, Grehan (2003) reported a 65.7% employment rate for graduates from Tennessee community and technical college graduates, with employment defined by requiring all four quarters of earnings in the year.

Twelve program employment rates surpassed the overall rate of 68.12 percent. These programs are from five different program areas, including Multi/Interdisciplinary Studies (Occupational Development); Health Professions and Related Clinical Sciences (Dental Hygiene, Health Information Technology, Physical Therapist Assistant,

Radiologic Technology, and Nursing); Security and Protective Services (Criminal Justice and Criminal Justice/Law Enforcement/Police Science); Legal Professions and Studies (Paralegal); and Business, Management, Marketing, and Related Support Services (Administrative Assistant Technology, Business Administration, and Business Technology). While the programs examined differed in Grehan's (2003) study, the previous research found similar higher employment rates for community and technical college graduates in Tennessee for health and business professions.

When considering employment rate as an indicator of economic development in West Virginia, the overall employment rate of 68.12% for the 6616 graduates is comparative to the results produced in Tennessee by Grehan (2003). As such, a limitation to this study is that conclusions cannot be accurately drawn from this researcher's results regarding the overall employment rate of graduates, as wages from out of state are not included in the data supplied by the HEPC. Beyond economic development, another role of community and technical college education includes transfer to four-year institutions (Bailey, 2003; Cohen & Brawer, 1996; Eaton, 1994; Eels, 1931; Koos, 1924; Monroe, 1972). Graduates of two year programs may matriculate into baccalaureate programs prior to entering the workforce and therefore not demonstrate income or economic development until completion of the four-year degree.

***Finding Three.*** The range of reported earnings for graduates from each community and technical college program in West Virginia for 1997 to 2002 was \$176,422.73. Table 5 contains the mean and median of wages by program for comparison to the ranges, in addition to the two digit identifier for program area. Table 6 further delineates the earnings into mean and median wages both in-industry and not-in-

industry. The earnings varied greatly by program area, similar to previous research on wage data from community and technical college graduates (Grubb, 1997). Range data show the extreme of wage earnings for each program area, but related mean and median data present a more realistic representation of graduate earnings (Johnson & Christensen, 2004).

The Health Professions and Related Clinical Services program area contains the highest wage earners, with Radiologic Technology and Nursing posting the highest and third highest mean wages. Electrical Engineering Technology program graduates posted the second highest mean wages for graduates. Six of the seven programs in the area of Health Professions and Related Clinical Services reported graduate earnings well above the average of the 23 programs mean wages of \$24,993.41. Business Administration reported the highest range of earnings in the area of Business, Management, Marketing, and Related Support Services, and was the only one of the seven programs in that area reporting earnings over the mean wage of \$24,993.41.

Previous researchers noted the likelihood of increased earnings with degrees from occupationally specific fields aligned with business and industry (Grubb, 1997; Laanan, 1998). This study has produced similar results. Of the six programs not examined in research question four because of a lack of identifiable industry, four of those programs reported wages substantially below the mean average wages of the 23 programs, with none of the mean wages reported over \$20,000. The remaining two of the six programs which did demonstrate wages above the mean were Occupational Development and Applied Technology.

Several programs demonstrated normal distribution of wages, where the mean and median were almost identical. Health Information Technology, Business Accounting, Criminal Justice, Criminal Justice/Law Enforcement/Police Science, and Human Services all reported mean and median wages within several hundred dollars. This normal distribution would usually account for minimal outliers of data, with a more precise range (Johnson and Christensen, 2004). Interestingly, Criminal Justice/Law Enforcement/Police Science posted a range of \$119,308.81, with the mean and median wages at \$27,119.00 and \$27,314.79, respectively. This extreme difference between the range and similarity between the mean and median wages could be the result of a single outlier wage earner while the majority of graduates are more likely to earn just over \$27,000. The remaining programs with normally distributed wages demonstrated a lower range with less chance of extreme wage earners skewing the reported data.

**Table 5. Mean and median wages by program with program area**

Program	Program area	Mean	Median
Electrical Engineering Technology	15	40432.46	37642.18
Dental Hygiene	51	29327.95	31510.94
Health Information Technology	51	20107.24	20375.31
Medical Laboratory Technology	51	26243.15	27337.67
Nursing	51	36395.78	38771.18
Physical Therapist Assistant	51	27439.81	31832.25
Radiologic Technology	51	42957.38	46071.86
Respiratory Therapy	51	27001.83	30415.73
Accounting	52	20660.65	19918.51
Business	52	23025.72	20766.61
Business Accounting	52	18640.12	18614.37
Business Administration	52	26297.40	20593.49
Business Studies	52	20642.56	18793.36
Criminal Justice	43	20866.91	20664.48
Criminal Justice/ Law Enforcement/ Police Science	43	27119.00	27314.79
Human Services	44	12798.89	12245.68
Paralegal	22	20301.81	21091.00
Associate in Arts	24	18295.01	15590.12
Associate in Science	24	19316.64	15954.18
Occupational Development	30	32321.29	23448.74
Applied Technology	15	27570.99	25728.05
Administrative Assistant Technology	52	19408.33	19325.60
Business Technology	52	17677.50	17856.39
		24993.41	24428.80

***Finding Four.*** The most revealing data analyzed is the percentage of community and technical college graduates who successfully secured employment in the industry of the program from which they graduated. The number of programs investigated drops from 23 to 17 with identifiable NAICS designation for industry correlation. The highest percentage of graduates working in industry was evident in the Health Professions and Related Clinical Sciences area with Dental Hygiene and Radiologic Technology employing 72.8% and 70.0% graduates, respectively. Of the eight programs that reported more than the mean of 47.89% of graduates employed in-industry, six of these were in the Health Professions and Related Clinical Sciences area. Conversely, of the nine remaining programs with less than 47.89% of the graduates working in-industry, five, or over half of these were in the Business, Management, Marketing, and Related Support Services area.

Upon calculation of a 1 x k Chi-square Goodness of Fit Test, the data demonstrated very significant and strong in-industry employment at the  $p < .001$  level for programs in the Health Professions and Related Clinical Sciences area. Graduates from the program areas of Legal Professions and Studies, Security and Protective Services, and Engineering Technologies also demonstrated strong significance for employment in-industry. Conversely, programs in the Business, Management, Marketing, and Related Support Services area demonstrated a strong significance for employment not-in-industry, well above the chance that graduates were not employed in-industry ( $p < .001$ ). Only one program, Business Accounting, in the Business, Management, Marketing, and Related Support Services area showed a chance of employment in-industry ( $p < .05$ ).

Grubb (1997) concluded that to most benefit from the program, graduates needed to find employment in the industry from which they graduated. The results of this research support Grubb's earlier findings as 13 of the 17 program graduates' demonstrated higher earnings when employed in-industry. However, this research notes employment success, as defined by mean and range wages, was not restricted to the graduate finding employment in-industry. Three programs demonstrated higher earnings for graduates out-of-industry while one program, Accounting, presented almost equal earnings for graduates working in- or out-of-industry.

Accounting and the three programs where graduates earned more out-of-industry than in-industry are all listed in the Business, Management, Marketing, and Related Support Services area. Employment in the Business, Management, Marketing, and Related Support Services area is not as easily identified by NAICS designation. The low employment in-industry yet high out-of-industry may be attributed to the limited industries identified by SOC, in turn resulting in fewer in-industry designations by the researcher.

**Table 6. Mean and Median Wages in-industry and not-in-industry**

Program	Not-Industry Mean	Not-Industry Median	In-Industry Mean	In-Industry Med
Electrical Engineering Technology	30332.44	25474.97	45162.84	46148.49
Dental Hygiene	13658.13	8786.16	30581.53	31684.36
Health Information Technology	12985.99	8882.93	21337.27	21306.80
Medical Laboratory Technology	17695.46	12480.23	26933.87	27533.09
Nursing	20844.90	17622.72	36996.47	39111.41
Physical Therapist Assistant	15016.45	11960.69	29814.86	32677.84
Radiologic Technology	30518.53	16239.41	43549.70	46775.65
Respiratory Therapy	13766.49	9720.33	28892.59	32438.36
Accounting	20028.61	19954.35	21354.35	18924.70
Business	23509.30	20747.50	22630.60	20867.03
Business Accounting	19548.91	19941.12	17135.96	17675.28
Business Administration	21766.14	19867.32	30015.35	21599.50
Business Studies	24096.13	21908.12	16784.86	15407.44
Criminal Justice	20169.90	15925.53	21672.09	23416.12
Criminal Justice/ Law Enforcement/ Police Science	19523.06	19043.20	31668.66	36927.85
Human Services	10758.46	8135.17	13664.52	13907.09
Paralegal	16167.83	15044.31	21723.90	21613.67

### **Ancillary Findings**

In the sample studied, graduates from all of the programs reviewed were more than two times as likely to be female. Only three programs graduated more males than females: Electrical Engineering Technology, Criminal Justice/ Law Enforcement/ Police Science, and Applied Technology. While graduates from all three of these programs posted earnings above the mean for all majors, the highest mean wage was in Radiologic Technology, which had three times as many female as male graduates.

The sample studied included approximately one fourth of the programs offered by community and technical colleges in West Virginia. The sample was limited to programs

with 100 or more graduates. With the high percentage of female to male graduates in the sample, one may surmise that graduates from the more populated programs are more likely to be female.

The NAICS codes were analyzed for the graduates of the six programs not identified as “in-industry” and “not-in-industry” (Associate in Arts, Associate in Science, Occupational Development, Applied Technology, Administrative Assistant Technology, and Business Technology). While these six programs had many NAICS codes identified for graduates, the highest percentage of industry codes all fell in the Health Care and Social Assistance sector codes. Approximately 18.3% of the 853 graduates with an Associate in Arts degree found employment in this sector, with 11.1% of these graduates reporting employment in the Educational Services sector.

Of the 497 graduates with a degree in Associate in Science, the largest single area of employment was in the Health Care and Social Assistance sector with 7.8%, and Financial and Insurance area with 7.4%. There were 345 graduates in Occupational Development, 18.8% of which found employment in the “Other services, except public administration”, 14.8% in Public Administration, and 14% in the Health Care and Social Assistance sector. Of the 279 Administrative Assistant Technology graduates, 21.2% found employment in the Health Care and Social Assistance sector, while 10.1% were employed in the Public Administration sector. Of the 243 graduates with a degree in Business Technology 18.5% were employed in the Health Care and Social Assistance sector, and 8.3% in the Finance and Insurance sector.

Graduates with Applied Technology degrees were widely scattered by industry of employment. The Construction sector claimed the greatest percentage of graduates with

10.4% of the 125 graduates employed and 9.6% employed in the Professional, Scientific, and Technical Services sector.

### **Summary**

Wage data on graduates from community and technical colleges in West Virginia between 1997 and 2002 were examined for employment success as an indicator of economic development. Existing data were acquired from HEPC in cooperation with the WVBEP. Data were sorted to include programs with 100 or more graduates, resulting in a sample of approximately one quarter of the programs offered at community and technical colleges, which yielded 6616 graduates from 23 programs.

The four research questions aimed at determining the employment success of graduates were answered through the use of descriptive statistics. Employment success, as an indicator of economic development, was examined in relation to the ratio of employment, employment rates, range of annual earnings, and employment in industry of graduates from community and technical colleges in West Virginia.

The mean ratio of employment to unemployment of the 6616 community and technical college graduates was 2.28. Occupational Development posted the highest ratio of employed to unemployed graduates at 3.73, while Respiratory Therapy posted the low ratio of 1.03. Respectively, the mean employment rate for all graduates from the 23 programs was 68.12%, with Occupational Development reaching the high of 78.8% employment and Respiratory Therapy recording the lowest employment rate among programs of 50.8%. The ratio of employed to unemployed graduates and employment rates of graduates per program are displayed in Table 2.

Graduates in the 23 programs from the six years studied earned wages which ranged \$176,422.73. Business Administration graduates posted a wage range of \$206,978.88, while Human Services program graduates earnings ranged \$30,566.15. The ranges of wages for the programs studied are listed in Table 3. Mean and median wages of program graduates were also investigated along with the range earnings to offer further interpretation of data. While Business Administration graduates posted the highest range of earnings, the mean wages were much lower at \$26,297.40 and median wages at \$20,593.49, indicating the presence of an extreme earning for one or more graduates. On the other hand, Human Services graduates demonstrated mean and median wages closer to the range, indicating fewer extreme wage earners and only posting mean wages of \$12,798.89. Mean and median wages for each of the programs are listed in Table 5. Overall, programs in the Health Professions and Related Clinical Services area posted the highest average wage earners.

Seventeen programs with identifiable NAICS designations were studied to identify the number of community and technical college graduates who secured employment in the industry of the program. Graduates with degrees in the Health Professions and Related Clinical Sciences area demonstrated the highest number of graduates finding employment in-industry. Graduates with degrees in the Business, Management, Marketing, and Related Support Services area posted the lowest percentage of graduates employed in-industry. Table 4 lists the percentage of graduates employed in-industry, not-in-industry, and unemployed.

While not related to the research question, several other findings of interest were noted. Of the 23 programs studied, graduates were more than two times as likely to be

female. In the six programs with unidentifiable industry areas of employment, several trends were noted among graduates. Primarily, the largest group of these graduates, regardless of program, found employment in the Health Care and Social Assistance sector.

As noted previously, Markusen (2004) argued the importance of targeting occupations, rather than industries, for the purpose of regional economic development. The results of this study provide insight into both the ability for graduates to find employment in-industry, and the economic development, defined by wages, produced by the graduates by program area.

## **CHAPTER FIVE: CONCLUSIONS, IMPLICATIONS, AND RECOMMENDATIONS**

This chapter provides the summary of purpose, conclusions, and recommendations of the research. Sections that follow consist of the summaries of the purpose, procedures, descriptive data, findings, ancillary findings, limitations, conclusions, implications, and recommendations.

### **Summary of Purpose**

The purpose of this study was to analyze existing wage data to quantify the employment success of community and technical college graduates by program as an indicator of economic development in West Virginia. Data for the variables were obtained through an agreement between the researcher and the Higher Education Policy Commission (HEPC) in cooperation with WORKFORCE West Virginia (WWV), and the West Virginia Bureau of Employment Programs (WVBEP) archival databases.

The following questions guided this research.

1. What is the ratio of employed to unemployed community and technical college graduates in West Virginia?
2. What are the differences in employment rates among the community and technical college program graduates in West Virginia?
3. What is the range of annual earnings for graduates from each community and technical college program in West Virginia?
4. What percentage of community and technical college graduates are able to find employment in the industry of the program from which they graduated in West Virginia?

## **Summary of Procedures**

The data acquired contained 37,674 rows of information representing all associate degree graduates in West Virginia public colleges from 1997 to 2002. The researcher sorted the data to identify graduates by Classification of Instructional Programs (CIP) codes, further limiting the sample to programs with 100 or more graduates in the six year period. In addition, the data were refined to comprise graduates only from community and technical colleges. The variables included for analysis were programs identified by CIP code, year, gender, institution of the graduate, wages by quarter, and the North American Industry Classification System (NAICS) code reported for the wages earned. The researcher identified two additional variables for each graduate based on wages reported and the first two digits of the NAICS code in relation to the Standard Occupational Classification (SOC): employed or unemployed and in-industry or not-in-industry.

## **Summary of Descriptive Data**

The final sample included 6616 graduates from 23 West Virginia community and technical college programs. The data from this sample were analyzed to answer three of the four research questions. The data for the final research question were further limited to 17 programs with identifiable industry designations for graduates. Descriptive statistics, including ratio, mean percentage, range, and frequency statistics along with 1 x k Chi-square Goodness of Fit Test, were utilized to answer the research questions.

## Summary of Findings

The ratio of employed to unemployed community and technical college graduates in West Virginia varies unpredictably according to program. Program graduates in the health fields demonstrated both the highest and lowest ratios of employed to unemployed, with Respiratory Therapy graduates just as likely to be employed or unemployed. Dental Hygiene graduates were over three and a half times more likely to be employed than unemployed. Occupational Development graduates and Criminal Justice/Law Enforcement/Police Science also enjoyed the highest employment rates, again being more than three and a half times more likely to be employed than unemployed.

Understandably, the employment rate of graduates also varied unpredictably according to program. The mean rate of employment for all graduates of the 23 programs was 68.12 percent. Twelve programs from five different program areas surpassed the mean employment rate of 68.12 percent, including Multi/Interdisciplinary Studies (Occupational Development); Health Professions and Related Clinical Sciences (Dental Hygiene, Health Information Technology, Physical Therapist Assistant, Radiologic Technology, and Nursing); Security and Protective Services (Criminal Justice and Criminal Justice/Law Enforcement/Police Science); Legal Professions and Studies (Paralegal); and Business, Management, Marketing, and Related Support Services (Administrative Assistant Technology, Business Administration, and Business Technology).

Business Administration posted the highest range of earnings, followed by Electrical Engineering Technology, and Criminal Justice/Law Enforcement/Police Science. The programs with the next highest range of earnings were the general associate

degrees in Arts and in Science. To gain a more realistic understanding of program graduate wage data, the researcher also examined mean wages. Six of the seven programs in the area of Health Professions and Related Clinical Services reported graduate earnings well above the average wages, \$24,993.41, for all programs. Of the programs demonstrating the highest range of earnings, only Electrical Engineering Technology exhibited a high mean wage, \$40,432.46, to correspond with the high range earnings, \$123,155.91.

Of the 17 programs with identifiable NAICS designations for industry correlation, the highest percentage of graduates working in industry were in the Health Professions and Related Clinical Sciences area. Dental Hygiene reported 72.8%, and Radiologic Technology 70.0%, of graduates employed in-industry. Overall, six of the seven programs in the Health Professions and Related Clinical Sciences area reported the number of graduates employed in-industry over the mean of 47.89%. Respiratory Therapy, at 44.4% was the only health related program with in-industry employment below the mean of the group. Conversely, none of the five programs in Business, Management, Marketing, and Related Support Services area reported the percentage of graduates working in-industry over the mean.

The researcher subjected the data for research question four to a 1 x k Chi-square Goodness of Fit Test for additional statistical analysis. The results revealed a very significant and strong in-industry employment at the  $p < .001$  level for programs in the Health Professions and Related Clinical Sciences, Legal Professions and Studies, Engineering Technologies, and one of the programs in Security and Protective Services. The remaining program in the Security and Protective Services area, Criminal Justice,

and all programs in Business, Management, Marketing, and Related Support Services demonstrated a strong significance for employment not-in-industry.

### **Summary of Ancillary Findings**

Ancillary findings indicate that the program graduates are more than two times as likely to be female. Respectively, the more populated programs, such as those included in this study, are more likely to attract a majority of female students. For the programs with un-identifiable industry sectors, the researcher summarized the most frequent areas of employment. The NAICS codes varied considerably for the six programs, however, the most popular employment areas remained in the Health Care and Social Assistance sector.

### **Limitations**

This study was limited by several factors. The researcher assigned the in-industry and not-in-industry designation based on the two digit industry classification (NAICS) codes. This industry assignment was intentionally limited to the first two-digits of the NAICS code to allow for employment in-industry based on the sector. For example, a dental hygiene graduate typically would be employed in a dental office to be considered in-industry, yet some dental facilities are located within hospital settings, which have a different four digit NAICS code. By using the first two digits of the NAICS code to make the in-industry assignment, less typical employment was considered in-industry for all programs. Resultantly, the two-digit assignment also allowed for some graduates to be coded as working in-industry, though the graduates' area of employment may not have been specific to the degree earned.

The SOC codes identified for the business programs were limited, thus limiting the designation of in-industry. It is possible that graduates secured employment related to their business program degree, but this employment may not have been identified through the SOC and NAICS codes.

The data analyzed were limited to a one-year period of time, as reported by the WVBEPC to the HEPC. Thus, graduates identified as unemployed may have found employment the following year, and the same could be true for employment in-industry and not-in-industry. Wages reported for each graduate were not annualized to account for August or December graduates. Rather, only the wages for the one-year period reported to the HEPC were included in this study.

### **Conclusions**

The data indicate a wide variety of employment success of graduates from community and technical colleges in West Virginia. The results of this study concur with Seppanen's (1998) findings that graduate earnings depend greatly on the field of study. Alumnae from health-related programs in West Virginia are more likely to be employed in-industry with the highest reported wages among community and technical college graduates. Electrical Engineering Technology also reported high earnings, though the ratio of employed to unemployed graduates was low (1.51). The low employment rates for Electrical Engineering Technology may be attributed to students who continued their education rather than entering the workforce the year after graduation. Interestingly, the Associate in Science and Associate in Arts majors exhibited slightly higher employment ratios (1.76 and 1.62, respectively) than Electrical Engineering Technology. Graduates from these typically transfer programs are more likely to pursue baccalaureate degrees

than other technical program graduates, yet still exhibit higher employment ratios than Electrical Engineering Technology, Respiratory Therapy, and Business Accounting graduates.

The results of this study are similar to the outcomes of Grehan's 2003 study. While Grehan defined employment differently (graduates must have been employed all four quarters), the mean employment rate of 65.7% was comparable to this study's employment rate of 68.12%. Grehan concluded that associate degree graduates in health and business professions in Tennessee enjoyed higher employment rates, while this study revealed a higher rate of employment in the health care fields than the business professions.

In previous studies, graduates were more likely to have increased earnings in degrees with occupationally specific employment (Grubb, 1997; Laanan, 1998). This study revealed similar earnings results, except for two programs with un-identifiable industry coding, where graduate wages exceeded the mean: Occupational Development and Applied Technology. While the researcher could not identify the industry specific to these graduates, both degrees are occupationally bound in nature. Converse to Grubb's research, programs in the Business, Management, Marketing, and Related Support Services area demonstrated higher mean income for employment out-of-industry. The low in-industry yet high out-of-industry employment may be attributed to the limited industries identified by SOC, in turn resulting in fewer in-industry designations by the researcher.

Of the graduates from the six programs with un-identifiable industry designations, three of the programs exceeded the mean percentage (68.12%) of employment. The

highest percentages of graduates in these six programs were employed in the Health Care and Social Assistance sector, even though none of the degrees were in the Health Professions and Related Clinical Sciences program area.

The mean wage data supports previous researchers' results with Health and Engineering fields reporting higher wages than other program areas (Grehan, 2003; Grubb, 1997; Laanan, 1998). The program demonstrating the lowest mean and range of wages was Human Services. The research thus indicates a higher level of economic development, or earnings, from graduates in the Health Professions and Related Clinical Sciences and Engineering Technology areas.

### **Implications**

The use of data from merged databases provides a current snapshot of earnings for graduates from community and technical colleges (Sanchez, 1998). By examining the wages per program area, conclusions may be made regarding the ability of graduates to contribute to economic development. Graduates who have moved out-of-state or pursuing additional degrees are reported as unemployed. While this distinction is necessary to understand the overall rate of employment, it is not a factor when identifying indicators of economic development in the state. Employment success, as an indicator of economic development, was easily demonstrated by graduates from many of the programs, reliably among the Health Professions and Related Clinical Sciences. These results are consistent with previous research indicating higher wage earners in health related fields (Grehan, 2003; Grubb, 1997; Laanan, 1998).

The research demonstrated a high frequency of earned degrees by graduates in several program areas with high ratios of employment. Four of the seven programs in

health related fields posted employment ratios over 2.75, along with Criminal Justice/Law Enforcement/Police Science, Administrative Assistant Technology and Occupational Development. Students entering these fields could expect to find employment in the chosen industry upon graduation. Providing information on employment success of graduates by program to potential students would be a powerful marketing tool. Additionally, such occupational analysis can link education with recruiting employers to a region to promote economic development (Markusen, 2004).

Programs for Health Professions and Related Clinical Sciences typically are more expensive to run (Grubb, 1997). Previous researchers highlighted the need to link the success of community and technical college program graduates to funding requests (Kirsehnmann & Lane, 2001; Smith, 1996). The results of this study justify increased funding for programs in the Health Professions and Related Clinical Sciences areas, as these graduates contribute to the economic development through increased earnings and probability of being employed in West Virginia.

Utilizing existing data provided several insights regarding community and technical college graduates' contributions to the economic development of the state. Previous studies have included other variables for determining community and technical college impact on economic development, such as graduation rates, job creation, and individual earnings (AACC, 2004; Gracie, 1998; Grehan, 2003; Kirshenmann & Lane, 2001; Laanan, 1998; Pennington, Pitmann, & Hurley, 2001; Pfeiffer, 1998; Seppanen, 1998; Smith, 1996). Administrators of community and technical colleges may use the data sorted to the level of this research to assist in decision making regarding program funding and areas of potential program growth. When employing descriptive statistics,

Laanan (1998) cautions against using aggregate data for performance accountability. The same caution is issued with the results of this study.

Human capital, as measured by the employment success, is gained through graduation from community and technical colleges in West Virginia. Paulsen (1998) identified income as the quantifiable measure typically attributed to human capital. The programs that demonstrate the greatest gains in human capital are in the Health Professions and Related Clinical Sciences degree areas. The results of this study clearly demonstrate economic development, as measured by employment success, for graduates from community and technical colleges in West Virginia. By providing the needed human capital identified by program area, community and technical college graduates play a vital role in economic development (Baldwin, 1966; Becker, 1992; Grubb, Badway, Bell, Bragg, & Russman, 1997; Schultz, 1961).

### **Recommendations**

An analysis of the descriptive data and the findings of this research have resulted in the following recommendations.

1. Write computer programs to compile the needed data, as this researcher has compiled, for institutional and programmatic assessment. With appropriate direction, the HEPC could work with the WWV and WVBEP to create computer code to summarize the annual earnings and program associations with industry based on the SOC and NAICS codes of employment.
2. Include multiple years of wage information in the data exchange to enable institutions to study graduate earnings over time. Additional use of the existing databases and exchange agreements between the HEPC, WWV, and WVBEP

would allow further investigation of economic development over an extended period.

3. Include a qualitative aspect in this study through interviews with graduates' employers. The current data exchange between the HEPC and WVBEPC includes the employer identifier. A study involving a carefully controlled release of employer information would enable researchers to include a qualitative aspect studying the success of the employers, while expanding the definition of economic development.
4. Investigate all community and technical college programs, with no minimum number of graduates per program, during the six-year period. While the limit in this study was intentional to create a sample more reflective of the population, including more programs for statistical analysis would have provided other areas, i.e. more engineering, computer, and public administration programs, for further descriptive observation.
5. Investigate the relationship between the counties of employment for the graduates and the service region for the community and technical colleges. Analysis of this existing data would provide institutional insight as to the ability to serve the needs of the region while promoting economic development.

## REFERENCES

- American Association of Community Colleges. *College Impact*. Retrieved May 5, 2004 from <http://www.aacc.nche.edu>.
- American Association of Community Colleges. (1987). *AACC Position Statement on the Associate Degree*. Retrieved November 1, 2002 from <http://www.aacc.nche.edu>.
- Asbury, R.L. (2002). Pitfalls, promises, and potential: West Virginia community colleges, economic development, and Senate Bill 547. (Doctoral dissertation, West Virginia University, 2001). *Dissertation Abstracts International*, 63/04, 1235.
- Bailey, T. R. (2003). Community colleges in the 21<sup>st</sup> century: Challenges and opportunities. [Electronic version] *Community College Research Center Brief*, 15 (January) 1-4.
- Baldwin, R. E. (1966). *Economic Development and Growth*. New York: John Wiley & Sons.
- Becker, G. S. (1992). The Adam Smith address: Education, labor force quality, and the economy. [Electronic version]. *Business Economics* (27)1. 1-7.
- Carnevale, A. P., & Desrocher, D. M. (2003, June/July). If America's so dumb, why are we so rich? [Electronic version]. *Community College Journal*, 10-15.
- Carvell, F., Graham, M., & Piland, W.E. (1998). Institutional Level Implementation: Translating research into current practice. [Electronic version] In J.R. Sanchez & T. S. Laanan (Eds.), *New Directions for Community Colleges*, 104 (pp. 69-76). San Francisco: Jossey-Bass.

- Cohen, A. M., & Brawer, F. B. (1996). *The American Community College* (3<sup>rd</sup> ed.). San Francisco: Jossey-Bass.
- Coomes, P.A. (1998). Economic performance measures for metropolitan areas. [Electronic version]. *Journal of Economic and Social Measurement*, 24. 157-179.
- Eaton, J. S. (1994). *Strengthening Collegiate Education in Community Colleges*. San Francisco: Jossey-Bass.
- Economic Development Reference Guide (2004). Retrieved 6/22/04 from <http://www.iedconline.org>
- Eels, W. C. (1931). *The Junior College*. Boston: Houghton Mifflin Company.
- Fitzgerald, R.A., & Burns, S. (2000). *College quality and the earnings of recent college graduates*. National Center for Education Statistics. U.S. Department of Education Office of Educational Research Improvement. (NCES 2000-043).
- Gillium, F. E., & Davies, R. G. (2003). The reality of perceptions: The future earning power of community college students. [Electronic version]. *Community College Journal of Research and Practice*, 27. 239-252.
- Gracie, L.W. (1998). Measurable outcomes of workforce development and the economic impact of attending a North Carolina community college. [Electronic version] In J.R. Sanchez & T. S. Laanan (Eds.), *New Directions for Community Colleges*, 104 (pp. 53-60). San Francisco: Jossey-Bass.
- Grehan, A. L. (2003). The feasibility of using wage record data to track the employment and earnings outcomes of Tennessee Community College graduates. (Doctoral dissertation, The University of Memphis, 2002). *Dissertation Abstracts International*, 63/11, 3874.

- Grubb, W. N. (1997). The returns to education in the sub-baccalaureate labor market, 1984-1990. *Economics of Education Review* (16)3. 231-245.
- Grubb, W. N. (1999, April). Learning and earning in the middle: The economic benefits of sub-baccalaureate education. *Community College Research Center, Institute on Education and the Economy, Teachers College, Columbia University.*
- Grubb, W. N., Badway, N. Bell, D., Bragg, D., & Russman, M. (1997, June). Workforce, economic, and community development: The changing landscape of the "entrepreneurial" community college. *The National Center for Research in Vocational Education, The League for Innovation in the Community College, The National Council on Occupational Education.*
- Gulick, L. (1936). Notes on the theory of organization. *Papers on the Science of Administration*. (pp. 3-45). Gulick, L. & Urwick, L. eds. New York, Augustus M. Kelley.
- Ingram, W.G. (1999). Economic development in state community college system. In T. A Tollefson, R. L. Garrett, & W. G. Ingram, *Fifty state systems of community colleges: Mission, governance, funding and accountability*. (pp.449-452). Johnson City, TN: The Overmountain Press.
- Institute for Higher Education Policy (2005). *The investment payoff, a 50-state analysis of the public and private benefits of higher education*. Retrieved July 13, 2005 from [www.ihep.org](http://www.ihep.org). Washington, D.C.
- Johnson, B. & Christensen, L. (2004). *Educational research: Quantitative, qualitative, and mixed approaches*. Boston: Pearson.
- Kirschenmann, S., & Lane, T. (2001, June/July). Measuring outcomes of community

- college economic development programs. *Community College Journal*. 14-17.
- Koos, L. V. (1924). *The Junior College*. Minneapolis, MN: University of Minnesota Press.
- Laanan, F. S. (1998). Descriptive analysis of students' post-college earnings from California community colleges. [Electronic version] In J.R. Sanchez & T. S. Laanan (Eds.), *New Directions for Community Colleges*, 104 (pp. 77-87). San Francisco: Jossey-Bass.
- Law, J.G., & Pittman, R.H. (1989). Trends in corporate real estate and implications for economic development. [Electronic version]. *Economic Development Review*, 7(2). 7.
- Levin, F. L. (2001). Public policy, community colleges, and the path to globalization. *Higher Education*, 42, 237-262.
- Liston, E. J., & Ward, C. V. (1984, November). The greenhouse effect. [Electronic version]. *American Association of Community and Junior Colleges Journal*, 20-23.
- Liu, B. C. (1997). Economic and non-economic quality of life: Empirical indicators and policy implications for large standard metropolitan areas. [Electronic version]. *The American Journal of Economic and Sociology*, 36(3), 225-240.
- Markusen, A. (2004). Targeting occupations in regional and community economic development. *Journal of the American Planning Association*, 70 (3), 253-268.
- Miller, E.L., & Dziagwa, C.E. (1997). West Virginia community colleges. [Electronic version] *Community College Journal of Research and Practice*, 21(4), 379-387.
- Monroe, C. R. (1972). *Profile of the Community College*. San Francisco: Jossey-Bass,

Inc.

- Pardue, D. (2004). Handbook for employers: An explanation of the employer's rights and responsibilities under the West Virginia Unemployment Compensation Law. *West Virginia Bureau of Employment Programs*. Charleston, WV.
- Paulsen, M. B. (1998). Recent research on the economics of attending college: Returns on investment and responsiveness to price [Electronic version]. *Research in Higher Education*, 39 (4), 471-489.
- Pennington, K.L., Pitmann, R.B., & Hurley, J.C. (2001) An assessment of the community college's influence on the relative economic development of a county [Electronic version]. *Community College Review*. 29.
- Pfeiffer, J. J. (1998). From performance reporting to performance-based funding: Florida's experiences in workforce development performance measurement. [Electronic version] In J.R. Sanchez & T. S. Laanan (Eds.), *New Directions for Community Colleges*, 104 (pp. 17-28). San Francisco: Jossey-Bass.
- Sanchez, J. R. (1998). Looking ahead: A national measure of post-community college earnings. [Electronic version] In J.R. Sanchez & T. S. Laanan (Eds.), *New Directions for Community Colleges*, 104 (pp. 89-94). San Francisco: Jossey-Bass.
- Sanchez, J. R., & Laanan, F. S. (1998). Economic benefits of a community college education: Issues of accountability and performance measures. [Electronic version] In J.R. Sanchez & T. S. Laanan (Eds.), *New Directions for Community Colleges*, 104 (pp. 5-15). San Francisco: Jossey-Bass.
- Schultz, T.W. (1961). Investment in human capital. *The American Economic Review*(LI)1. 1-17.

- Senate Bill #448. West Virginia Legislature. 2004.
- Senate Bill #547. West Virginia Legislature. 1995.
- Senate Bill #653. West Virginia Legislature. 1999.
- Seppanen, L. (1998). Translating data into useful information and knowledge. [Electronic version] In J.R. Sanchez & T. S. Laanan (Eds.), *New Directions for Community Colleges, 104* (pp. 29-40). San Francisco: Jossey-Bass.
- Skidmore, J.L. (1999). Economic development in state community college system. In T. A. Tollefson, R. L. Garrett, & W. G. Ingram, *Fifty state systems of community colleges: Mission, governance, funding and accountability*. (pp.15-22). Johnson City, TN: The Overmountain Press.
- Smith, K.B. (1996). The role of the North Carolina community college system in the economic development of the state's communities (Doctoral dissertation, North Carolina State University, 1996). *Dissertation Abstracts International, 57/03*, 991.
- Walters, D. (2003). "Recycling": The economic implications of obtaining additional post-secondary credentials at lower or equivalent levels [Electronic version]. *Canadian Review of Sociology and Anthropology (40) 4*, 463-480.
- WVCTCS (2004). Community and Technical College Performance Indicators. West Virginia Community and Technical College Council Report.
- WVCTCS (2005). <http://www.wvctcs.org>.
- West Virginia Council for Community and Economic Development (2000, December). Implementation Plan. *West Virginia A Vision Shared!* Market Street Services, Inc.

West Virginia Council for Community and Economic Development (2001, December).

Economic Development Strategy: A plan for West Virginia's future. *West*

*Virginia A Vision Shared!* Market Street Services, Inc.

West Virginia Higher Education Policy Commission (2004). *Degree Inventory of all*

*programs for public institutions as of June 4, 2004*. Retrieved July 23, 2004 from

<http://www.wvhepc.org/resources>.

West Virginia Higher Education Policy Commission (2005).

<http://www.wvhepc.org/resources>.

Wiseley, W. C. (1998). Collaborative administrative record matching in California.

[Electronic version] In J.R. Sanchez & T. S. Laanan (Eds.), *New Directions for*

*Community Colleges, 104* (pp. 41-51). San Francisco: Jossey-Bass.

Young, J.W. (1997). Community economic development through community

colleges. [Electronic version] *New Directions for Higher Education 97*. 74-83.

## **APPENDICES**

**Appendix A: Supplemental Cooperative Agreement**

**Appendix B: Curriculum Vita**

**APPENDIX A**

**SUPPLEMENTAL COOPERATIVE AGREEMENT**



Joe Manchin III  
Governor

Ronald E. Radloff  
Director

MEMORANDUM

**TO:** Jim Barton, Director, WVHEPC  
**FROM:** *DW* Dave Watson, Manager, UC Benefit & Technical Support  
**DATE:** October 17, 2005  
**SUBJECT:** West Virginia Higher Education Policy Commission  
Supplemental Cooperative Agreement

Attached please find a copy of your signed Supplemental Cooperative Agreement.

Attachment

Benefits and Technical Support Section  
Unemployment Compensation Division  
112 California Avenue, Charleston, West Virginia 25305-0112  
Telephone: 304-558-7823 • Fax: 304-558-3252  
<http://www.wvbep.org/bep/> • <https://www.workforcewv.org/>

**SUPPLEMENTAL COOPERATIVE AGREEMENT**  
**Between**  
**WORKFORCE WEST VIRGINIA**  
**And**  
**WEST VIRGINIA HIGHER EDUCATION POLICY COMMISSION**

The purpose of this Agreement is to supplement the current unemployment compensation (UC) information disclosure agreement between WORKFORCE West Virginia (WWV) and the West Virginia Higher Education Policy Commission (HEPC) by allowing for the disclosure of information to Kristin Mallory, Doctoral Candidate at Marshall (MU). The purpose of this disclosure is to research the relationship between post-graduation income levels and degrees obtained through West Virginia Community and Technical College System Institutions. The information to be released includes: randomized ID number, gender, institution where graduated, year, CIP of Degree Program, quarter, wages and SIC of employer.

This Supplemental Agreement does not replace or in any way detract from the terms of the basic information disclosure agreement that currently exists between WWV and HEPC. The information furnished to Kristin Mallory by HEPC shall be strictly confidential. Kristin Mallory and HEPC will publish data only in aggregate form and will not disclose individual names or social security numbers. If additional programming time is required by WWV staff for on-going costs, WWV will bill HEPC through current billing procedures as established in the previous agreement.

This Supplemental Agreement may be canceled by either of the parties upon a minimum of fifteen (15) working days' written notice to the party. However, in the event changes in either State or Federal laws or regulations occur rendering performance hereunder illegal or void, this Supplemental Agreement will terminate immediately.

This Supplemental Agreement shall become effective upon being signed by the appropriate officials of each party. It shall continue until either party provides a written notice to terminate.

**WORKFORCE West Virginia**

\_\_\_\_\_  
 Donald Pardue, Deputy Executive Director

10/11/05  
 Date

**West Virginia Higher Education Policy Commission**

\_\_\_\_\_  
 Jim Barton, Director, Research and Technology

9-28-2005  
 Date

**Marshall University**

\_\_\_\_\_  
 Kristin Mallory, Doctoral Candidate

9/28/05  
 Date

**APPENDIX B**

**CURRICULUM VITAE**

**CURRICULUM VITAE  
KRISTIN L. MALLORY**

**EDUCATION**

Marshall University

**Doctor of Education in Educational Leadership, 2006**

Salisbury University

**Master of Education, Secondary Science, 1991**

West Liberty State College

**Bachelor of Science in Dental Hygiene, 1985**

**Associate of Science in Dental Hygiene, 1985**

**Honors: Magna Cum Laude**

**CERTIFICATION**

Registered Dental Hygienist, West Virginia License

**PROFESSIONAL EXPERIENCE**

2005- Present Tenure, Associate Professor

2004- Present Interim Vice President, Community and Technical College at West Virginia University Institute of Technology

2003- Present Chair and Associate Professor, Department of Dental Hygiene, Community and Technical College at West Virginia University Institute of Technology

1999-2003 Assistant Professor, Department of Dental Hygiene, West Virginia University Institute of Technology

1999-Spring Adjunct Instructor, Department of Dental Hygiene, West Virginia University Institute of Technology

1990-1991 Graduate Assistant, Department of Nursing, Salisbury State University

1987-1995 Adjunct Instructor, Dental Assisting, Wor-Wic Community College

1985-1995 Registered Dental Hygienist, various private dental practices, full-time and part-time, Salisbury, MD

**HONORS AND RECOGNITION**

2005 & 2006 Co-Presented "Conducting the Self-Study Process for Initial Candidacy," Higher Learning Commission of the North Central Association

2005 Presented "Gathering Community College Data to Quantify Economic Development- a roundtable discussion," West Virginia Community College Association

2005 Expert witness, faculty workload, Bailey & Wyant, P.L.L.C.

2003-2005 Who's Who Among America's Teachers