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Career and Technical Education Program Alignment with Local Workforce Needs

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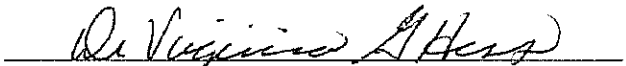

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DEDICATION

This dissertation is dedicated to family

Mr. David Hargis, Logan and Zachary Hargis

AND

Mrs. Betty Phelps

AND

Mr. and Mrs. Keith Pierce, Bailey and Parker Pierce

AND

The late Mr. L. Howard Phelps

who have supported me invaluably in a multitude of educational efforts.

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I would like to thank my husband and sons for their understanding and patience when the computer and countless volumes of research seemed to be my only repast and for keeping me on track when it seemed the end was not in sight. David, your name should be right beside mine. I would also like to thank my committee members for their encouragement and for reminding me that this too shall pass. I would like to thank my mother and sister for their love and support which was often counted on. I would like to thank my friends and family who have prayed for this day and a special thank you to Mike Centers for asking each Sunday morning, "Are you a doctor yet?" Finally, thank you to our Lord and Savior Jesus Christ for guidance and focus.

ABSTRACT

This research attempted to answer whether or not career and technical education (CTE) in a section of Kentucky's Appalachian Region was meeting the employment needs of local business and industry through appropriate program alignment and provision of 21st century soft skills. This study utilized a quantitative approach devoid of researcher invention. Job quotients were used as a measure of program alignment. Job quotients were calculated using the number of jobs available in particular labor markets as the numerator and the aggregate enrollment of respective CTE programs as the denominator. A job quotient of one demonstrates alignment in that a position in the industry exists for every student receiving training. Alignment is critical for business and industry to have access to a trained labor force and critical to students entering the workforce to be able to find jobs. Realizing the importance of soft skills in the 21st century as well as technical skills, this study analyzed the passage rate of the Kentucky Occupational Skills Standards Assessment (KOSSA) as a measure of 21st century soft skills.

Findings from the study demonstrated broad inconsistencies in job quotients with some CTE program enrollments greater than industry needs and others smaller than industry needs. Findings from KOSSA rates revealed significant inconsistencies in soft skill attainment among programs and did not reveal consistent growth toward proficiency. The study concluded KOSSA passage rates did not demonstrate student proficiency in soft skills.

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CHAPTER I

INTRODUCTION

Statement of the Problem

Since the industrial revolution, the need for a technically skilled workforce within the United States has increased securing a niche for technical workers in the labor market that has been sustained even during a wide range of economic cycles. As the United States strives to maintain its leadership in a struggling global economy, the need for technically skilled workers is critical as global companies seek new technologies for product design and development. Technical skills are specialized aptitudes necessary for acceptable performance within respective industries and current projections demonstrate a continued need for skilled laborers despite the current condition of the U.S. economy (Stone, 2009).

Skills required for success in today's industrial setting include highly technical skills in multiple fields including electricity, robotics, and computer technology (Owens, 2010). The need for proficiency in multiple skill sets increases required training and difficulty for employers to find suitable employees (Owens, 2010). Manufacturers in the United States have long sounded the need for skilled laborers with studies showing exorbitant costs in recruiting, training, and lost production resulting from difficulty in finding the right individuals (Owens, 2010). Owens (2010) speculates the existing skilled labor shortage, coupled with baby boomer retirements, may only increase the shortage requiring a change in public policy. Owens suggests the United States should look more to career and technical education career paths to help with shortages.

The 2010-2011 Occupational Outlook Handbooks project for the years 2008-2018, 14 of the 20 fastest growing occupations will require skills which can be acquired with training other than a four year post-secondary college degree (U.S. Department of Labor (BLS), 2010). Career and technical education (CTE) offers technical skills instruction for a broad range of career fields which are required for a highly skilled labor force capable of competing in today's decidedly advanced technological industries. CTE organizes programs under 16 career clusters with curriculums designed to instruct common knowledge and skill sets appropriate for relative occupations (Association of Career and Technical Education, 2010). The Association for Career and Technical Education, (2010) reports CTE is accessible to students beginning in middle school and continuing through the post-secondary level which provides students an opportunity for additional training after high school and acquisition of an associate's degree or certification in the respective field. The ACTE reports close to 14 million high school and college students participated in CTE instruction during the 2008 school year.

The current skilled worker labor market requires workers to be skilled in more than job specific technical skills. CTE purports efficacy in preparing students for the labor market by instilling not only job specific tasks, but academic and employability skills needed for success in both today and tomorrow's economy (ACTE, 2010). Successful job skills for the current workforce can be categorized as hard and soft skills. Hard skills, also known as technical skills, are defined as job specific tasks directly necessary for successful completion of the job. Dr. Dennis Coates (2006), CEO of Performance Support Systems, Inc., defines hard skills as "technical…procedures related to an organization's core business" (¶2). However, soft skills include a broad range of

personal skills related to personal communication, work ethic, critical thinking, and problem solving skills (Coates, 2006). Dr. Coates (2006) characterizes soft skills as the basic people skills used everyday including "how people relate to each other: communicating, listening, engaging in dialogue, giving feedback, cooperating as a team member, solving problems, contributing in meetings and resolving conflict" (¶3).

The ACTE (2011b) states that CTE has a "long and rich history in the United States" (¶1) and assesses curriculum and programs to ensure relevant instruction in both "academic subject matter taught with relevance to the real world" and "employability skills, from job-related skills to workplace ethics" (¶1). As evidence to academics taught in CTE, Dr. Jim Stone (2008), Director of the University of Louisville's National Research Center for Career and Technical Education (NRCCTE) reports students participating in CTE demonstrate greater math skills than students completing traditional high school curriculums and exhibit greater interest in post-secondary training as evidence for the ACTE assertions. Dr. Stone relates CTE's success to an emphasis on teaching work ready skills.

Despite CTE's success in technology instruction relevant for today's business and industry, it is impossible to predict what will constitute an adequate skill set for success in the 21st century as technical skills vary according to industry and technical abilities are continuously evolving. Bob Regan (2008), Director of kindergarten through twelfth grade education at Adobe Systems Inc. relates the acquisition of technical skills needed for the 21st century to early educator John Dewey's premise that training and learning come through task performance and ingenuity. Dewey's emphasis on ingenuity is still relevant today and suggests employees in the 21st century will need problem solving and

critical thinking skills to adapt to emerging skills. As confirmation of the importance of a wide range of employability skills, Rotundo and Sacket (2004) found proficiency in broad cognitive abilities rather than precise skills limited to specific tasks were directly tied to higher wages. If CTE is to adequately prepare students for the future and skills yet to be developed, it is necessary to not only provide instruction for hard skills, but soft skills which will enable them to adapt and transition to changes in the workplace.

Though beneficial, CTE instruction is costly and the ability to financially maintain programs is difficult for educational facilities. Financial assistance for CTE provision has evolved over the years with CTE legislation providing federal funding sources. The Vocational Education Act of 1964, renamed the Carl D. Perkins Act upon its reauthorization in 1984 (Carl D. Perkins Act, 1984; O'Hara, 2009), substantially impacts the ability of CTE programs to fund the provision of technical skills at the local level. In 2002, all 50 states were receiving Perkins funding at either the secondary or post-secondary levels with total appropriations of $1.288 billion dollars for the funding period (U.S. Department of Education, 2003). Most recently, Perkins IV was authorized in 2006 providing funding for CTE initiatives for an additional five years (U.S. Department of Education, 2006). Reiterating the need for skilled workers, President Obama called for level funding of the Carl D. Perkins Career and Technical Education Act (Perkins Act) in the 2010 fiscal budget (National Association of State Directors of Career Technical Education Consortium, 2009). To ensure equitable distribution of federal tax dollars, continued eligibility for receipt of Perkins funding by states is contingent on local performance standards including post-secondary placement of

students in the workforce or post-secondary education and technical skill attainment (U.S. Department of Education, 2006).

Specifically, Perkins IV requires states to report on eight core performance indicators at the secondary level known as accountability standards which are titled as follows (Association for Career and Technical Education, 2011a; Kentucky Tech, 2011b):

1S1 - Academic Attainment in Reading/Language Arts,

1S2 - Academic Attainment in Mathematics,

2S1 - Technical Skill Attainment,

3S1 - Secondary School Completion,

4S1 - Student Graduation Rate,

5S1 - Secondary Placement,

6S1 - Nontraditional Participation, and

6S2 - Nontraditional Completion

For Kentucky purposes, standard 2S1, technical skill attainment, is reported as the passage rate of the Kentucky Occupational Skills Standards Assessment (KOSSA) by 12th grade program concentrators (Kentucky Tech, 2011b). Kentucky Occupational Skills Standards represent a statewide accepted occupational skill set which measures the effectiveness of CTE in preparing students in both hard and soft skills (ACTE, 2010). Students required to sit for the KOSSA are considered concentrators and are students who have completed a minimum of two credits and are either enrolled in or have completed their third credit in the same program area (Kentucky Department of Education, 2011).

Kentucky students have the opportunity to receive technical and soft skills instruction through technical programs offered in the high school setting under the guidance of the Kentucky Department of Education (KDE) and through area technology centers (ATC's) operated by Kentucky Tech and administered through Kentucky's Office of Career and Technical Education (OCTE). Post-secondary CTE training is available to students with many training programs offered through Kentucky's Community and Technical College System (KCTCS). As part of the OCTE, Kentucky Tech's 54 ATC's offer high school students training in technical and soft skills to meet labor needs in the local community (Marks, 2009).

In Kentucky, the need for skilled workers with well rounded abilities is just as important as it is at the national level as the state seeks to improve its economic status under the harsh economic climate. Kentucky's Appalachian region includes 54 of its 120 counties (Appalachian Regional Commission, 2010). Of the 13 states with Appalachian regions, Kentucky ranked last for citizens holding high school diplomas attesting to the need for increased student achievement and education in the Kentucky Appalachian Region (ARC, 2010). The importance of educational attainment should not be ignored as economists have tied education to economic and social growth of local communities for over 50 years (Shaw, T., De Young, A., & Rademacher, E., 2004). This implies increased job skills in Appalachia through career and technical education could lead to an adequately trained and available workforce assisting in recruitment of business and industry to the region and an ultimate increase in economic growth.

Programs offered in ATC's are designed to meet the labor needs of local business and industry for a minimum of 10 years through the provision of technical and soft skills

(C. Wells, personal communication, February, 2006). Kentucky Tech's ATC system provides training for 25 programs in the areas of agriculture, business and marketing, communications, construction, health and human services, transportation, public safety, security, and manufacturing (Kentucky Tech, 2011a). When ATC's are established, local and state representatives collaborate and select programs for implementation which are aligned with current and projected employment needs for the particular areas served by the ATC's (C. Wells, personal communication, February, 2006), thus establishing alignment between employee training and labor supply and employer demands for labor.

Despite alignment of ATC programs with the needs of local business and industry when the ATC is established, many of Kentucky's ATC's have operated with original programs for well over 30 years. While local labor needs evolve over time due to diverse economies and fluctuations in supply and demand, it is unclear if existing ATC programs continue to meet the labor needs of local communities through program offerings relevant to local industry. When programs are not training students for jobs available within the local community, the result is program misalignment and a loss of human capital as students are either forced to leave localities to find employment related to training received or secure positions in an unrelated field without adequate skills. The consequences of static and misaligned program offerings are the inability of ATC's to meet the needs of local business and industry by either an overabundance of workers in career fields and/or a shortage of skilled workers in others.

Kentucky CTE curriculum includes skills instruction based on the most recent technologies available for respective program areas. However, it is unclear if students participating in Kentucky's CTE programs in area technology centers receive instruction

and training in appropriate soft skills leading to the development of a well rounded employee capable of adapting to up and coming job skills and meeting employer needs for the 21st century. The difficulty in determining whether students are adequately mastering soft skills is twofold. As previously mentioned, it is impossible to completely predict soft skills necessary for the next century and Kentucky does not isolate measurement and analysis of soft skills at the time of this research.

Kentucky Tech implements a well established assessment plan for CTE programs. CTE components assessed in the plan range from students academic and job skill success to the ability of ATC's to develop and maintain community relations. However, the ability to effectively analyze whether programs meet the labor needs of local communities after initial establishment is not present. As well, the plan does not effectively measure and analyze skills for the 21st century including the provision of soft skills. This situation is not unique to Kentucky as there is little evidence of analysis of CTE and business and industry alignment in the United States.

Robert Carreira studied CTE Tech Prep program alignment to the business and industry needs of Cochise County, Arizona. Tech Prep designation for CTE programs requires students to complete two years of CTE at the secondary level and two additional years at the post-secondary level leading to at least a two year post-secondary degree (Kentucky Department of Education, 2009). Carreira's (2009) study investigated two research issues dealing with how well Tech Prep programs were aligned with current and future labor needs and how administrators could achieve alignment if misalignment were found. Carreira (2009) used regression analysis to determine the relationship between

Tech Prep programs and current and future labor needs and job quotients as information for CTE administrators.

Carreira introduced job quotients as a valid measure for program allocative efficiency. Carreira explained job quotients of one suggest an "equal number of jobs in the local economy for each student offered access to the program that prepares students for those jobs" (p. 14). Subsequently, alignment "ensures workforce shortages are equitably distributed and career fields and industries within the local economy are equitably served" (p. 14). This study accepts the simplicity and straightforwardness of job quotients, but does not attempt to explain margins of acceptable efficiency when calculated job quotients do not purport alignment.

Purpose of Study

The purpose of this study is to add to the body of literature on Kentucky's Appalachian CTE programs to determine if programs offered in the Lake Cumberland Area Development District (LCADD) are aligned with current and future local labor needs in terms of job availability and 21st century soft skills. The LCADD was selected for this study due to its locality and accessibility of data for counties included in the LCADD. The LCADD is one of Kentucky's 15 Area Development Districts (KADD) which were organized over thirty-five years ago to assist regional Kentucky communities in meeting the needs of local business and industry (Kentucky Council of Area Development Districts, 2009a). Specifically, KADD's were designed to help "local officials and citizens unite to provide for the planned growth of their area" (Kentucky Council of Area Development District, 2009b, ¶1). KADD's serve local governments and communities through provision of forums for community members to discuss issues

and opportunities and to provide leadership in planning and implementing projects (KCADD, 2009b).

Under the Kentucky Council of Area Development Districts (2009b) structure, 15 development districts operate under the authority of federal and state statutes assisting local communities to secure and maintain business and industry and an adequate workforce. The Lake Cumberland Area Development District (LCADD) includes Adair, Casey, Clinton, Cumberland, Green, McCreary, Pulaski, Russell, Taylor and Wayne Counties in Kentucky (KCADD, 2009a). All except Taylor County are part of Kentucky's Appalachian Region (KCADD, 2009a). Table 1 displays geographical demographics of counties included in the LCADD.

Table 1
LCADD County Geographical Demographics

County	2010 Population	Square mileage	Population density per square mile
Adair	18,656	406.84	45.86
Casey	15,955	445.61	35.80
Clinton	10,272	197.46	52.02
Cumberland	6,856	305.82	22.42
Green	11,258	288.66	39.00
Pulaski	63,063	661.60	95.32
Russell	17,565	253.53	69.28
Wayne	20,813	459.40	45.30
Total	164,438	3018.92	54.47

Source: 2010 U.S. Census Bureau http://2010.census.gov/2010census/data/

Research on the topic of CTE program alignment and measurement of soft skills instruction is limited and in the Appalachian region of United States studies regarding CTE program alignment and instruction are scarce. This study will contribute findings for Kentucky administrators and decision makers when considering program changes for area technology centers.

Research Questions

This study addresses the following questions pertaining to career and technical education programs offered through Kentucky Tech:

1. Are career and technical programs offered by Kentucky Tech's area technology centers in central Kentucky aligned with current labor needs in counties served by the LCADD?
2. Are career and technical programs offered by Kentucky Tech's area technology centers in central Kentucky aligned with future labor needs in counties served by the LCADD?
3. Are CTE preparatory students demonstrating proficiency in 21st century soft skills required by employers?

Framework

The theoretical framework for this study is based on Gary Becker's Human Capital Theory (HCT) which acknowledges the extreme costs for education as an investment which will lead to higher wages (Becker, 1975). Becker contends that better education leads to greater wealth of citizens and nations and that all humans are rational and seek to maximize their individual wealth through appropriate educational attainment (Vandenberghe, 1999). Becker asserts educational providers are only concerned with

pleasing their clients whether the clients are students or industry and will adapt educational processes to meet those needs (Vandenberghe, 1999). This assertion increases the relevance of this study as CTE program alignment is necessary to meet the needs of industry.

Formation of the HCT can be traced to the mid-1700's to economist Adam Smith and his *Wealth of Nations* (Baptiste, 2001). Despite researcher interest in the theory, modern formation of the HCT was delayed due to the controversy surrounding it (Baptiste, 2001). To many, it challenged the foundations of human freedom and dignity by implying humans were nothing more than capital with their education and training considered an investment in capital (Baptiste, 2001). Opponents of HCT argued that humans were not to be valued and marketed for their skills, but rather recipients of wealth (Baptiste, 2001).

In the 1960's, Gary Becker studied the economics of education and was followed by significant research solidifying HCT as a widely accepted philosophy (Gilead, 2009). The philosophy recognizes humans as capital and training expenses or education of laborers as a human capital investment resulting in education as a generator of human capital (Becker, 1975; Vandenberghe, 1999). Limitations to the HCT are evident in that opponents argue that individuals are not always logical and do not always seek to maximize wealth (Gilead, 2009; Baptiste, 2001). In fact, many individuals are constrained by their socio-economic placements and are tied to alternative paths that do not always lead to wealth and prosperity (Baptiste, 2001). Too, not all seek wealth as a source of happiness and are content in their lifestyles based on values and upbringings. Likewise, educational providers may not always respond to the needs of students and

industry as confounding variables such as political demands may dictate educational processes (Vandenberghe, 1999).

If the HCT were followed precisely, CTE programs would continually adjust to market needs as the HCT emphasizes educators' desire to meet the needs of clients. Under the HCT, students would only select training for occupations for which there is adequate demand leading to maximization of personal wealth (Gilead, 2009). However, this study acknowledges individuals do not always act logically in selecting occupations and education does not always immediately adjust to market demands. As a result, HCT is not directly applied to this study. Rather, this study modifies the theory using the premise that CTE instruction will meet labor needs of respective industries, accordingly leading to increased salaries.

Figure 1 illustrates how the theory is applied to this study. Factors influencing career and technical education programs include business and industry needs dictated by technical skills required by industry standards, student interests, and education policy required to fund technical programs. It is assumed that students entering the workforce with appropriate training and educational foundations will benefit employers' labor needs by replenishing skilled workers. It is assumed a percentage of high school completers will continue CTE training at the post-secondary level with subsequent placement in the appropriate career field. Moreover, this study assumes a percentage of high school students completing career and technical education programs will transition directly to the workforce for which CTE instruction was received thus reiterating the importance of proper alignment between programs and local labor needs. It is also understood a portion of high school students completing career and technical education programs will further

their training at the post-secondary level including KCTCS sites or technical programs at a four year institution before entering the workforce.

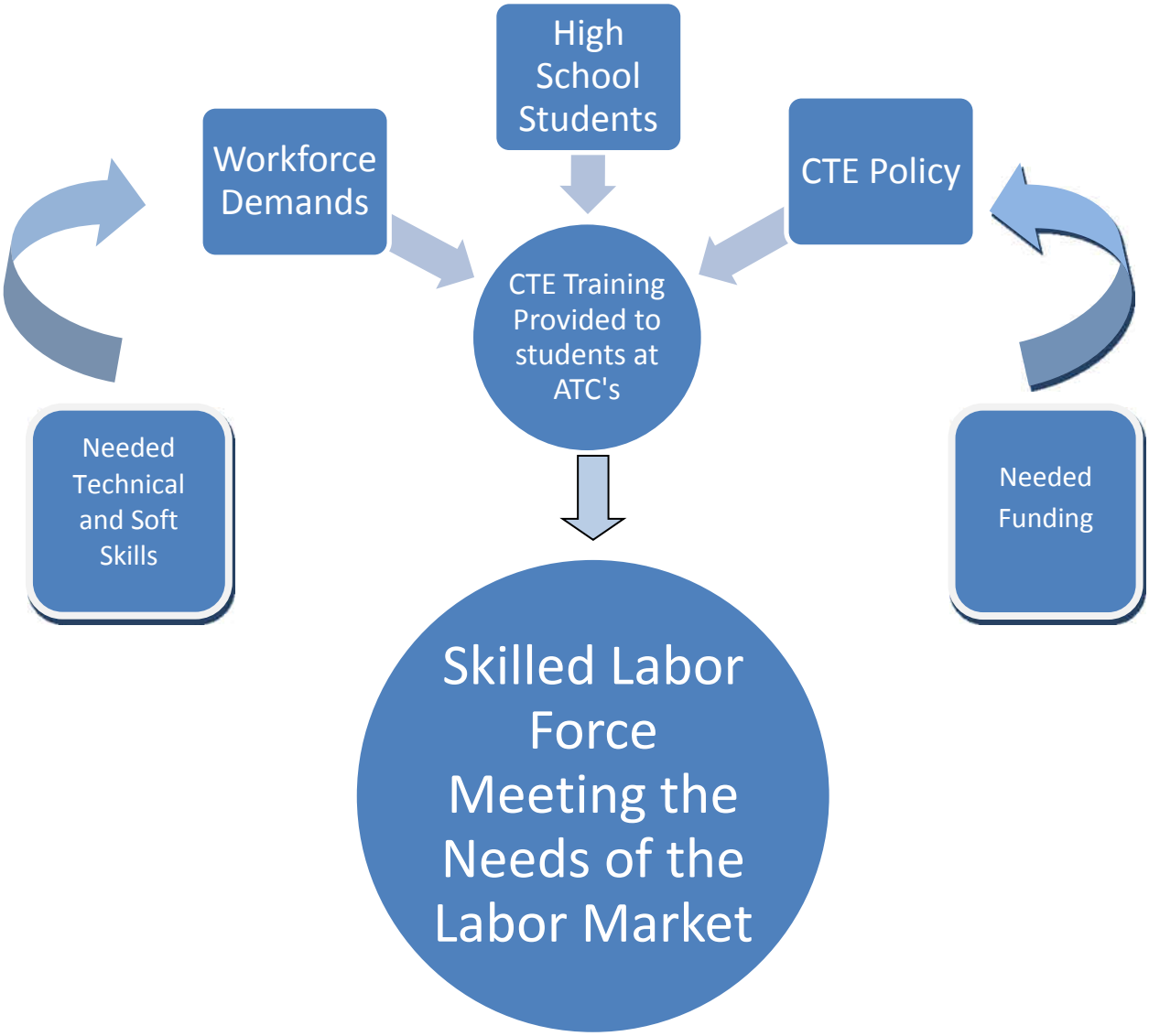

Figure 1
Framework of CTE's Impact on Meeting the Demands of Local Labor Markets

Assumptions, Limitations, and Delimitations of the Study

Robert Carreira studied alignment between tech prep programs and the current and future labor needs in Arizona. This study, replicates Carreira's 2009 study in part of Kentucky's Appalachian region. As a result, this study encompasses many of the same assumptions, limitations, and delimitations. Following Carreira's study, assumptions, limitations, and delimitations will be presented mutually.

First, the focus of this study is on CTE offerings for secondary students within ATC's and does not include analysis of technical programs outside of Kentucky Tech's ATC's or at the post-secondary level. It is assumed that post-secondary program offerings are directly tied to enrollment and are maintained by their ability to sustain adequate enrollment.

This study assumes equal effectiveness of CTE instruction in all programs, facilities, and instructional pedagogies across the Lake Cumberland Area Development District (LCADD). It does not analyze the age or condition of facilities and equipment and subsequent impacts on instruction. Rather, it is assumed that CTE technical instruction offered through ATC's meets the skilled technical training needed by business and industry and is sufficient for training of secondary students to enter the workforce with appropriate job specific hard skills.

The study assumes students completing four course credits in a given program area will complete the program with an acceptable level of skills necessary for successful employment in the respective occupational field. The study assumes students not completing programs during their high school tenure may not hold the necessary and adequate skill set necessary for success in the respective occupational field.

Again following Carreira's study, this study utilizes enrollment capacities of ATC's programs as a primary measure of trained students and assumes enrollment equals capacity. It is understood that actual student enrollment may be the result of student preferences based on uncontrollable variables such as teacher preferences. While analysis of program enrollment is outside the scope of this study, it is implicit that analysis of enrollment capacities is vital to administrative decisions regarding alignment of programs with labor needs.

It is assumed ATC program alignment with local industry labor needs is imperative to fulfilling labor needs within the community and subsequent community sustainment. This assumption is based on the Carl D. Perkins ACT indicating that funding is conditional on the ability of CTE to promote the competitiveness of the United States by providing a highly skilled workforce. Likewise, Perkins IV mandates CTE provide students with "placement…in employment, including placement in high skill" occupations (Carl D. Perkins Career and Technical Education Improvement Act of 2006, 250-15) as well as "employer involvement in, and satisfaction with, career and technical education programs and career and technical education students' preparation for employment" (Carl D. Perkins Career and Technical Education Improvement Act of 2006, 250-22).

A primary constraint of this study is the limited overall business and industry and subsequent workforce populations within the rural Appalachian research area. To overcome this limitation, the scope of this study analyzes ATC's ability to meet current and future labor needs of existing business and industry without investigation of the LCADD potential attainment of new labor markets. The population for this study is

derived from the LCADD which encompasses 10 counties located in Kentucky's Appalachian region and, historically, is most predisposed to economic struggles. This limitation is exacerbated by the current economic downturn which is even more relevant in Appalachia. In an effort to minimize economic impacts, counties included in the study are located on the farthest west side of Kentucky's Appalachian region and may not reflect the same economic setbacks as Appalachian counties located in extreme Eastern Kentucky dependent on coal for their economies and lacking more advanced infrastructures. Understanding the difficulty associated with macro-economic assumptions, this study relies on the Workforce Kentucky database for labor market data (Kentucky Office of Employment and Training (KOET), 2011). The database contains the largest and most notable information regarding Kentucky's labor market (KOET, 2011). The database is administered by Kentucky's Office of Employment and Training and is directly linked to federal databases for data collection reliability (KOET, 2011).

This study's delimitations include only evaluation of labor needs of business and industry in regard to available skilled workers and current and projected available employment slots. The study does not evaluate specific soft skills required by each industry within the region nor does the study evaluate individual hiring practices of business and industry. It is assumed that students initially entering the workforce will require training specific for the respective employer regardless of their job skill abilities.

Definitions

Career Clusters: Occupations grouped under industry classifications and similar technical skills (KDE, 2011).

Concentrator/Preparatory Students: Students who have completed at least two credits in a respective program and are enrolled in or have completed their third credit (KDE, 2011).

Hard Skills: Technical skills specific to respective industries (Carreira, 2009).

Job Quotient: The employment capacity for jobs which CTE programs prepare students in relation to the enrollment capacity for the respective CTE program (Carreira, 2009).

Kentucky Occupational Skills Standards (KOSS): Business and industry standards adopted as a benchmark of necessary skills for successful employment including both hard and soft skills (KDE, 2011).

Kentucky Occupational Skills Standards Assessment (KOSSA): Assessment given to 12th grade concentrator students to measure attainment of technical and soft skills (KDE, 2011).

Non-Completers: Students participating in at least one course in a program area, but failing to complete four credits.

Program Alignment: Programs offered at area technology centers are aligned with business and industry labor needs when job quotients are one (Carreira, 2009).

Program Completers: Students completing at least four course credits in a given CTE program area with a minimum grade of "C" and considered adequately trained to enter the respective program's labor market (KDE, 2011).

Technical Preparation (Tech Prep): Federal program requiring student completion of two years of CTE at the secondary level followed by two years of post-

secondary training leading to a certificate or diploma (Carreira, 2009, Kentucky Department of Education, 2009).

Soft Skills: Interpersonal skills including but not limited to communication and teamwork that enhance job performance (Coates, 2006).

TEDS: Technical Education Database System maintained by the state of Kentucky for the collection and reporting of data associated with federal Carl D. Perkins funds (KDE, 2011).

Summary

As the United States finds itself struggling to emerge from an extreme recession and remain competitive in a global arena, a primary task facing the U.S. is the ability to produce not only workers skilled in latest industrial technologies, but workers skilled for jobs that will be available upon the economy's ultimate upswing. As educators, it is our responsibility to ensure students are equipped with skills that enable them to be productive members of society upon graduation and into the 21st century. CTE is a vital component of the educational process as its ability to effectively train students for transition to the workforce as well as transition to post-secondary training makes it a particularly valuable educational venue at the secondary level.

Though CTE programs are designed to meet the training needs of local business and industry upon their initial establishment, it is unclear if program alignment remains intact through economic changes. Currently, there is not a measure in place that provides full disclosure of this information. This fact is relevant across the country, but even more so in Appalachian regions that struggle even during favorable economic times.

Despite the fact CTE programs prepare students for both hard and soft skills needed in today's industrial setting, it is impossible to predict skills needed for the 21st century. As a result, it is critical for students to possess adequate soft skills that will enable them to adapt to changing workplace demands in the future. Assessment of CTE programs does not include analysis of a relationship between CTE curriculum and soft skills needed for success in future labor markets.

It is hoped this study will begin wide range evaluation across the country regarding alignment between CTE programs and the needs of business and industry as well as provision of 21st century soft skills within CTE curriculum. Likewise, it is hoped this study will provide information useful to policy makers and administrators when making decisions regarding appropriate CTE instruction.

CHAPTER II

REVIEW OF LITERATURE

Introduction

This review of literature provides a historical view and current appraisal of career and technical education revealing a need for future study. Abundant literature exists for career and technical education; although literature regarding the scope of this study is limited. For this review of literature, an in-depth exploration included related terms such as vocational education, CTE, CTE program alignment, and labor needs. Literature for this review was obtained electronically through databases accessed through Eastern Kentucky University's Educational Leadership and Policy Studies guide within EKU's Crabbe Library. Online resources were accessed through Academic Search Premier, Education Abstracts, ProQuest Dissertation & Thesis Abstracts, Sage Journals online, and ERIC.

The search revealed a single study regarding CTE program alignment performed by Robert Carreira in Cochise County, Arizona in 2008. It is evident the topic of CTE program alignment is greatly understudied. Due to the lack of literature regarding program alignment, this review of literature categorically scrutinizes the development and funding of career and technical education (CTE), changing workforce demands, initiatives and governance, and benefits of CTE instruction to synthesize the current situation of CTE program alignment and implications for adjustments.

CTE Policy Development

Modern CTE offers skills training in preparation of post-secondary employment to secondary students and has expanded to include technologically advanced skills training in trade and industry, information technology, and health occupations (Scott & Sarkees-Wircenski, 2008). Additionally, CTE has transformed into a rigorous educational program also providing career and post-secondary exploration opportunities to a broad spectrum of students (Scott & Sarkees-Wircenski, 2008). As a result, the benefits of CTE prompted Elliot & Deimler (2007) to declare CTE a "premier educational delivery system" (p. 45).

The current economic situation has increased competition for jobs resulting in increased enrollment in CTE programs (Career Classes Make a Comeback, 2007). Specifically, Texas CTE enrollment expanded 170 percent between 1996 and 2006, marking the increased importance of CTE programs as a component of secondary education (2007, Career Classes Make a Comeback). It is important not to overlook CTE's educational relevance as it offers an educational package that enables students to become contributing members of society (Scott & Sarkees-Wircenski, 2008).

Smith-Hughes Act

Vocational education policy was first recognized and funded at the federal level through the Smith-Hughes Act of 1917 also known as the Vocational Act of 1917. The legislation created the Federal Board for Vocational Education whose membership included representatives from manufacturing, agriculture, and labor (Smith-Hughes Act, 1917; Dugger, 1965). The Act also provided assistance to states for teacher salaries in

agriculture, home economics, and trade and industrial education (Smith-Hughes Act, 1917).

The 1917 Act emphasized meeting the needs of employers and preparing a much needed workforce (MartiNez, 2001). During the early 1900's the United States was already recognized as the industrialized leader of nations and could not fill its need for skilled laborers in agriculture and industry following World War I despite increased employment of skilled immigrants (Smith-Hughes Act, 1917; Dugger, 1965;Scott & Sarkees-Wircenski, 2008). At the same time, formal education provided students an academic curriculum excluding trade and industrial skills which had long been handed down through families (Scott & Sarkees-Wircenski, 2008). The Smith-Hughes Act brought awareness for the integration of skills and academic training in the educational setting

Political influences. Politically, passage of the Smith-Hughes Act was influenced by a growing population and the importance of the United States to maintain its economic position. President Woodrow Wilson created the Commission on National Aid to Vocational Education in 1914 which, after analysis of 1910 census information, reported a need for additional vocational education and training (Patterson, n.d.; Kleiver, 1965). The Commission related a significant number of people in vocational careers lacked appropriate training for their positions (Smith, 1999; Patterson, n.d.). Senator Hoke Smith, chairman of Wilson's commission, co-sponsored the Smith-Hughes Act of 1917 following the commission's report (Smith, 1999; Patterson, n.d.).

Influence of leading educators. Leading up to the Smith-Hughes Act, John Dewey and Charles Prosser advocated an educational system that would offer realistic

training to benefit both individuals and society (Scott & Sarkees-Wircenski, 2008). Dewey, a strong advocate for vocational education, stressed education should enable students to be successful in both skills and attitudes during a technological age (Scott & Sarkees-Wircenski, 2008). Theoretically, Dewey adhered to a progressive approach believing education should meet the need of the learner in order to bring about success (Scott & Sarkees-Wircenski, 2008).

In contrast to Dewey, vocational activist Charles Prosser argued an essentialist approach that vocational education should meet the needs of business and industry (Scott & Sarkees-Wircenski, 2008). Prosser's philosophy embraced 16 ideals which were embedded into the Smith-Hughes Act and guided vocational education for over 50 years (Scott & Sarkees-Wircenski, 2008). Most prominently, Prosser suggested vocational education should include real-world activities taking place in real-world settings, include current workplace technologies, instill critical thinking skills, and perhaps most progressively, should be taught by individuals trained in the particular field rather than in general education (Scott & Sarkees-Wircenski, 2008, p. 196).

1964 Vocational Education Act

Following the Smith-Hughes Act, vocational policy remained somewhat static until the Vocational Education Act of 1964 which secured funding for training to high school students and adults who were either out of work or needing additional training to hold their current position (Dugger, 1965). A main purpose of the 1964 Act was to circumvent increasing demands of labor resulting from a growing population and the advent of technology (Dugger, 1965). The Act focused on assisting schools in providing a "balanced education for those millions of youth who will enter the world of work

without a baccalaureate degree" (Dugger, 1965, p. 15). In doing so, the Act changed how funds were distributed to schools in order to prevent training for unneeded skills and to ensure job placement and post-secondary opportunities for students (Warfield, 1969). The Act required schools to offer a minimum of five occupational programs for funding eligibility along with development of work-study opportunities for students in need (Dugger, 1965). In an attempt at accountability, receipt of federal funding required states to establish a fiscal agent for fund oversight and administration (Dugger, 1965)

Political influences. During the 1950's and 60's, ongoing debate was underway as to what and how much the federal government's involvement in overall education should be (Debray, 2006). The Department of Education had been established in 1867 to merely provide local educational representatives with sound advice for implementing effective education (U.S. Department of Education, 2010) not inclusive of funds. John E. Chubb, a distinguished visiting fellow at Stanford's Hoover Institution, highlighted federal funding was less than one percent of total school funding during the 1920's and was only 1.8 percent of the next decade's entire budget (Moe, 2007).

Echoing the national awareness for education reform, President Lyndon Johnson proclaimed in 1965 that it was more important to approve funding at the elementary and secondary levels in some form than to worry about whether or not it was sound policy (Debray, 2006). Even though the proclamation came after passage of the 1964 Act, President Johnson's statement provides insight to the pressure politicians were under to pass a measure of relief. Passage of the Vocational Education Act of 1964 achieved awareness for vocational skills training and planted a seed for vocational education that would expand during the 1980's. However, it did not satisfy advocates for education

reform. It was merely a starting point offering federal funding assistance to secondary programs that incorporated a vocational program into its academic curriculum (Vocational Education Act, 1964), thus placing the primary focus on the traditional school curriculum with vocational training merely a beneficiary of the funds.

Carl D. Perkins. Carl D. Perkins, representative from Knott County, Kentucky, introduced the eventual 1964 Vocational Education Act in response to the overall education crisis (Kliever, 1965). The Vocational Education Act of 1964 was passed to "strengthen and improve the quality of vocational education and to expand the vocational education opportunities in the nation" (Vocational Education Act, 1964, p. 1). To achieve this goal, funds were offered to states in the form of grants to improve vocational programs for both students and adults (Vocational Education Act, 1964; Dugger, 1965). This initiative stemmed from investigation of future labor markets anticipating an overabundance of undereducated workers (Dugger, 1965).

Congressman Perkins' interest in vocational education stemmed from an upbringing in an impoverished Appalachian setting and subsequent military service, where he witnessed plight of the underprivileged and uneducated (Damron, 1990; Smith, 2010). His experiences molded him into a staunch politician who pursued every initiative through to the end and earned him the respect of politicians from both sides of the political spectrum (Smith, 2010). His dedication earned not only respect from his peers, but his constituents who prided themselves in electing an honest congressman (Smith, 2010).

Contributing factors to passage. Throughout history, the nation has struggled to maintain a skilled workforce and has turned to vocational education to meet the need

(Dugger, 1965). Shortages in skilled labor are most evident in war times, but decades following WWII demonstrated a need for a skilled workforce even during peace times (Dugger, 1965). After WWII, the country was dealing with multiple issues not limited to civil rights, the Cuban Missile Crisis, the Soviet Union's launch of Sputnik, and the realization of poverty in the U.S (Dugger, 1965; Debray, 2006). The changing global economic environment reinforced the need for the U.S. to develop a labor force trained in work related skills and technology. These factors enabled CTE to emerge as an effective solution for the provision of better equipped laborers to meet the diverse needs of employers (Drage, 2009; Dugger, 1965).

CTE was not only designed to provide skill labor at a national level, but specifically for communities where CTE programs reside (Arnold, 1965). In defining a complete technical education program, Arnold, 1965, reiterated the need for programs to be aligned with community labor needs first while taking into account labor trends at the state and national levels.

1984 Carl D. Perkins Act

The 1980's began with the country suffering a deep recession (Conte, C. & Karr, A. & United States. Dept. of State. Bureau of International Information Programs, 2001), but by 1983, the economy was rebounding bringing about economic growth that would be sustained throughout the rest of the decade (Conte, et al., 2001). Culturally, the 1980's were impacted by the advent of personal computers in the home (Cogan, 2005), beginning a technological age still thriving today, the fall of communism, and an increased interest for conservative politics (CBS News, n.d.). With the age of technology, the 1980's witnessed a shift toward a service economy resulting in greater

opportunities for highly skilled computer technicians and unemployment for many industrial workers (Babcock, L., Benedict, M., & Engberg, J., 1998). There was also a correlation between education of workers and wages indicating the need for training in required job-related skills (Babcock, et al., 1998).

A nation at risk. In 1981, Secretary of Education Honorable T.H. Bell formed the National Commission on Excellence in Education to analyze the state of America's education (U. S. Department of Education, 1983). The commission's 1983 report titled *A Nation At Risk,* compiled 18 months of study providing insight to the condition of educational affairs as well as reformation opportunities (U. S. Department of Education, 1983). *A Nation At Risk* portrayed education in other countries exceeding the United States despite reform and awareness following Sputnik (U. S. Department of Education, 1983).

During this time, the U.S. suffered from a lackadaisical attitude regarding work and generated a work force whose training and skills were substantially behind global competitors who embraced increased training in a technological age (U. S. Department of Education, 1983). The 1983 report suggested the growing use of technological skills in the workplace would require education reform for not only current students, but remedial training of current workers (U. S. Department of Education, 1983) implying a growing demand for highly skilled workers.

Political influences. In response to the changing times, Congressman Perkins again introduced legislation in October of 1983 designed to strengthen and expand the economic base of the Nation, develop human resources, reduce structural unemployment, increase productivity, and strengthen the Nation's defense capabilities by assisting the

States to expand, improve, and update high-quality programs of vocational-technical education (Carl D. Perkins Vocational Education Act, 1984, Official Title). Following Congressman Perkins' death on August 3, 1984, the bill was expeditiously signed as Public Law 98-52 or the Carl D. Perkins Vocational Education Act, commonly referred to as Perkins I, by President Ronald Reagan on October 19, 1984 (Carl D. Perkins Vocational Education Act, 1984). As tribute to Congressman Perkins' support of career and technical education and disadvantaged workers, the 1984 Act included an amendment changing the name of the 1963 Vocational Education Act to the Carl D. Perkins Vocational Education Act (Carl D. Perkins Vocational Education Act, 1984).

The 1984 Act expanded vocational education to address issues identified in *A Nation At Risk*. Language of the Perkins Act clearly outlined the need for vocational education reform including the need for program improvement (Muraskin, 1989). Formation of an adequate assessment program for policy evaluation purposes coincided with Williamson M. Evers supposition that education reform had been carried out through additional funding without reliable data to guide funding (Moe, 2001).

Development of the Carl D. Perkins Act of 1984 reflected portions of a network approach to policy making in that there were a "large number of actors dealing with specific policy issues" and the actors did not have full control by themselves, but were "characterized by interactions of public and private actors" (Sabatier, 2007. P. 129). Silke Adam and Hanspeter Kriesi explain that a policy network approach theory involves mutually independent diverse performers (Sabatier, 2007). When applied to the 1984 Perkins Act, participants included members of the National Commission on Excellence in Education who drafted *A Nation At Risk*, as well as the U.S. Department of Education

which authorized the commission to report on the status of education in the United States (U.S. Department of Education, 1983). Likewise, Perkins' untimely death during the final stages of the Act, along with *A Nation At Risk*, may have served as triggering events worthy to not only influence passage, but change the name of the 1964 Act.

Current Funding

Despite stalemates, the Carl D. Perkins Act continues to serve as the leading federal funding source of CTE. In 2002, all 50 states were receiving Perkins funding at either the secondary or post-secondary levels with total appropriations of $1.288 billion dollars for the funding period (U.S. Department of Education, 2003). The Carl D. Perkins Act was re-authorized in 1990 (Perkins II) and increased funding to 1.6 billion through the year 1995 (Library of Congress, 1995-1996). In 1995, the 104th congress introduced 14 bills pertaining to the Carl D. Perkins Act including proposals to both amend and abolish the legislation (Library of Congress, 1995-1996). However, inability to agree upon amendments resulted in a continuation of Perkins II language and funding. In October, 1998, President Bill Clinton signed Perkins III legislation which provided vocational funding through 2003, modified state funding formulas, and increased state accountability measures (Library of Congress, 1997-1998; O'Hara, 2009). Similar to 1995, the 108th congress in 2004 was unable to pass further Perkins legislation which continued funding under Perkins III (Library of Congress, 2003-2004). It was not until 2006 that Perkins IV was authorized to provide funding for a six year period ending 2012 and included an emphasis for curriculum alignment between CTE and academia (Library of Congress, 2005-2006; U.S. Department of Education, n.d.).

Inadequacies. Despite CTE being recognized as a model system for skills training, funding issues in providing the training format have long been noted. In the early 1900's, Charles Prosser recognized the ideal format for CTE would result in greater expenses than that found in traditional education (Scott & Sarkees-Wircenski, 2008). The Perkins Act serves to assist schools in funding only those activities which improve and expand programs rather than providing funding for daily consumables integral to program operations (ACTE, 2010). With the current state of the economy, educational institutions are surveying their priorities in order to glean the most effective use of funding. Unfortunately, literature is scarce regarding funding of daily CTE program supplies and emphasizes Perkins funding for CTE despite its inability to provide operational funding.

There were problems in distributing Perkins grants equitably. For example, the National Assessment of Vocational Education (NAVE) called for accountability after evaluating services provided under the Perkins act (Muraskin, 1989). Even though *A Nation At Risk* moved CTE to increased accountability, NAVE report findings of 1989 indicated inadequacies were still evident as fiscal agents in the states were retaining funds (Muraskin, 1989). Likewise, Muraskin (1989) points out funds were often distributed to groups based on ties to the fiscal agent. For example, post-secondary institutions often received greater allocations when the fiscal agent was itself a post-secondary institution. Too, NAVE findings demonstrated the need for a more concise state formula for grant distribution to meet the needs of CTE programs (Muraskin, 1989).

21st Century Workforce Demands

Globally, the current recession has resulted in massive layoffs and a stymied industry base with the U.S. unemployment rate reaching over 10 percent during October 2009 and still holding a strong 9.00 percent in January 2011 (BLS, 2011). Challenger (2009) predicts continued advancement of skills and technologies despite the current recessive economy and predicts employers will struggle to find adequately trained employees when the economy strengthens. Employers expect employees to possess skills necessary for job completion (Coll & Zegwaard, 2006) and often find proficient employees are scarce following a recession as workers have found employment in other fields or lack newly required skills.

To determine frameworks for today's curriculum, it is important to analyze future labor markets for anticipated future skills (Barton, 2008). Barton (2008) suggests the inability to accurately predict needed skills may lead to the U.S. falling behind in the global economy. However, analysis and prediction of the future in a technological age is difficult at best and researchers agree the answer to what constitutes needed skills for future employment often depends on who is answering (Cech, 2007).

The impossibility of forecasting future business needs has prompted industrial and educational stakeholders to postulate skill sets most likely to be required in the 21st century (Black, 2009). In order to ensure employees are prepared for future occupational demands, it is common that needed skill sets include proficiency in thinking and reasoning skills as a means to master developing technical skills (Silva, 2009). As affirmation, Bennett (2006), offers workers possessing thinking and reasoning skills are more likely to adapt to workforce changes. Likewise, literature reveals those most likely

to be unemployed in the future are workers with the least relevant skills (Low, 2004). Low (2004) suggests it is imperative for workers to receive continued training to ensure possession of adequate skills for the future. Chris Humphries, head of the skills task force and director-general of the City and Guilds, declares the anticipated skills gap for the future can be overcome through effective CTE (as cited in Low, 2004).

Hard skills. Hard skills refer to training needed for given vocations and are most often attained by students through CTE (Careira, 2009; Taylor, 2005; Bennett, 2006). Morey (2009) defines hard skills as "skills associated with jobs in the construction, manufacturing, and repair industries. Also, those skills primarily associated with manipulating things" (p.14). Because of their nature, they are easily identified and measured on the job (Coats, 2006). Coats (2006) also asserts hard skills are relatively easy to teach and assess because they are observable and are most often new skills that do not require a student to unlearn prior methods.

Soft skills. In ever changing global economies, jobs not only require special technical skills, but interpersonal workplace skills (Bennett, 2006). Literature recounts the imperativeness of today's worker having the ability to solve problems and change with the everyday demands of the position which involves more than basic reading, writing, and arithmetic (Bennett, 2006) (Harris & Rogers, 2008). Cassel & Kolstad (1998) report employers need employees who are able to work with fellow employees and indicate job promotions are largely dependent upon human relations. In a report to industrial engineers, Zinn and Haddad (2007) suggest that mastery of technical skills is only part of career success. In fact, they imply technical skills cannot be fully recognized

without effective communication and problem solving skills which lie in the soft skills realm.

Workplace thinking and reasoning skills have become known as soft skills (Coates, 2006). Effective soft skills enable workers to be more effective in their jobs and open the door for leadership opportunities (Ranade, S., Tamara, C., Castiblanco, E., & Serna, A., 2010; Harris & Rogers, 2008). Despite recognition of soft skills as an integral component of 21st century skills, employers agree employees lack needed skills (Mitchell, G., Skinner, L., & White, B., 2010).

Soft skills required by employers can be defined as people skills which include effective listening and communication skills (Ranade, et. al, 2010). Research also demonstrates a need for employees to possess a positive attitude and "work smarter" to creatively and efficiently meet job expectations (Bennett, 2006) which falls under the soft skills umbrella. CTE offers a career path inclusive of needed "soft" skills and Bennett (2006) asserts that through CTE, students have access to a curriculum which guides instruction on the essential elements required for success in today's work environment.

Coates (2006) describes soft skills as the skills individuals use on a daily basis in relating to each other whether at home or on the job. Black (2009) explains the way people live their daily lives has changed dramatically as a result of the technological age. Black makes clear that technological advances have simplified lives by enabling communication regardless of geographical location. Accordingly, this has heightened the importance of making communication a required soft skill. Reiterating the importance of communication, the 21st Century Workforce Commission (2000) asserts the economic health of United States in the 21st century is tied to an overall increase in literacy. As the

importance of literacy skills increases, multiple literacy organizations are working with business and industry representatives to develop curriculums relating literacy to 21st century skills (Black, 2009).

Kentucky occupational skills standards. In 1996, Kentucky Governor Paul Patton called for the development of broad based business and industry standards to be developed through a joint partnership composed of business and industry representatives, Workforce and Economic Development Cabinets, and the Kentucky Department of education (Castellano, M., Stringfield, S.. & Stone, J., 2005). The resulting standards are known as Kentucky Occupational Skills Standards (KOSS) and measure student ability for transition to post-secondary or employment (Castellano, et al., 2005). KOSS assesses student achievement in the areas of academics, employability, and occupational skills thus providing a measure of soft skills necessary for the 21st century.

Kentucky seniors who have completed two credits within a CTE program area and are either enrolled in or have completed their third credit are required to take the Kentucky Occupational Skills Standards Assessment (KOSSA) (KDE, 2011). Students completing the number of credits required to sit for KOSSA are known as concentrators or preparatory students (KDE, 2011).

Kentucky Occupational Skills Standards include both technical and employability skills and are available for 21 CTE career clusters (KDE, 2011). These standards are categorized into multiple sets including, but not limited to verbal and written communication, teamwork, and workplace skills along with categories that are technical skill specific for each career cluster (KDE, 2011). Each category of skill sets include subcategories which are numbered and may be included in multiple career cluster

standards (KDE, 2011). As an example, the category of workplace skills is labeled skill set EF and includes a numbered subset of 20 skills (KDE, 2011). Kentucky Occupational Skills Standard EF 001 is the workplace skill "Demonstrate punctual, regular attendance" and is included in multiple career clusters as a measure of employability skills (KDE, 2011). The KOSS skills represent broad based required requirements for the 21st century with increased relevance from the inclusion of business and industry representatives in their development.

According to the Association of Career and Technical Education, Kentucky considered the overall cost of establishing standards electing to create documents within state professionals rather than contracting with outside vendors (ACTE, 2011c). The process was lengthy, but was less expensive and more relevant to the state than purchasing existing products (ACTE, 2011c). The ACTE (2011c) reports Kentucky is continuing to increase relevance of KOSSA by aligning the exam to current Perkins accountability and increasing the number of students tested.

Labor shortages. Throughout the industrial age, the United States has encountered labor shortages including appropriately skilled workers. It is difficult for employers to appreciate the impacts of worker shortages during economic downturns (Challenger, 2003). However, Challenger (2003) discusses the relevance of educational and demographic changes in promoting labor shortages during economic downturns. Challenger surmises during turbulent economic times, employers seek new methods to increase business. This in turn increases the possibilities of labor shortages as business and industry are forced to train workers within their own respective training centers for newly designed skills. As a result, Westray (2008) explains labor shortfalls impact not

only today's economy, but the ability of the United States to remain competitive in a global market in the future.

Employment opportunities. The U.S. Census Bureau predicts an approximated 26 percent increase in the population ages 65 and over by the year 2015 (Challenger, 2003). Challenger (2003) also notes a projected decrease in populous age of 40-54 which will lead to a reduction in the labor force in the near future. However, Challenger also notes the reduced availability of workers will increase the availability of jobs and need for training. Challenger surmises the future will demonstrate business and industries enacting their own training programs to fill labor needs.

The Department of Labor's Occupational Outlook Handbook (BLS, 2010) predicts a 10.7 percent increase in the civilian population 16 years of age and older resulting in an increased workforce of 8.2 percent by 2018. The Department of Labor projects a 10 percent employment increase which should assist in offsetting the projected increase in population (BLS, 2010). Although employment in industries producing consumer goods has declined over the past twenty years, the Department of Labor (BLS, 2010) projects employment to remain fairly constant in the overall industry with fluctuations in occupations. The 2010-2011 Occupational Outlook Handbook suggests by 2018 the demand for construction workers will increase by 13 percent while installation, maintenance, and repair jobs will increase by 8 percent. The 2010-2011 Occupational Outlook Handbook also implies computer occupations may increase at a rate that is almost double all other occupations. In Kentucky, the employment force is projected to grow by 7.5 percent by the year 2018 varied by occupation and in state region (BLS, 2010).

CTE Initiatives and Governance

National Perspective

Nationally, emphasis on accountability has been adopted by CTE and Wilcox (2007) recommends CTE programs implement more specific accountability measures in order to secure grants for continued sustenance. During the 70's and 80's, the American labor sect witnessed unrest as it became less likely young workers would obtain employment in the same manufacturing venue that had sustained their parents income (Castelanno et al., 2003). As a result, federal legislation forced CTE to reassess the needs of employers and CTE (Castelanno et al., 2003).

Upon the 1989 review of Perkins implementation, NAVE recommended 19 changes to increase accountability measures in the Perkins Act based on funding discrepancies identified across the country (Muraskin, 1989). As part of re-authorization, states were required to report progress toward benchmarks set forth by the 1989 NAVE report. Failure to meet standards could result in termination of the respective state's receipt of Perkins funding. This process assisted in ensuring Congress had adequate information regarding the usefulness and cost-effectiveness when making funding decisions for the Perkins Act. This process opened the door for effective reforms that were both systematic and well-defined (Guthrie, 2008).

The Department of Education Website highlights changes made to Perkins III which enhanced previous versions of the Act in order to prioritize service to non-traditional demographic groups as recommended in the NAVE report. Most recently, Perkins IV was authorized in 2006 again providing funding for CTE initiatives for five more years (U.S. Department of Education, 2006). Financially, the Perkins Act

substantially impacts the ability to provide students with technical skills required by the workforce.

Nationally, CTE is critical for a competitive global economy in that it plays a vital role in training a future workforce (Reese, 2010). The U.S. Bureau of Labor Statistics' 2010-2011*Occupational Outlook Handbook* identifies half of the 20 fastest-growing careers are in the health care field (Reese, 2010) and training can be received through CTE. The Association of Career and Technical Education (ACTE) stresses that regardless of the education level required for future careers, CTE must be considered an integral piece of the curriculum (Peckham, 2010). The ACTE also notes students must master academic, soft, and hard skills to be adequately prepared for the future and confirms CTE as an effective training venue (Peckham, 2010).

Kentucky Initiatives & Governance

At the state level, Kentucky found itself debating whether to stress academics or vocational education during the 1980's (O'Hara, 2009). In 1985, the non-profit Council for Better Education garnered support from Kentucky school districts and filed suit for equitable and adequate education for Kentucky children (Western Kentucky University, 1996). The lawsuit resulted in colossal education reform for Kentucky and led Governor Wallace Wilkinson to establish the State Board for Adult, Vocational Education, and Vocational Rehabilitation (O'Hara, 2009) as part of the reform effort. The State Board was responsible for organizing stakeholder interest and support in order to determine and ensure appropriate skills and technology for skilled workforce training (O'Hara, 2009).

Area technology centers. Following Kentucky's landmark education reform of 1990, discussion concerning the governance of vocational education for secondary

students led to creation of the Cabinet for Workforce Development (O'Hara, 2009). By the year 2000, funding had also been re-structured mandating funding to area technology centers (Legislative Research Commission, 2003). A marketing campaign was launched to emphasize the technology aspect of Kentucky's Career and Technical Education Program and embody the system as a symbol for workforce training (O'Hara, 2009). Kentucky Tech was selected as the logo for the system of area technology centers and helped identify Kentucky Tech as the governing system for Kentucky's secondary technology centers (O'Hara, 2009). Executive Director of the Kentucky Office of Career and Technical Education (OCTE), John Marks, emphasizes that the Kentucky Tech School System, which consists of the area technology centers, is the first technology system in the nation to be accredited by the Southern Association of Colleges and Schools (SACS) (Marks, 2009). Marks, explains that through the SACS process, Kentucky Tech has established the national standard for career and technical education. According to Marks, the system is dedicated to continuous improvement by ensuring Kentucky secondary students receive quality career and technical education and an overall improvement in student academic performance.

Funding for area technology centers under the guidance of Kentucky Tech is provided by Kentucky's general biennial budget and Kentucky education funding formula known as Support Education Excellence in Kentucky (SEEK) (Legislative Research Commission, 2003). For each student enrolled in a Kentucky Tech area technology center, 80 percent of the SEEK funds provided are designated to OCTE for operational and instructional expenses and the remaining 20 percent given to the local district for building maintenance as Kentucky Tech centers are located within locally owned district buildings (Legislative Research Commission, 2003). Despite established

funding arenas for CTE in Kentucky, formulas do not include provisions for increased costs in CTE instruction and are subject to change in accordance to Kentucky's fiscal situation (Legislative Research Commission, 2003).

Assessment. The OCTE implements a legislative mandated assessment program for CTE programs (Kentucky Tech, 2011b). The assessment plan was put into practice utilizing 21 assessment standards which were later reduced to 17 standards still currently in place to effectively measure CTE programs in relation to assessment objectives (Kentucky Tech, 2011b).

As shown in the following objectives for Kentucky Tech's assessment plan, the OCTE assessment encompasses a broad spectrum of CTE components making certain the plan assesses the CTE instructional goals and is revised bi-annually to ensure relevance in the assessment process (Kentucky Tech, 2011b):

- Increased Student Achievement Program Improvement
- Program Consistency
- Successful Student Transition
- Technical Program Support
- Meeting Accountability Criteria
- Support for the School Comprehensive Improvement Plan
- Alignment with and Support for SACS Accreditation

Bi-annually, ATC's receive visits from assessment teams comprised of the OCTE staff, community representatives, and post-secondary representatives (Kentucky Tech, 2011b). Assessment cycle time frames for ATC's begin one year prior to the bi-annual assessment visit (Kentucky Tech, 2011b). During the all day assessment visit, each instructional program located in the ATC presents evidence standard compliance which is

measured against the current assessment standards (Kentucky Tech, 2011b). Each standard is scored on a scale of 0 to 4 with 4 representing adequate evidence of the standard being met. Scores from each standard are combined to generate an overall assessment score for each program and each school (Kentucky Tech, 2011b). Each May, CTE program instructors complete a self assessment study of the standards which provides an interval measure of their program's effectiveness and direction for program improvement (Kentucky Tech, 2011b). The OCTE's (2011) 17 program assessment categorical standards include:

1 – Curriculum
2 – Lesson/Unit Plans
3 – Student Achievement
4 – Student Recognition
5 – Postsecondary Links
6 – Perkins Performance Measures
7 – Program Area Safety
8 – Student Safety
9 – Student Organization
10 – Public Relations
11 – Families and Community Contributions
12 – Advisory Committee
13 – Industry Certification
14 – Work-Based Learning
15 – Professional Growth
16 – Program Improvement Plan
17 – Technology

Programs. Today's CTE is not the same vocational training originally developed during the early 1900's as it requires higher level skills for all jobs (Committee on Vocational Education Research and Development (CVERD), 1976). According to Staten (2004), CTE programs should include activities related to individual communities and should be designed to provide human capital for the community. Studies show CTE

programs are not always aligned with labor needs in the local communities (Carreira, 2009) which may result in labor shortages for respective industries. Carreira's (2009) research reinforces the need to correctly align training programs to the expected labor market in order to meet the needs of a highly competitive labor force. The Vocational Education Act of 1963 provided considerable funds for research and development in vocational education (CVERD, 1976) leading to investigation as to appropriate program alignment.

CTE Benefits

The National Association of State Directors of Career Technical Education Consortium (NASDCTEC) (2009) reports findings from studies indicate a positive return on investment for CTE expenditures. The NASDCTEC (2009) explains CTE expenditures are recouped through tax bases created by a thriving labor force. Benefits of CTE are multi-faceted and include preparation for today's labor market, increased student engagement, transition to post-secondary education, and increased graduation rates. Likewise, both students and employers benefit from CTE as it increases skill levels of potential employees and provides instruction that is more engaging to students.

Labor Market Preparation

The Bureau of Labor and Statistics researches and reports on labor projections for the United States. Of the top 20 fastest-growing occupations in the United States forecasted for the years 2008 through 2018, approximately 50 percent of the labor needs can be fulfilled with training other than a bachelor's or post-graduate degree (BLS, 2010). Education is the most assured step in moving students into the labor market and is positively correlated with income (Castellano, M., Stringfield, S., & Stone, J., 2003).

While college is not suited for every student, those who do not plan for post-secondary education can still have successful high-paying jobs in the trade industry (Garcia, 2008). Again, training for these careers is available through CTE and Garcia (2008) explains this trend is becoming a nationwide catalyst for career and technical education. In fact, CTE is redeveloping its model of instruction to include stronger academic skills along with the necessary technical skills to generate a strong workforce for the future (Garcia, 2008).

Increased Student Engagement

Literature reveals CTE curriculum increases student engagement through hands-on and work based learning experiences ultimately resulting in increased academic achievement (Wilcox 2007). In fact, high school graduates participating in career exploration through CTE are more likely to enroll in college than students not participating in CTE programs (Visher, M., Bhandari, R., & Medrich, E., 2004). Wilcox (2007) stresses the importance for school guidance councilors, instructors, and administrators to understand the value of a hands-on instructional approach that both actively engages students and increases learning and then to share this information with both students and parents.

Hands-on learning. Many students in CTE programs choose their program of study due to the hands-on learning style afforded in the curriculum and report increased learning (Trinidad, 2008). However, Wilson (2006) states, "the learner has changed dramatically, yet many teachers are still using the same rote teaching styles that were used fifty years ago" (p. ix). Studies show only a small percent of students demonstrate a visual learning style and as a result, visual learning is the least preferred strategy by students while hands-on instruction is the most preferred (Trinidad, 2008). Based on

learning style research, Trinidad (2008) recommends teachers incorporate hands-on learning activities as a means to encourage student engagement.

Work based learning. CTE programs implement work based learning (WBL) initiatives which enable students to experience learning in a simulated work setting. The goal of WBL is to provide students a realistic view of today's workplace and the skills required for success as it helps "create a context for creative decision making in uncertain situations" (Harnish & Wilke-Schnaufer, 1998, p.22). Deborah Reese (2008) found students participating in intern programs attained multiple positive employment characteristics including basic work skills, positive attitudes, interpersonal skills, cooperation, and teamwork.

Job shadowing is also offered by CTE programs and allows students to observe employees performing their job duties (Reese, 2008). Reese states that one benefit of this program is that students are able to experience the culture of an occupation in which they are interested and more likely to pursue as a career. Likewise, job shadowing offers students an opportunity to experience a day of work (Visher, et al., 2004).

Academic achievement. Research does not show a significant difference in the grade point average or American College Test (ACT) scores of students completing a planned CTE curriculum and students only completing one course (Brown, 2007). However, Brown (2007) suggests that any participation in CTE may lead to increased academic achievement. Brown's conclusion is based on the intent of the Carl D. Perkins CTE legislation which requires CTE students to perform at least as well on academic standards as other students.

School systems receiving federal Perkins funding are required to integrate academic content into the technical curriculum (Moye, 2011). Moye, 2011, explains technical education is based on real-world experiences providing relevance to academics which students might not otherwise understand. Moye also stresses the importance of collaboration between CTE and academic instructors in order for student academic achievement to be maximized. Also attesting to the relevance of CTE regarding academic achievement, James E. (Gene) Bottoms, Southern Regional Education Board Senior Vice President, stated "You cannot achieve both rigor and relevance in high school for most students without modern career and technical education" (Bottoms, 2006, p. 14).

Post-Secondary Transition

Career and technical education is not limited to secondary students. Many two year colleges offer an Associate of Science (AS) degree which consists of 64 credit hours with approximately one-half of those dedicated to technical courses (Stumpf, 2007). Although many states look at an associate degree as a path to a bachelor's degree, Stumpf (2007) contends there are still states that look at the AS degree as preparation for immediate entrance into the workforce. In response to criticism that an associate degree does not provide enough technical skills training for the entry-level worker to successfully transition to the workforce, Stumpf relays that colleges have established options to reinforce employability including internship programs along with other work based learning initiatives.

Another option for secondary students to be better prepared for transition to college is through obtaining college credit in high school. Articulated course work is

defined as a "college level technical course that allows high school students to qualify for college credit through articulation agreements" (p.12) between high schools and colleges (Kim, 2006). Kim (2006) defines dual credit students as "students who have received dual credit from both high school and community college by taking dual credit course(s) while in high school" (p.13). Research demonstrates a significant positive correlation between articulated and dual-credit hours and college readiness indicating that students should be given greater opportunities to receive dual and articulated credit to be adequately prepared for college (Kim, 2006).

CTE programs do not diminish the participating students' college preparedness (Wilcox 2007). In fact, research shows support for technical education with insignificant differences between the college readiness of technical and non-technical students (Wilcox, 2007). Wilcox (2007) recommends CTE programs in order to adequately prepare students for the technologically advanced positions for which they must compete.

Graduation Rates

Posey (2008) notes that dropout rates are a serious cause for concern nationally and reports school districts are incorporating smaller learning communities or career academies to motivate student learning through cohort scheduling, dual enrollment, differentiated instruction, mentoring, and work based learning all of which are offered through CTE. Garcia (2008) reports educators are increasing course relevance and providing an opportunity for students to experiment with courses that offer instruction in modern technology and lead to well-paying careers. To battle significant dropout rates, Los Angeles schools turned to CTE in order to provide at risk students with workplace

principles and skills that will hopefully stimulate an interest to maintain their academic endeavors (Garcia, 2008).

Human Capital Theory

Capital is defined as the "Material wealth used or available for use in the production of more wealth." (Kleinedler , 2005). Gary Becker, Nobel Memorial Prize winning economist from the University of Chicago, is credited with the theory of human capital as a means of increasing one's wealth (Becker, 1993). Becker's theory, straightforward in its simplicity, suggests training and education are directly tied to the overall value of human worth and ingenuity thus serving as an intangible form of capital. Becker's original 1957 study focused on the rate of return for education and formed a theory which explains multiple research phenomena (Becker, 1975). Becker found increased income resulted from investments in human capital (Becker, 1993). Becker (1975) devised the equation, $mp=w$, meaning wages increase along with marginal productivity. In turn, education and training are required to increase skill sets and knowledge; ultimately leading to increased productivity.

> Embracing the Human Capital Theory, David Baker (2009), declares "formal education not only educates individuals, it reconstitutes the very foundations of society through a pervasive culture of education with a legitimate capacity to reconstruct work and its central components such as ideas about human productive abilities, new organisations and management, widespread professionalism and expertise, and the emerging educated workplace" (p. 163).

Baker's statement implies individuals are not the sole benefactors of human capital investment, but rather employers profit from increased skills and production. Reiterating this point, literature contends once knowledge and skills are obtained, they become an integral part of who the employee is and positively impacts actions and workplace behaviors (Clark & Allison-Jones, 2011). As a result, employers should consider investing in additional employee training (Clark & Allison-Jones, 2011).

Becker contends that better education leads to greater wealth of citizens and nations and that all humans are rational and seek to maximize their individual wealth through appropriate education attainment (Vandenberghe, 1999). Becker asserts educational providers are only concerned with pleasing their clients whether the clients are students or industry and will adapt educational processes to meet those needs (Vandenberghe, 1999). This assertion increases the relevance of this study as CTE program alignment is necessary to meet the needs of industry.

Formation of the Human Capital Theory (HCT) can be traced to the mid-1700's to economist Adam Smith and his *Wealth of Nations* (Baptiste, 2001). Despite other researcher's interest in the theory, HCT was somewhat controversial as it challenged the foundation of human freedom and dignity by implying humans were nothing more than capital with their education and training considered an investment in capital (Baptiste, 2001). Opponents of HCT argued that humans were not to be valued and marketed for their skills, but rather recipients of wealth (Baptiste, 2001).

Becker's early studies of the economics of education were followed by significant research solidifying HCT as a widely accepted philosophy (Gilead, 2009). The philosophy recognizes humans as capital and training expenses or education of laborers

as a human capital investment resulting in education as a generator of human capital (Becker, 1962; Vandenberghe, 1999). Limitations to the HCT are evident in that opponents argue that individuals are not always logical and do not always seek to maximize wealth (Gilead, 2009; Baptiste, 2001). In fact, many individuals are constrained by their socio-economic placements and are tied to alternative paths that do not always lead to wealth and prosperity (Baptiste, 2001). Too, not all seek wealth as a source of happiness and are content in their lifestyle based on values and upbringings. Likewise, educational providers may not always respond to the needs of students and industry as confounding variables such as political demands may dictate educational processes (Vandenberghe, 1999). Becker (1975) admits there are multiple variables associated with Human Capital Theory and stresses the importance of continued study.

Community Success

Literature shows local community sustainability depends upon economic growth and job provision (Renski, 2009). Renski, 2009, suggests the success of local communities is jeopardized when a lack of jobs forces new and younger workers to seek employment in other areas. Renski also discusses the negative impact of a lost tax base on community structure when workers move out of the area. Likewise, Morgan (2009) stresses the need for increased economic growth to sustain local communities and suggests communities are looking for innovative ideas for business and industry recruitment in the current economic climate. Morgan (2009), found communities involved in the dedicated pursuit of economic growth were focusing on garnering a workforce trained in needed skills for the particular industry needs.

Appalachian variable

Wide diversity of the United States' Appalachian region exists with communities ranging from vast poverty to characteristics of suburbia (Baumann, 2006). Baumann (2006) explains Appalachia's central region, including Kentucky's Appalachian counties, is most prone to extreme poverty. From an Appalachian perspective, Shaw, et al., (2004) contends education is necessary for economic growth of respective communities.

Unfortunately, Appalachia has historically demonstrated under attainment in education in relation to the rest of the country (Baumann, 2006; Shaw, et al., 2004). Johnson & Broomhall (1992) found the lack of education within Appalachia resulted in turning away new industries to the region. Confirming the need for career and technical education, Hall (2009) reported the lack of educational attainment in Appalachia cannot be replaced with specific short-term training as it is not a viable alternative to a skilled labor force. Again sounding the importance of career and technical education within the Appalachian region, a summation of topics from a 1980's Appalachian Regional Commission Conference explained the importance of technical education in relation to economic growth of the region (Conference Focuses on Jobs and Skills for the Future, 1983). Coming full circle, Shockley (1995) found the CTE program area Appalachian students participated in were correlated to the students' career choice recapping the need for CTE program alignment to the needs of business and industry.

Literature Conclusion

A review of literature reveals that overall CTE provides an educational plan for students and employers. Literature attests current employers are looking for the total package in employees including both job skills and interpersonal skills also known as

technical and soft skills. Literature suggests employer needs often change with the advent of new technologies increasing the difficulty of sustaining well trained workers. Literature also suggests CTE provides instruction leading to successful employability skills in both technical and soft skills.

Literature reveals the importance of funding in providing education according to business and industry needs. This is evident in the amount of federal funding allocated to CTE through the Carl D. Perkins Act and the act's continued approval. However, literature shows Perkins funding is available only for CTE program advancement and not daily program expenditures necessary for daily implementation implying a need for research regarding CTE operational funding.

Gary Becker theorizes investment in education and training is an investment in human capital which leads to increased personal wealth. Based on the Human Capital Theory, literature discloses investment in employee educational obtainment and continued training not only benefits individual employees, but is profitable to business and industry. The Human Capital Theory is closely aligned with CTE as it relates educational costs to personal and organizational benefits.

Both nationally and in Kentucky, CTE has been influenced by various policy models and frameworks dependent upon both federal and state initiatives. In Kentucky, the success and vision of policy makers in re-designing CTE demonstrates attributes of multiple policy making theories. The Council for Better Education lawsuit reflects a triggering event that is evident in punctuated equilibrium policy model (Sabatier, 2007). Because of the triggering event, the window of opportunity was opened allowing this policy theory to play the largest role in the education reform that followed. Not only was the entire educational spectrum changed for Kentucky, but the governance and implementation of CTE in Kentucky. The

premise behind the creation of the Workforce Development Cabinet was to form a relationship that would benefit the labor needs of business and industry through employment of highly skilled and educated workers.

Literature implies the overall education system has benefited tremendously from benefits associated with CTE instruction. Literature attests to the engaging teaching methods associated with CTE and the positive impact of this strategy on dropout rates indicating partnerships between CTE and traditional educational programs result in increased achievement in both formats. Identified benefits increase the credibility of CTE helping to overcome the premise of CTE only suited students not pursing post-secondary opportunities.

Within the next generation, vocational education will continue to grow and evolve by offering expanded programs and higher levels of skills and technology as dictated by the ever changing needs of business and industry. Over the years, educators in the vocational system have claimed ownership of technical training and are currently working to develop a stronger base of operation that will secure a culture of higher order learning with student achievement levels greater than recognized in the traditional school setting. However, continued growth and development of CTE programs requires an increase in valid research to enable stakeholders in the decision making process.

Literature reveals soft skills are a necessary skill set for the 21st century. Soft skills vary according to industry, but each list generally contains a contiguous skill set categorized as communication, teamwork, critical thinking, and problem solving skills. Literature implies CTE promotes soft skills within its curriculum, but lacks specific measurement and analysis of such. In Kentucky, the Kentucky Occupational Skills

Standards depict a relevant skill set necessary for both technical and personal skills for current and future employment. Likewise, the KOSSA provides relevant information regarding student achievement, but the assessment does not provide measurement of stand alone soft skills. Rather the KOSSA includes measurement of technical skills alongside soft skills as an overall employability benchmark. However, KOSSA information is included in this study as it provides the most extensive data as a measurement of soft skills mastery in Kentucky as it was authorized to be imported as a Perkins Grant accountability tool in the 2006-2007 school year.

Overall, literature reveals a lack of research in the area of CTE program alignment to the labor needs of local business and industry despite Arnold's (1965) assertion that quality CTE programs are directly tied to local communities. There is little question regarding the ability of CTE to adequately prepare a trained workforce, but the question not being asked or answered in this review of literature is whether or not specific workforces are able to find local employment.

Literature also attests the need for economic growth in order to sustain local communities. Local communities are dependent upon a solid tax base for infrastructure improvement and stability. Morgan (2009) related innovative communities are working to secure skilled labor for recruitment purposes. In order to effectively recruit business and industry to local communities, it is imperative the community is work ready and can provide adequately skilled labor. This study is directly tied to this premise as CTE is a cornerstone to the provision of a skilled workforce and solicitation of new business and industry is dependent upon adequately skilled labor.

This review of literature shows the Appalachian region suffers from educational attainment and subsequent development of business and industry. Again, this study addresses the need for technical education in Appalachia and is even more relevant considering Shockley (1995) found the CTE program areas Appalachian students participated in were correlated to the students' career choice. Considering this, when jobs in those career fields are not available due to misalignment, students are more likely to leave the community to find employment thus contributing to the breakdown of the community.

The area of CTE program alignment and the provision of 21st century soft skills are vital in determining the overall success of CTE in meeting the needs of local business and industry. This review of literature reveals an opening for research regarding CTE program alignment. Too, literature reflects discrepancies in acceptable broad based soft skills necessary for 21st century success. This study will add to the vacancy in literature providing conclusions and recommendations to CTE policy makers regarding CTE program alignment and provision of 21st century soft skills.

CHAPTER III

METHODOLOGY

Introduction

The purpose of this study was to analyze the relationship between CTE training programs offered to high school students and the labor needs of business and industry. Secondly, this study analyzed whether CTE preparatory students demonstrate proficiency in 21st century soft skills. This study's quantitative design depicted the alignment of CTE programs to current and future labor needs as well as the relationship between CTE curriculum and 21st century soft skills through observational information devoid of experimental research intervention (Sloman, 2010). Research designs applied to this study provided baselines and predictive factors with relative accuracy for further study (Sloman, 2010; Jackson, 2009).

The research questions investigated in this study follow:

1. Are career and technical programs offered by Kentucky Tech's area technology centers in central Kentucky aligned with current labor needs in counties served by the LCADD?
2. Are career and technical programs offered by Kentucky Tech's area technology centers in central Kentucky aligned with future labor needs in counties served by the LCADD?
3. Are CTE preparatory students demonstrating proficiency in 21st century soft skills required by employers?

Context of Study

The concept of human capital accentuates skill development as a vital component for a capable workforce leading to improvement in the standard of living and overall citizenry (Olaniyan & Okemakinde, 2008). Olaniyan & Okemakinde (2008) reported a positive correlation between Human Capital Theory and economic development in their findings, implying developing human resources may result in increased business and industry productivity and levels of technological skills. Along those lines, Eastern Asia attributed its advancement in economic growth on this foundation (Olaniyan & Okemakinde, 2008).

Embracing the Human Capital Theory and its association with education, this study investigated whether area technology centers in Kentucky's Appalachian region are providing the skilled labor force required both currently and in the future for local community needs. This study took place in Kentucky's Appalachian counties in the Lake Cumberland Area Development District (LCADD) located on Kentucky's western edge of the Appalachian region. The LCADD region was chosen for the study as it represents Appalachia which historically displays vast poverty (Ziliak, 2007). Ziliak (2007) reports the lack of educational attainment in Appalachia has contributed to the lack of human capital and may explain the significant economic plight of the region. The LCADD region provided a broad representation of Appalachia's human capital eliminating potential bias resulting from stereotypical assumptions associated with Appalachian people.

This study replicated Robert Carreira's *Aligning Tech Prep Programs with Current and Future Labor Market Needs* study which investigated whether Tech Prep

programs in Cochise County, Arizona were aligned with the current and future labor needs of that area. Adapting Carreira's research, this study explored whether CTE programs offered through ATC's under the control of OCTE were aligned to the current and future labor needs of communities served by the ATC's. Different from Carreira, this study incorporated analysis of skills needed for the 21st century.

Instrumentation

Carreira (2009) introduced job quotients as a valid measure for program allocative efficiency. Job quotients are a simple fraction with the numerator representing the number of jobs available in a chosen field and the denominator representing the number of students able to receive training in the respective field (Carreira, 2009). Carreira's development of job quotients stemmed from reviews of literature for location quotients. Location quotients have long been used as a valid research tool by economists and regional planners for comparative analysis and is commonly stated as a ratio (Beyene & Moineddin, 2005; Carreira, 2009; Moineddin, R., Beyene, J., & Boyle, E., 2003). Beyene & Moineddin (2005) provide the following methodology for the calculation of location quotients (p. 2):

x_i = outcome of the i^{th} area

n_i= population of the i^{th} area

x=$\sum x_i$ outcome of the whole

n=$\sum n_i$ population of the whole

$$LQ_i = \frac{\frac{x_i}{n_i}}{\frac{x}{n}} = \frac{x_i}{x} \text{ x } \frac{n}{n_i}$$

Beyene and Moineddin suggest the use of confidence levels with the location quotients to increase validity of the quotients.

For this study, Carreira's adaption of job quotients was used without the use of confidence levels. As Carreira notes, location quotients are not easily interpreted by the user. Likewise, location quotients in an economic setting are beneficial for comparison between local and national venues (Moineddin, et al. 2003). This study's population encompassed eight counties in Kentucky's Appalachian region and did not include national labor markets. In fact, many of the ATC's in the population offered the same CTE programs within their area technology centers which provided a better setting for a regional study. For this study, Carreira's manipulated job quotients provided a tool that was easily interpreted by the user addressing the number of jobs in relation to the number of students trained and did not take into account confidence intervals outside the scope of this study.

Carreria's study indicated that the simplicity of job quotients spoke to their validity as a research method. Carreira explained job quotients of one suggest an "equal number of jobs in the local economy for each student offered access to the program that prepares students for those jobs" (p. 14). Subsequently, alignment "ensures workforce shortages are equitably distributed and career fields and industries within the local economy are equitably served" (p. 14). This study accepted the simplicity and straightforwardness of job quotients, but did not attempt to explain margins of acceptable efficiency when calculated job quotients do not purport alignment.

Population

The population for this study included CTE programs in six of Kentucky Tech's 54 ATC's which provide CTE instruction to secondary students in Kentucky. ATC's included in the population are under direct control of the Kentucky Education and Workforce Investment Cabinet's Office of Career and Technical Education. This study's sample included the population's 6 Kentucky Tech ATC's providing CTE instruction to students in the LCADD located in south central Kentucky. The study's sample serves 8 of the 10 counties in the LCADD area which are classified as Appalachian: Adair, Casey, Clinton, Cumberland, Green, Pulaski, Russell, and Wayne. McCreary County was not included in the sample as resident students are not served through an ATC and resident students from Taylor County were omitted as Taylor County is not included in the Appalachian region. Table 2 illustrates programs offered in the respective ATC's.

Table 2
Program Offerings in ATC's located within the LCADD

	Lake Cumberland ATC	Pulaski County ATC	Casey County ATC	Green County ATC	Clinton County ATC	Wayne County ATC
LCADD Counties Served	Russell Adair	Pulaski	Casey	Green	Clinton Cumberland	Wayne
Programs						
Accounting and Finance			X	X		X
Automotive Technology	X	X	X	X	X	X
Construction Carpentry	X	X			X	X
Electrical Technology	X		X	X	X	
Health Sciences	X	X	X	X	X	X
Horticulture			X			
Industrial Maintenance	X					
Information Technology		X				
Machine Tool	X			X		X
Office Technology			X	X	X	X
Welding	X	X	X	X	X	X
Wood Manufacturing				X		

Data Collection

The study used existing data sets collected by the LCADD, OCTE, Workforce Kentucky Database, and TEDS database for Carl D. Perkins reporting. Research questions one and two utilized data from the LCADD, OCTE, and Workforce Kentucky Database. Research question three utilized data provided by the TEDS database for Carl D. Perkins reporting. No human participants were used in this study which qualified the study for exempt status from Eastern Kentucky University's Institutional Review Board. The exempt status was authorized under Protocol Number 11-182.

The Lake Cumberland Area Development District is one of Kentucky's 15 Area Development Districts organized by regional communities to help meet the needs of local business and industry (Kentucky Area Development District, 2009). For this study, the LCADD website provided a list of counties included in the LCADD and demographics including Appalachian status.

The Workforce Kentucky Database is a product of Kentucky's Office of Employment and Training (OET) and provided labor market information for Kentucky collated by Kentucky's Area Development Districts (KOET, 2011). Specifically, the Workforce Kentucky Database reported current and projected workforces associated with career clusters offered through Kentucky Tech ATC's in the LCADD and projected annual openings for each workforce.

For this study, Kentucky's Workforce Kentucky Database provided the most relevant and reliable data for the population area. At the federal level, the Bureau of Labor Statistics (BLS) offers the most reliable employment and economic data for public use. The BLS (2010) reports that individual states track and report occupational

information within their respective areas working cooperatively with the Bureau of Labor Statistics which increases data reliability. The BLS acknowledges some states may not track and report on all occupational areas included in national statistics due to insignificant labor numbers within the occupations. To streamline reporting, the BLS explains individual states often group occupations with insignificant employment numbers under broader and larger industry categories. For these reasons, individual county information for this study's population area was not available at either the national or state level.

The Office of Career and Technical Education is governed by Kentucky's Workforce Investment Cabinet (Kentucky Workforce Investment Cabinet, 2011). The OCTE's staff includes program consultants who, like instructors are experts in their respective fields, serve as liaisons between business and industry area technology centers advising instructors on curriculum and industrial needs (Kentucky Tech, 2011a). For this study, program consultants provided lists of occupations for area technology center program offerings. Detailed occupational information provided by OCTE consultants is included in Appendix B.

Data for research question three was obtained from the TEDS database and the Office of Career and Technical Education. The Office of Career and Technical Education website provided lists of Kentucky Occupational Skills Standards, which after analysis provided a list of widely accepted soft skills in Kentucky. The TEDS database contains information for Carl D. Perkins accountability standards and provided passage rates for the Kentucky Occupational Skills Assessment.

Research Design and Analysis

This study utilized a quantitative research design which took place in four phases. The first and second phases of this study consisted of data collection for research questions one and two. Phase one of the research included a summary of programs offered by each ATC within the sample along with a supply side compilation of aggregate enrollment capacities for respective programs. This was accomplished by organizing enrollment capacities for schools in the population by programs. Data collected for this phase was provided through the OCTE and TEDS database. This study assumed students completing programs possess adequate hard skill sets necessary for technical skill success in respective labor markets. As referenced earlier, program completers are students who have completed four credits within a given program. It was also assumed that not all students enrolling in a given program will complete four credits. It is important to note analysis of program completers compared to enrollment capacities was outside the scope of this study. As a result, enrollment capacities were used as a measure to determine program alignment to labor needs while assuming programs were training students at full capacity.

The second phase of data collection included a demand side compilation of current and future occupation capacities associated with each program area along with projected annual openings. Data for this phase was collected from Workforce Kentucky Database, and the Office of Career and Technical Education. The Workforce Kentucky Database provided current labor market numbers as well as the projected number of annual jobs for the years 2008 through 2018 for occupations associated with CTE programs offered within the LCADD. Occupational data for Kentucky was available

through the Workforce Kentucky database. The website offered current and projected occupational data organized through various modes. Categorical groupings included the state at large, metropolitan areas, and Kentucky Area Development Districts. For this study, Workforce Kentucky information was organized and retrieved for the Lake Cumberland Area Development District and provided current and projected employment data for the region. As noted previously, the BLS reports individual states do not always provide specific county information due to lack of significant labor numbers (BLS, 2010). For Kentucky, individual rural county information was not available. Also in this data collection phase, lists of respective occupations for each program area for which CTE provides instruction were collected from OCTE program consultants and organized by career clusters.

Phase three of the study included analysis of data collected during phases one and two. Supply side data from phase one was organized by program, assuming full enrollment capacities of programs to arrive at an aggregate enrollment figure for programs in the LCADD. When compared to current and future labor openings in the LCADD, data analysis revealed whether programs adequately aligned to labor needs thus answering the alignment portion of the research questions.

Data was analyzed following Carreira's study through utilization of job quotients. This study utilized job quotients as the statistical measure between current and future job opportunities in the LCADD area in relation to ATC program offerings. As noted in Carreira's study, job quotients indicate either an abundance or lack of resources to program areas through calculation of either too many or too few trained students for the number of jobs. Sufficient program alignment was determined when a calculated job

quotient was one; assuming a job quotient numerator of the number of jobs available within each program area and a denominator of the number of students available to work in each program area. As Carreira noted, job quotients are relatively new as a statistical measure and do not carry "well established" validity and reliability. However, the measure's simplicity speaks to its ability to effectively measure what it claims and does not raise validity issues (Carreira, 2009). The use of job quotients as a measure of alignment did not provide historical references for data analysis. As a result, this study did not attempt to determine statistically significant margins indicating alignment with job quotients above and below one.

While Carreira's study utilized regression analysis as the primary measure between current and future labor needs and enrollment capacities, this study diverged from Carreira and utilized descriptive statistics without research manipulation to minimize the impact of a potential low sample size. Low sample sizes in research can pose a problem for reliability in quantitative statistics (Anderson-Cook, 2004). Research shows larger sample sizes more precisely mirror the research population resulting in higher confidence levels. However, effective research design does not depend solely on sample size, but rather what data will provide answers to the research questions (Anderson-Cook, 2004). The scope of this study was narrowed to involve a relatively low sample of the CTE population in Kentucky's Appalachian region. The scope was limited in order to adequately address concerns in the Appalachian region as outlined in the program of studies for Eastern Kentucky University's Educational Doctoral Program. For this reason, the research design utilizing descriptive statistics with a lower sample size was appropriate to answer the research questions posed.

Phase four of the study included analysis of the level of soft or employability skills proficiency by CTE preparatory students. As evidenced with the development of the Kentucky Occupational Skills Standards, employability and soft skills are an integral part of CTE curriculum. The Kentucky Occupational Skills Standards Assessment offers a measure of student mastery of Kentucky Occupational Skills Standards and subsequent 21st century soft skills. Taylor (2005) reported the current movement for the inclusion of soft skills within educational curriculums requires an effective framework for measuring student attainment. While slight variances in soft skills may exist according to industry and prevent a consistent national skill set, research demonstrates common skill sets germane to most all industries.

In an effort to increase the validity and reliability of KOSSA as a measure of 21st century soft skills, the researcher analyzed soft skills included in the skill standards of each relative career cluster. The researcher compiled the number of soft skills included in each career. This analysis was necessary to show readers of the study the importance of the KOSSA passage rates.

The number of students successfully passing the Kentucky Occupational Skills Standards Assessment was collected and analyzed beginning with the school year 2006-2007. The 2006-2007 school year was the first year KOSSA data was collected and imported into the TEDS system for Perkins Grant accountability. As a result, data before the 2006-2007 school year was not available for this study. The student passage rate was charted to reflect either a decrease, increase, or no change in the passage rate indicating whether the program was moving towards increased proficiency. The data was presented

by program areas to determine the level of soft skills mastery by students from individual program areas.

Summary

This study used existing data sets provided by the Office of Career and Technical Education, LCADD, and Workforce Kentucky to analyze the study's research questions. The study's methods included data observation without experimental intervention and were divided into four phases to answer the three research questions. Phases one and two included data collection of current and projected labor needs in the LCADD as well as total enrollment capacities of each program. From the collected data, job quotients were calculated. Phase three entailed analysis of job quotients to determine if CTE programs were aligned with current and projected labor needs. Alignment was considered when calculated job quotients are one. Phase four included analysis of Kentucky Occupational Skills Standards as a measure of 21st century soft skills and analysis of Kentucky Occupational Skills Standards Assessment passage rates to determine whether CTE students demonstrated proficiency in 21st Century Soft Skills.

CHAPTER IV

FINDINGS

Introduction

The purpose of this study was to determine if CTE programs offered in Kentucky's Lake Cumberland Area Development District (LCADD) under the umbrella of Kentucky Tech were aligned with current and future local labor needs in terms of job availability and whether program completers demonstrated 21st century soft skills. Results of this study follow in this chapter.

As outlined in the previous chapter, this study was broken down into four phases to answer the study's three research questions. Phases one and two provided data collection for the first two research questions. Research questions one and two dealt with Kentucky Tech area technology centers in the LCADD program alignment with jobs in the area.

Phase one of the research entailed a summary of programs offered by each ATC within the sample along with a supply side compilation of aggregate enrollment capacities for respective programs. This was accomplished by organizing enrollment capacities for each school by programs. Data collected for this phase was provided through the OCTE and included total available enrollments for programs during the 2010-2011 school year. (See Table 5).

The second phase of data collection consisted of compiling current and future employment capacities for occupations within each program area. Data for this phase was collected from the Workforce Kentucky Database and the OCTE. The Workforce Kentucky Database provided current labor market numbers as well as the projected

number of annual jobs for the years 2008 through 2018 for occupations associated with CTE programs offered within the LCADD. OCTE program consultants provided information regarding attainable occupations for each program area.

Phase three of the study included compilation and analysis of job quotients for each program area. Job quotients were calculated using the number of jobs in each program area as the numerator and the number of aggregate program enrollment capacities as the denominator. Job quotients demonstrated a lack or abundance of training potential for program areas. The study recognized a job quotient of one would indicate alignment of programs in the Lake Cumberland Area Development District to the respective labor needs as it implies an available trained workforce for business and industry needs. It was assumed job quotients in excess of one would demonstrate a need for program completers. Likewise, it was assumed job quotients below one would demonstrate an overabundance of trained workers which might result in workers leaving the LCADD to find employment.

Phase four was used to determine whether CTE students were demonstrating proficiency in 21st century soft skills through compilation and analysis of soft skills and Kentucky Occupational Skills Standards Assessments. Skills standards documents for programs offered in the LCADD were compared and a list of categorical soft skills required by employers was assembled. As previously discussed, a single set of accepted soft skills does not exist. The list gathered from KOSS for each program demonstrates KOSSA measures 21st century soft skills. Once this was done, passage rates from the previous four years of KOSS assessments were organized by overall programs in the LCADD allowing the researcher to determine whether students were increasing in soft

skills attainment. It was assumed programs were demonstrating proficiency in soft skills when passage rates were above 50 percent. Likewise, it was assumed programs were moving towards increased proficiency when passage rates were increasing over reported years.

Phase 1

Table 3 shows welding, health sciences, and automotive technology programs had the greatest enrollment capacity for the area as all technology centers in the study sample had those respective technology programs. This suggested that welding and automotive technology jobs should be the greatest occupational areas for the LCADD. As the table also conveys, horticulture and information technology had the lowest available enrollment. This is due to only one ATC having these program areas suggesting that horticulture and information technology should have the lowest number of jobs in the area.

Table 3
Enrollment Capacities by Program

Program	Enrollment Capacity
Accounting and Finance	420
Automotive Technology	860
Construction Carpentry	600
Electrical Technology	580
Health Sciences	860
Horticulture	120
Industrial Maintenance	140
Information Technology	120
Machine Tool	440
Office Technology	600
Welding	860
Wood Manufacturing	140
Total Enrollment Capacity	5,740

Phase 2

Table 4 provided current and projected future jobs for each attainable occupation in the LCADD as well as projected annual openings from growth and replacements.

Table 4
Current and Projected Career Cluster Occupations and Projected Annual Openings for LCADD

Program	Current Labor Force	Projected Labor Force	Projected Annual Openings
Accounting	18,048	19,322	619
Automotive	6,337	6,305	162
Construction carpentry	8,012	8,241	176
Electricity	275	272	7
Health Sciences	8,554	11,098	345
Horticulture	2,267	2,301	59
Industrial Maintenance	16,511	15,662	367
Information Technology	1,613	1,946	72
Machine Tool	14,208	13,307	305
Office Tech	33,714	35,672	1,067
Welding	10,752	10,110	234
Wood Manufacturing	12,129	11,567	263

Table 4 shows office technology and accounting occupations as being the greatest source of employment in the LCADD area. As previously discussed, this implies the greatest enrollment capacities should encompass these areas. However, future job projections are merely projections and are not completely reliable. Nevertheless, the Workforce Kentucky database is the most reliable provider of occupational statistics within Kentucky (KOET, 2011). As a result, the projections provided demonstrate the most reliable data available for this study.

Phase 3

Table 5 reflects calculated job quotients for each program area in the LCADD. Quotients were calculated for current and projected jobs in the LCADD along with an adjusted job quotient. Adjusted job quotients retained the same denominator as current and projected quotients, but utilized the projected number of annual openings as the numerator in order to more clearly reflect employment possibilities for respective occupations. Adjusted job quotients were not discussed in the methods section of this study and were added after the current and projected labor markets revealed wide ranges between total current and projected employment and annual projected available jobs.

Table 5
Program Area Job Quotients

Program	Current	Projected	Adjusted
Accounting and Finance	42.97	46.00	1.47
Automotive Technology	7.37	7.33	.19
Construction carpentry	13.35	13.74	.29
Electricity	0.47	0.47	.01
Health Sciences	9.94	12.90	.40
Horticulture	18.89	19.18	.49
Industrial Maintenance	117.94	111.87	2.62
Information Technology	13.44	16.22	.60
Machine Tool	32.29	30.24	.69
Office Technology	56.19	59.45	1.78
Welding	12.50	11.76	.27
Wood Manufacturing	86.64	82.62	1.88

Job quotients can be interpreted literally as the number of jobs available for each student enrollment slot in a respective CTE program area (Carreira, 2009). Adjusted job quotients revealed the number of projected openings for each trained student. A job

quotient of one suggested alignment between employment opportunities in a respective field and the number of available trained students.

Conversely, job quotients in excess of one demonstrated more occupational positions than students trained for the respective position. For example, current and projected job quotient of 117.94 and 111.87 for industrial maintenance suggested that each year, there were an average of 114.90 industrial maintenance positions for every student trained in that field by Kentucky Tech CTE programs. Again, this suggests a lack of available training slots for students and a potential need for increased industrial maintenance programs and subsequent student enrollment.

Job quotients less than one demonstrated more student enrollment and training than the industry needs. For example, the job quotient of .47 for both current and projected jobs in electricity suggested only .47 jobs exist for every student trained in electricity on an annual basis. As a result, students trained in electricity in the LCADD area may not be able to find adequate employment in the electrical field without leaving the LCADD area.

Program Job Quotient Results

Accounting and Finance

Aggregate enrollment for the accounting programs in area technology centers located in the Lake Cumberland Area Development District was 420. The Workforce Kentucky database revealed 18,048 current jobs in the LCADD falling under the accounting program technical skill set. Current jobs included filled positions reported for the 2008 calendar year which was the most current data available in the Workforce Kentucky Database. For the year 2018, the projected employment in the accounting

industry for the LCADD area was 19,322 representing a projected increase of 1,274 positions. The Workforce Kentucky Database projected annual openings in the field of accounting of 619 for the LCADD area. These projected openings are expected to be the result of replacements and growth.

The calculated job quotient for current accounting positions was 42.97 indicating 42.97 active accounting positions for each student trained in a CTE accounting program. The calculated job quotient for projected accounting positions was 46.00 projecting 46.00 accounting jobs in the LCADD area for the year 2018 for every student trained in a CTE accounting program. Current and projected job quotients for this program area indicated a greater aggregate enrollment is needed in accounting in the LCADD. The adjusted job quotient for accounting was 1.47 indicating 1.47 open accounting positions each year for every student trained in a CTE accounting program. Like the current and projected job quotients, the adjusted job quotient indicated a greater aggregate enrollment is needed in accounting in the LCADD and program alignment was not evident.

Automotive Technology

Aggregate enrollment for the automotive technology programs in area technology centers located in the Lake Cumberland Area Development District was 860. The Workforce Kentucky database revealed 6,337 current jobs in the LCADD falling under the automotive technology program technical skill set. Current jobs included filled positions reported for the 2008 calendar year which was the most current data available in the Workforce Kentucky Database. For the year 2018, the projected employment in the automotive technology industry for the LCADD area was 6,305 representing a projected loss of 32 positions. The Workforce Kentucky Database projected annual openings in the

field of automotive technology of 162 for the LCADD area. The projected openings are expected to be the result of replacements and growth.

The calculated job quotient for current automotive technology positions was 7.37 indicating 7.37 active automotive technology positions for each student trained in a CTE automotive technology program. The calculated job quotient for projected automotive technology positions was 7.33 projecting 7.33 automotive technology jobs in the LCADD area for the year 2018 for every student trained in a CTE automotive technology program. Current and projected job quotients for this program area indicated a greater aggregate enrollment was needed in automotive technology in the LCADD. The adjusted job quotient for automotive technology was .19 indicating .19 open automotive technology positions each year for every student trained in a CTE automotive technology program. Unlike the current and projected job quotients, the adjusted job quotient indicated a smaller aggregate enrollment is needed in automotive in the LCADD. All calculated job quotients indicated program alignment was not evident.

Construction Carpentry

Aggregate enrollment for construction carpentry programs in area technology centers located in the Lake Cumberland Area Development District was 120. The Workforce Kentucky database revealed 8,012 current jobs in the LCADD falling under the construction carpentry program technical skill set. Current jobs included filled positions reported for the 2008 calendar year which was the most current data available in the Workforce Kentucky Database. For the year 2018, the projected employment in the construction carpentry industry for the LCADD area was 8,241 representing a projected decrease of 229 positions. The Workforce Kentucky Database projected annual openings

in the field of construction carpentry of 176 for the LCADD area. The projected openings are expected to be the result of replacements and growth.

The calculated job quotient for current construction carpentry positions was 13.35 indicating 13.35 active construction carpentry positions for each student trained in a CTE construction carpentry program. The calculated job quotient for projected construction carpentry positions was 13.74 projecting 13.74 construction carpentry jobs in the LCADD area for the year 2018 for every student trained in a CTE construction carpentry program. Current and projected job quotients for this program area indicated a greater aggregate enrollment was needed in construction carpentry in the LCADD. The adjusted job quotient for construction carpentry was .29 indicating .29 open construction carpentry positions each year for every student trained in a CTE construction carpentry program. Unlike the current and projected job quotients, the adjusted job quotient indicated a smaller aggregate enrollment was needed in construction carpentry in the LCADD. All calculated job quotients indicated program alignment was not evident.

Electricity

Aggregate enrollment for electricity programs in area technology centers located in the Lake Cumberland Area Development District was 580. The Workforce Kentucky database revealed 275 current jobs in the LCADD falling under the electricity program technical skill set. Current jobs included filled positions reported for the 2008 calendar year which was the most current data available in the Workforce Kentucky Database. For the year 2018, the projected employment in the electricity industry for the LCADD area was 272 representing a projected decrease of 3 positions. The Workforce Kentucky

Database projected annual openings in the field of electricity of 7 for the LCADD area. The projected openings are expected to be the result of replacements and growth.

The calculated job quotient for current electricity positions was .47 indicating .47 active electricity positions for each student trained in a CTE electricity program. The calculated job quotient for projected electricity positions was .47 projecting .47 electricity jobs in the LCADD area for the year 2018 for every student trained in a CTE electricity program. Current and projected job quotients for this program area indicated less aggregate enrollment was needed in electricity in the LCADD. The adjusted job quotient for electricity was .01 indicating .01open electricity positions each year for every student trained in a CTE electricity program. Like the current and projected job quotients, the adjusted job quotient indicated a smaller aggregate enrollment was needed in electricity in the LCADD and program alignment was not evident.

Health Sciences

Aggregate enrollment for health sciences programs in area technology centers located in the Lake Cumberland Area Development District was 860. The Workforce Kentucky database revealed 8,554 current jobs in the LCADD falling under the health sciences program technical skill set. Current jobs included filled positions reported for the 2008 calendar year which was the most current data available in the Workforce Kentucky Database. For the year 2018, the projected employment in the health sciences industry for the LCADD area was 11,098 representing a projected increase of 2,544 positions. The Workforce Kentucky Database projected annual openings in the field of health sciences of 345 for the LCADD area. The projected openings are expected to be the result of replacements and growth.

The calculated job quotient for current health sciences positions was 9.94 indicating 9.94 active health sciences positions for each student trained in a CTE health sciences program. The calculated job quotient for projected health sciences positions was 12.90 projecting 12.90 health sciences jobs in the LCADD area for the year 2018 for every student trained in a CTE health sciences program. Current and projected job quotients for this program area indicated that a greater aggregate enrollment was needed in health sciences in the LCADD. The adjusted job quotient for health sciences was .40 indicating .40 open health sciences positions each year for every student trained in a CTE health sciences program. Unlike the current and projected job quotients, the adjusted job quotient indicated a smaller aggregate enrollment was needed in health sciences in the LCADD. All calculated job quotients indicated program alignment was not evident.

Horticulture

Aggregate enrollment for the horticulture programs in area technology centers located in the Lake Cumberland Area Development District was 120. The Workforce Kentucky database revealed 2,267 current jobs in the LCADD falling under the horticulture program technical skill set. Current jobs included filled positions reported for the 2008 calendar year which was the most current data available in the Workforce Kentucky Database. For the year 2018, the projected employment in the horticulture industry for the LCADD area was 2,301 representing a projected increase of 34 positions. The Workforce Kentucky Database projected annual openings in the field of horticulture of 59 for the LCADD area. The projected openings are expected to be the result of replacements and growth.

The calculated job quotient for current horticulture positions was 18.89 indicating 18.89 active horticulture positions for each student trained in a CTE horticulture program. The calculated job quotient for projected horticulture positions was 19.18 projecting 19.18 horticulture jobs in the LCADD area for the year 2018 for every student trained in a CTE horticulture program. Current and projected job quotients for this program area indicated that a greater aggregate enrollment was needed in horticulture in the LCADD. The adjusted job quotient for horticulture was .49 indicating .49 open horticulture positions each year for every student trained in a CTE horticulture program. Unlike the current and projected weighted job quotients, the adjusted job quotient indicated a smaller aggregate enrollment was needed in horticulture in the LCADD. All calculated job quotients indicated program alignment was not evident.

Industrial Maintenance

Aggregate enrollment for industrial maintenance programs in area technology centers located in the Lake Cumberland Area Development District was 140. The Workforce Kentucky database revealed 16,511 current jobs in the LCADD falling under industrial maintenance program technical skill set. Current jobs included filled positions reported for the 2008 calendar year which was the most current data available in the Workforce Kentucky Database. For the year 2018, the projected employment in the industrial maintenance industry for the LCADD area was 15,662 representing a projected decrease of 849 positions. The Workforce Kentucky Database projected annual openings in the field of industrial maintenance of 367 for the LCADD area. The projected openings are expected to be the result of replacements and growth.

The calculated job quotient for current industrial maintenance positions was 117.94 indicating 117.94 active industrial maintenance positions for each student trained in a CTE industrial maintenance program. The calculated job quotient for projected industrial maintenance positions was 111.87 projecting 111.87 industrial maintenance jobs in the LCADD area for the year 2018 for every student trained in a CTE industrial maintenance program. Current and projected job quotients for this program area indicated that a greater aggregate enrollment was needed in industrial maintenance in the LCADD. The adjusted job quotient for industrial maintenance was 2.62 indicating 2.62 open industrial maintenance positions each year for every student trained in a CTE industrial maintenance program. Like the current and projected job quotients, the adjusted job quotient indicated a greater aggregate enrollment was needed in industrial maintenance in the LCADD and program alignment was not evident.

Information Technology

Aggregate enrollment for information technology programs in area technology centers located in the Lake Cumberland Area Development District was 120. The Workforce Kentucky database revealed 2,267 current jobs in the LCADD falling under the information technology program technical skill set. Current jobs included filled positions reported for the 2008 calendar year which was the most current data available in the Workforce Kentucky Database. For the year 2018, the projected employment in the information technology industry for the LCADD area was 2,301 representing a projected increase of 34 positions. The Workforce Kentucky Database projected annual openings in the field of information technology of 72 for the LCADD area. The projected openings are expected to be the result of replacements and growth.

The calculated job quotient for current information technology positions was 13.44 indicating 13.44 active information technology positions for each student trained in a CTE information technology program. The calculated job quotient for projected information technology positions was 16.22 projecting 16.22 information technology jobs in the LCADD area for the year 2018 for every student trained in a CTE information technology program. Current and projected job quotients for this program area indicated that a greater aggregate enrollment was needed in information technology in the LCADD. The adjusted job quotient for information technology was .60 indicating .60 open information technology positions each year for every student trained in a CTE information technology program. Unlike the current and projected job quotients, the adjusted job quotient indicated a smaller aggregate enrollment was needed in information technology in the LCADD. All calculated job quotients indicated program alignment was not evident.

Machine Tool

Aggregate enrollment for machine tool programs in area technology centers located in the Lake Cumberland Area Development District was 440. The Workforce Kentucky database revealed 14,208 current jobs in the LCADD falling under the machine tool program technical skill set. Current jobs include filled positions reported for the 2008 calendar year which was the most current data available in the Workforce Kentucky Database. For the year 2018, the projected employment in the machine tool industry for the LCADD area is 13,307 representing a projected decrease of 901 positions. The Workforce Kentucky Database projects annual openings in the field of machine tool of

305 for the LCADD area. The projected openings are expected to be the result of replacements and growth.

The calculated job quotient for current machine tool positions was 32.29 indicating 32.29 active machine tool positions for each student trained in a CTE machine tool program. The calculated job quotient for projected machine tool positions was 30.24 projecting 30.24 machine tool jobs in the LCADD area for the year 2018 for every student trained in a CTE machine tool program. Current and projected job quotients for this program area indicated that a greater aggregate enrollment was needed in machine tool in the LCADD. The adjusted job quotient for machine tool was .69 indicating .69 open machine tool positions each year for every student trained in a CTE machine tool program. Unlike the current and projected job quotients, the adjusted job quotient indicated a smaller aggregate enrollment was needed in machine tool in the LCADD. All calculated job quotients indicated program alignment was not evident.

Office Technology

Aggregate enrollment for the office technology programs in area technology centers located in the Lake Cumberland Area Development District was 600. The Workforce Kentucky database revealed 33,714 current jobs in the LCADD falling under the office technology program technical skill set. Current jobs included filled positions reported for the 2008 calendar year which was the most current data available in the Workforce Kentucky Database. For the year 2018, the projected employment in the office technology industry for the LCADD area was 35,672 representing a projected increase of 1,958 positions. The Workforce Kentucky Database projected annual

openings in the field of office technology of 1,067 for the LCADD area. The projected openings are expected to be the result of replacements and growth.

The calculated job quotient for current office technology positions was 56.19 indicating 56.19 active office technology positions for each student trained in a CTE office technology program. The calculated job quotient for projected office technology positions was 59.45 projecting 59.45 office technology jobs in the LCADD area for the year 2018 for every student trained in a CTE office technology program. Current and projected job quotients for this program area indicated that a greater aggregate enrollment was needed in office technology in the LCADD. The adjusted job quotient for office technology was 1.78 indicating 1.78 open office technology positions each year for every student trained in a CTE office technology program. Like the current and projected job quotients, the adjusted job quotient indicated a greater aggregate enrollment was needed in office technology in the LCADD and program alignment was not evident.

Welding

Aggregate enrollment for the welding programs in area technology centers located in the Lake Cumberland Area Development District was 860. The Workforce Kentucky database reveals 10,752 current jobs in the LCADD falling under the welding program technical skill set. Current jobs included filled positions reported for the 2008 calendar year which was the most current data available in the Workforce Kentucky Database. For the year 2018, the projected employment in the welding industry for the LCADD area was 10,110 representing a projected loss of 642 positions. The Workforce Kentucky Database projects annual openings in the field of welding of 234 for the LCADD area. The projected openings are expected to be the result of replacements and growth.

The calculated job quotient for current welding positions was 12.50 indicating 12.50 active welding positions for each student trained in a CTE welding program. The calculated job quotient for projected welding positions was 11.76 projecting 11.76 welding jobs in the LCADD area for the year 2018 for every student trained in a CTE welding program. Current and projected job quotients for this program area indicated that a greater aggregate enrollment was needed in welding in the LCADD. The adjusted job quotient for welding was .27 indicating .27 open welding positions each year for every student trained in a CTE accounting program. Unlike the current and projected job quotients, the adjusted job quotient indicated a smaller aggregate enrollment was needed in welding in the LCADD. All calculated job quotients indicated program alignment was not evident.

Wood Manufacturing

Aggregate enrollment for wood manufacturing programs in area technology centers located in the Lake Cumberland Area Development District was 140. The Workforce Kentucky database revealed 12,129 current jobs in the LCADD falling under the wood manufacturing program technical skill set. Current jobs included filled positions reported for the 2008 calendar year which was the most current data available in the Workforce Kentucky Database. For the year 2018, the projected employment in the wood manufacturing industry for the LCADD area was 11,567 representing a projected decrease of 562 positions. The Workforce Kentucky Database projected annual openings in the field of wood manufacturing of 263 for the LCADD area. The projected openings are expected to be the result of replacements and growth.

The calculated job quotient for current wood manufacturing positions was 86.64 indicating 86.64 active wood manufacturing positions for each student trained in a CTE wood manufacturing program. The calculated job quotient for projected wood manufacturing positions was 82.62 projecting 82.62 construction carpentry jobs in the LCADD area for the year 2018 for every student trained in a CTE wood manufacturing program. Current and projected job quotients for this program area indicated that a greater aggregate enrollment was needed in wood manufacturing in the LCADD. The adjusted job quotient for wood manufacturing was 1.88 indicating 1.88 open wood manufacturing positions each year for every student trained in a CTE wood manufacturing program. Like the current and projected job quotients, the adjusted job quotient indicated a greater aggregate enrollment was needed in wood manufacturing in the LCADD and program alignment was not evident.

Phase 4

Phase four of the study compiled categorical soft skills gathered from respective area skills standards documents provided through KDE's website. Twelve program areas were included in the study's sample. However, skills standards were designed by career cluster resulting in all twelve program areas falling under the heading of 9 career clusters. The manufacturing career cluster includes welding, machine tool, and industrial maintenance.

Table 6 reveals the importance of a positive work ethic, effective communication, and adequate workplace relationships as these characteristics were included in the skills standards for all program areas in the sample. Likewise, technology and information management along with critical thinking and lifelong learning skills, also included in

multiple clusters, demonstrated their relevance to required soft skills. Workplace diversity and workplace attire were only listed in two program areas, yet still represented employability skills in more than a single category which increased their relevance as soft skills.

Table 6
Kentucky Occupational Skills Standards Soft Skills by Career Cluster

	Accounting	Automotive	Manufacturing	Horticulture	Allied Health	Financial Services	Construction	Communicatio	Administrative Support
Personal Management Skills (3)	X				X	X			
Work Ethic (9)	X	X	X	X	X	X	X	X	X
Effective Workplace Relationships (9)	X	X	X	X	X	X	X	X	X
Workplace Diversity (2)	X				X				
Communication & Teamwork Skills (9)	X	X	X	X	X	X	X	X	X
Critical Thinking and Problem Solving Skills (6)	X	X	X	X		X	X		
Lifelong learning skills (6)	X	X	X		X		X	X	
Workplace Attire (2)	X							X	
Technology and Information Management (7)	X	X			X	X	X	X	X

Note: Soft skill frequency listed in parenthesis

Table 7 displays the number of students tested and the passage rate of the Kentucky Occupational Skills Standards Assessment by program area and year.

Table 7
Total Students Tested and KOSSA Passage Percentage by Program and Year

Program/Year	2006-2007		2007-2008		2008-2009		2009-2010	
	Tested	Passage Rate	Tested	Passage Rate	Tested	Passage Rate	Tested	Passage Rate
Accounting and Finance	3	1.00	15	.73	3	.67	7	.00
Automotive Technology	25	.44	39	.56	63	.30	46	.26
Construction Carpentry	12	.25	17	.53	33	.15	37	.16
Electricity	13	.69	12	.83	13	.46	18	.56
Health Sciences	55	.87	36	.78	127	.67	74	.58
Horticulture	4	.50	4	.50	3	.33	0	N/A
Industrial Maintenance	7	.57	8	.50	1	.00	9	.89
Information Technology	0	N/A	5	.00	17	.47	4	.50
Machine Tool	26	.35	13	.85	24	.38	20	.40
Office Technology	8	.75	33	.27	52	.14	35	.09
Welding	26	.50	19	.58	66	.33	45	.18
Wood Manufacturing	3	.33	0	N/A	2	.50	9	.11
Average								

Passage Rate	182	.60	201	.56	404	.37	304	.34

Note: N/A denotes none tested. Slots where students were not tested (N/A) were not included in overall averages.

Accounting and Finance

The Kentucky Occupational Skills Standards passage rate for accounting and finance for the four years reported was highest during the 2006-2007 school year with 100 percent of the 3 students tested passing the assessment. The passage rate was lowest during the 2009-2010 school year with none of the 7 students tested passing the assessment. Passage rates were above 50 percent for three of the reported years with rates declining each subsequent year. This indicated accounting and finance students taking the assessment were demonstrating proficiency in soft skills with a decline in continued growth towards proficiency.

Automotive Technology

The Kentucky Occupational Skills Standards passage rate for automotive technology for the four years reported was highest during the 2007-2008 school year with 56 percent of the 39 students tested passing the assessment. The passage rate was lowest during the 2009-2010 school year with 26 percent of the 46 students tested passing the assessment. Passage rates were above 50 percent for one year of the reported years and declined during the two most recent years. This indicated automotive students taking the assessment were not demonstrating proficiency in soft skills or movement towards proficiency.

Construction Carpentry

The Kentucky Occupational Skills Standards passage rate for construction carpentry for the four years reported was highest during the 2007-2008 school year with 53 percent of the 17 students tested passing the assessment. The passage rate was lowest during the 2008-2009 school year with 15 percent of the 33 students tested passing the assessment. The passage rate declined 66 percent from a pass rate of 53 percent in 2007-2008 to 15 and 16 percent for the most recent school years. Passage rates were above 50 percent for one year of the reported years. This indicated construction carpentry students taking the assessment are not demonstrating proficiency in soft skills and no movement towards continued proficiency.

Electricity

The Kentucky Occupational Skills Standards passage rate for electrical technology for the four years reported was highest during the 2007-2008 school year with 83 percent of the 12 students tested passing the assessment. The passage rate was lowest during the 2008-2009 school year with 46 percent of the 13 students tested passing the assessment. The passage rate declined 37 percent from the 2007-2008 rate of 83 percent to the 2008-2009 rate of 46 percent and increased to 56 percent for the most recent school year. Passage rates were above 50 percent for three of the reported years. This indicated electrical technology students taking the assessment were demonstrating proficiency in soft skills and continued growth towards proficiency.

Health Sciences

The Kentucky Occupational Skills Standards passage rate for health sciences for the four years reported was highest during the 2006-2007 school year with 87 percent of the 55 students tested passing the assessment. The passage rate was lowest during the

2009-2010 school year with 58 percent of the 74 students tested passing the assessment. Passage rates were above 50 percent for all of the reported years. This indicated health sciences students were demonstrating proficiency in soft skills with a decline in continued growth towards proficiency.

Horticulture

The Kentucky Occupational Skills Standards passage rate for horticulture for the four years reported was highest during the 2006-2007 and 2007-2008 school years with 50 percent of the 4 students tested each year passing the assessment. The passage rate was lowest during the 2008-2009 school year with 33 percent of the 3 students tested passing the assessment. Horticulture is only offered in one ATC in the LCADD—the Casey County Area Technology Center. The program did not have any students eligible to take the assessment during the 2009-2010 school year. Passage rates were 50 percent for the first two of the reported years and declined in the following year. This indicated horticulture students taking the assessment did not demonstrate proficiency in soft skills or continued growth towards proficiency.

Industrial Maintenance

The Kentucky Occupational Skills Standards passage rate for industrial maintenance for the four years reported was highest during the 2009-2010 school year with 89 percent of the 9 students tested passing the assessment. The passage rate was lowest during the 2008-2009 school year with the single student tested not passing the assessment. Passage rates were at or above 50 percent for three of the reported years. This indicated industrial maintenance students taking the assessment were demonstrating proficiency in soft skills and movement towards proficiency.

Information Technology

Data for information technology programs was limited to three years. Information technology was only offered in one ATC in the LCADD—the Pulaski County Area Technology Center. Likewise, the Pulaski County ATC began operation with the 2006-2007 school year and did not have students eligible for assessment until 2007-2008. The Kentucky Occupational Skills Standards passage rate for information technology for the three years reported was highest during the 2009-2010 school year with 50 percent of the 4 students tested passing the assessment. The passage rate was lowest during the 2007-2008 school year with none of the 5 students tested passing the assessment. Passage rates were 50 percent for 1 of the reported years and increased in the most recent two school years. This indicated information technology students taking the assessment were not demonstrating proficiency in soft skills and demonstrated only a slight increase in continued growth towards proficiency.

Machine Tool

The Kentucky Occupational Skills Standards passage rate for machine tool for the four years reported was highest during the 2007-2008 school year with 85 percent of the 13 students tested passing the assessment. The passage rate was lowest during the 2006-2007 school year with 35 percent of the 26 students tested passing the assessment. Passage rates were below 50 percent for three of the reported years and have fluctuated with increases in the most recent two school years. This indicated machine tool students taking the assessment were not demonstrating proficiency in soft skills, but showed slight movement towards proficiency.

Office Technology

The Kentucky Occupational Skills Standards passage rate for office technology for the four years reported was highest during the 2006-2007 school year with 75 percent of the 8 students tested passing the assessment. The passage rate was lowest during the 2009-2010 school year with 9 percent of the 35 students tested passing the assessment. Passage rates were 50 percent or above for the first reported year and were below 50 percent and declining for the following three years. This indicated office technology students taking the assessment were not demonstrating proficiency in soft skills and showed a decline in continued growth towards proficiency.

Welding

The Kentucky Occupational Skills Standards passage rate for welding for the four years reported was highest during the 2007-2008 school year with 58 percent of the 19 students tested passing the assessment. The passage rate was lowest during the 2009-2010 school year with 18 percent of the 45 students tested passing the assessment. Passage rates were 50 percent or above for two of the reported years and declined in the most recent two school years. This indicated welding students taking the assessment were not demonstrating proficiency in soft skills, and showed a decline in continued growth towards proficiency.

Wood Manufacturing

The Kentucky Occupational Skills Standards passage rate for wood manufacturing for the four years reported was highest during the 2008-2009 school year with 50 percent of the 2 students tested passing the assessment. The passage rate was lowest during the 2009-2010 school year with 11 percent of the 9 students tested passing the assessment. Wood manufacturing was only offered in one ATC in the LCADD—the

Green County Area Technology Center. The program did not have any students eligible to take the assessment during the 2007-2008 school year. Passage rates were 50 percent one of the reported years and declined in the most recent reported school year. This indicated wood manufacturing students taking the assessment were not demonstrating proficiency in soft skills with a decline in continued growth towards proficiency.

Summary

This study's findings demonstrated whether or not area technology center programs located in the Lake Cumberland Area Development District were aligned with business and industry. As well, findings revealed whether or not CTE students demonstrated proficiency in 21st century soft skills.

Job quotients were used to determine program alignment. Job quotients represented the number of jobs available for students trained within a given program area. This study utilized three different job quotients to provide increased reliability. The first job quotient utilized the number of jobs within a given industry as the numerator and the aggregate possible program enrollment as the denominator. The second job quotient utilized projected jobs within a given industry as the numerator and the aggregate possible program enrollment as the denominator. The projected jobs were obtained from the Workforce Kentucky Database and provided labor force projections for the year 2018. The final job quotient utilized projected annual openings as the numerator in place of the number of filled jobs within the industry and the aggregate possible program enrollment as the denominator. This quotient provided the most realistic view of alignment as it was based on job openings that students can obtain rather than the total employed labor force for which jobs were not available.

Findings indicate none of the program offerings in the Kentucky Tech Area Technology Centers in the Lake Cumberland Area Development District were aligned with the current or projected needs of the area's business and industry. Current and projected job quotients of four programs were in agreement with adjusted job quotients in that all quotients were above one. Current and projected job quotients from one program were in agreement with the adjusted job quotient in that all were below one. Overall, current and projected job quotients from five programs were in agreement with adjusted job quotients. Current and projected job quotients of seven programs were not consistent with adjusted quotients.

Findings from the analysis of the passage rate of the Kentucky Occupational Skills Standards Assessment indicated students in 4 of the 12 programs offered in Kentucky Tech Area Technology Centers in the LCADD demonstrated proficiency in 21st century soft skills.

CHAPTER V

CONCLUSIONS

This study's primary focus was to determine whether alignment between career and technical education programs in rural Kentucky were aligned with local business and industry. In planning the study, it became evident it is critical for CTE students to demonstrate 21st century soft skills. As a result, a question about students' soft skills was included in the study. The purpose of this study is to assist CTE stakeholders in decisions regarding CTE programs and instruction.

Historical insight relates periods of intense focus on career and technical education most recently in the modern age with the industrial revolution during the early 20th century and the developing age of technology during the latter 20th century. Despite recent economic downturns, the need for a technically skilled workforce is critical as the United States strives to remain competitive in a growing global economy.

In 1917, development of Smith-Hughes Act began the federal government's involvement in the continuance and funding of CTE. Throughout the course of history, a multitude of influential people have impacted CTE legislation including the most prominent individual from Kentucky, Carl D. Perkins. To honor Congressman Perkins' work in vocational education, the 1963 Vocational Education Act was changed to the Carl D. Perkins Vocational Education Act upon his death.

In Kentucky, CTE is available to students in CTE programs provided under the direction of the Kentucky Department of Education and the Office of Career and Technical Education (OCTE). CTE instruction provided through OCTE is referred to as

the Kentucky Tech system and is available through 54 area technology centers throughout the state. Regardless of other policy initiatives, funding issues are at the forefront of CTE policy considerations.

The benefits of CTE are far reaching to both employers and employees. Kentucky employers benefit from the availability of a highly skilled workforce while students benefit from completing planned CTE programs that develop necessary skills enabling them to find employment. CTE instruction provides students' real world and hands on instruction which often leads to increased educational attainment and post-secondary endeavors.

This study utilized a modified version of Gary Becker's Human Capital Theory which acknowledges the correlation between training and education to human worth. Becker suggests increased knowledge and skill sets lead to increased wages and industry productivity. The theory suggests that better education leads to greater wealth of employees and employers as well as nations.

Embracing Becker's theory, this study analyzed the career and technical educational alignment between Kentucky Tech CTE programs and business and industry labor needs in the Lake Cumberland Area Development District. Alignment results in an adequate workforce available for employment as well as the ability of the trained workforce to find employment. When alignment is not present, business and industry struggle to find competent employees and may result in the loss of jobs in the given areas. Likewise, when trained workers are unable to find positions in their local communities, they are forced to seek employment elsewhere often resulting in relocation and a tax base loss for the home community.

This study addressed program alignment in Kentucky's Lake Cumberland Area Development District (LCADD) which encompasses several counties within the Appalachian region which historically struggles to develop and maintain adequate business and industry opportunities for residents. This study also addressed the ability of CTE to adequately instill employment skills necessary for success in the current century. The following research questions were developed to address these issues:

1. Are career and technical programs offered by Kentucky Tech's area technology centers in central Kentucky aligned with current labor needs in counties served by the LCADD?
2. Are career and technical programs offered by Kentucky Tech's area technology centers in central Kentucky aligned with future labor needs in counties served by the LCADD?
3. Are CTE preparatory students demonstrating proficiency in 21st century soft skills required by employers?

The relevancy of this study addressed the lack of research in overall CTE program alignment in Kentucky and more so in Appalachia. As noted throughout the study, the researcher found a similar study similar in nature conducted by Robert Carreira in Cochise County, Arizona. Carreira's study focused on alignment between Tech Prep initiatives and labor needs of business and industry. As previously discussed, Tech Prep designation for CTE programs requires students to complete two years of CTE at the secondary level and two additional years at the post-secondary level leading to at least a two year post-secondary degree (Kentucky Department of Education (KDE), 2009). At the time of this study, Kentucky did not participate in the Tech Prep initiative. As a

result, this study focused on overall program offerings within the Kentucky Tech system located in the LCADD. Also divergent from Carreira, this study included analysis of 21st century soft skills due to the emergence of their importance in today's business and industry.

Research for this study took place in four stages. Stage one involved a compilation of programs and enrollment capacities offered under Kentucky Tech Area Technology Centers located in the LCADD. The second phase consisted of compiling current and future employment data for respective programs. Data for the second phase came from state and national sponsored databases. The third phase of research included calculation of job quotients based on current and projected labor markets. During calculation, the researcher determined it necessary to include a quotient utilizing the projected number of annual job openings in relation to the program aggregate enrollment. This quotient was not included in the original methods section of the study, but was explained in Chapter IV. This quotient's relevance is based on the fact that current and future labor markets represent filled labor positions and do not take into consideration the ability of students entering the work force to obtain open positions. Job quotients, introduced in Carreira's study, were used as a measure of alignment between CTE programs and labor needs. However, due to the rural nature and potentially small size of the study's population, this study utilized job quotients as the sole measure of program alignment.

The final phase of research included organization and analysis of passage rates from the Kentucky Occupational Skills Standards Assessment for which data was

available through the Technical Education Database System (TEDS) database, to analyze the student level of proficiency in 21st century soft skills.

Interpretation of Findings

Program Alignment

Job quotients calculated in the study did not reveal a job quotient of one for either current or projected labor markets. Likewise, job quotients calculated utilizing projected job openings did not reveal program alignment. The job quotients produced the answer to research questions one and two:

1. Are career and technical programs offered by Kentucky Tech's area technology centers in central Kentucky aligned with current labor needs in counties served by the LCADD?
2. Are career and technical programs offered by Kentucky Tech's area technology centers in central Kentucky aligned with future labor needs in counties served by the LCADD?

The answer to both questions was career and technical programs offered by Kentucky Tech's area technology centers were not aligned with either current or future labor needs in counties served by the LCADD.

Job quotients for this study revealed dichotomies among programs and the potential number of jobs available to students. For example, industrial maintenance quotients were 117.94 and 111.87 for current and projected jobs in the LCADD area for each student offered access to CTE industrial maintenance. Adjusted job quotients were calculated using the Workforce Kentucky Databases which projected annual job openings and a job quotient of 2.62 indicated there would be more annual openings for every

student trained in industrial maintenance. Although the adjusted quotient was in agreement with current and projected quotients in that students with industrial maintenance skills should have adequate opportunity for employment, the dichotomies between the quotients raised a question regarding an appropriate number of enrollment spots.

Job quotients for industrial maintenance were the largest of all computed job quotients indicating available enrollment for this program should be large in relation to other program areas. However, industrial maintenance has next to the lowest enrollment capacity for programs within LCADD programs and is located in one area technology center within the region.

Conversely, machine tool job quotients showed 32.29 and 30.24 current and projected machine tool jobs in the LCADD for each student offered access to CTE machine tool instruction indicating the need for additional students to receive training in machine tool. However, the adjusted job quotient for machine tool was .69 which indicated students leaving high school with machine tool skills would have difficulty obtaining employment in the field of machine tool.

Yet another unique situation was found in electricity where current, projected, and adjusted job quotients reveal that not a single employment position is or will be available for students. Current and projected job quotients were both .47 and the adjusted job quotient was .01. However, electricity programs are included in four of the six sample area technology centers with an aggregate enrollment capacity of 580.

Understanding of job quotients is critical for this study. Current and projected job quotients as well as adjusted job quotients for all programs were either above or below

one indicating an absence of alignment. Also, 7 of the 12 adjusted job quotients were not in agreement with current and projected quotients indicating great disparities between total program work forces and projected available jobs for students reiterating the need for further study.

Disparities between job quotients may be the result of multiple external variables. First, the age of the current workforce directly impacts the number of annual openings as an aged current workforce could result in greater yearly attrition from retirements creating greater annual openings and a younger current workforce could mean fewer annual openings. Projected increases and decreases in industries due to growth or decline of the industry would also impact annual openings. It is important to note there are difficulties involved in workforce projections. Despite potential inaccuracies of projections, this study relies on publicly available data generated by the state of Kentucky. Irregularities should be analyzed by program area and take into consideration external variables.

The lack of prior research in this area did not provide a basis for establishing margins of error in alignment determination. As discussed, this study's definition of program alignment is based on a job quotient of one. It is understood job quotients of one would be rare. Further study should include acceptable ranges of job quotients that would meet both the labor needs of business and industry as well as the need for students to find employment within their local community.

21st Century Soft Skills

Analysis of Kentucky Occupational Skills Standard passage rates for the past four years did not indicate consistent growth in student proficiency. These findings provided an answer for research question three:

3. Are CTE preparatory students demonstrating proficiency in 21st century soft skills required by employers?

As a result of the findings demonstrating an absence of consistent student proficiency, CTE preparatory students are not demonstrating proficiency in 21st century soft skills required by employers.

Ever changing workforce dynamics require employees to demonstrate a wide variety of employability skills above and beyond standard technical skills. Literature bears out the need for soft skills, but does not disclose a master set of skills accepted for all jobs. As well, at the time of this study, Kentucky does not officially recognize a widely accepted measure of soft skills. To answer the research question, a compilation of common soft skills encompassing Kentucky career clusters associated with the LCADD region was required. Table 6 represents the assembly and frequency of soft skills found within the skills standards. Data also demonstrated soft skills are embedded within the Kentucky Occupational Skills Standards and validated measurement of the Kentucky Occupational Skills Standards Assessment to answer research question three.

Findings for the 2009-2010 school year showed passage rates for the Kentucky Occupational Skills Standards Assessment from 4 out of 12 programs were above 50 percent. Also, no programs demonstrated sustained growth from the 2006-2007 school year which represented the first year data was available from the Perkins data base. In

fact, the accounting and finance program displayed a direct opposite trend. This program had 100 percent passage during the 2006-2007 school year and decreased each of the following years to a 0 percent passage rate during the 2009-2010 school year. During the four years analyzed for this study, all programs demonstrated passage rates above 50 percent for at least one year. However, the lack of consistency and low overall increases reinforce the lack of demonstrated proficiency.

Findings from the analysis demonstrate a lack of reliable measurement due to assessment fluctuations. During the 2006-2007 and 2007-2008 cycles, students taking the assessment were selected by teachers. These students most likely were selected based on their likeliness to pass the exam. This assumption is demonstrated in the overall passage rates reported in Table 7. Likewise, teacher selection lowered the total number of students assessed which most likely skewed passage results. The assessment cycle of 2008-2009, the first year teachers were not permitted to select students to be tested, 203 more students were assessed compared to 2007-2008. The same assessment cycles saw the average overall passage rate decrease from 56 percent to 37 percent respectively.

Limitations of Research

Limitations to this study follow:

- This study encompassed the Lake Cumberland Area Development District spanning rural south central Kentucky. The rural Appalachian setting included a limited business and industry set impacting job quotient outcomes. In a larger sample area, job quotients could reveal different outcomes due to a larger labor force and potential job openings.

- This study's sample did not include an analysis of technical programs and students at the post-secondary level which also impact labor forces within the LCADD.
- This study was conducted assuming full enrollment in the ATC's and full program completion by students. However, this assumption also serves as a limitation to the study as students often enroll in programs for reasons other than career choice.
- The study discusses how misalignment of programs to relative business and industry results may result in a trained workforce moving to other communities. However, the scope of this study did not include analysis of the impact of this scenario on the LCADD.
- This study utilized job quotients as the sole measure of program alignment. Job quotients are a modification of widely accepted location quotients and research demonstrates increased reliability when used with confidence intervals (Beyene & Moineddin, 2005). This study did not include confidence intervals as a comparison was not made between the sample area and potential larger areas.
- This study analyzed the LCADD as a whole and did not take into account individual characteristics of each county located within the district. This study assumed employment opportunities in one county within the population area was logistically accessible to all students residing in the LCADD. It should be noted commute times from edge to edge of the LCADD could infringe upon employment opportunities forcing students to look for employment in surrounding counties located in other area development districts.

- The minimal data found for research question three limited the relevance and reliability of data analysis. Data for the research was only available for four school years. Likewise, during the first two years of available data, instructors selected the best students to sit for the Kentucky Occupational Skills Standards Assessment which most likely skewed results.

Implications and Future Research

Research demonstrates CTE is a valuable tool in training a highly skilled workforce and is beneficial to local business and industry by providing highly skilled laborers. However, findings and analysis from this study reveal programs in the LCADD are not aligned with the local business and industry. As a result, it is probable graduates from the LCADD area entering the workforce will be forced to leave the area in order to find employment

This scenario can be devastating to local communities. Most often, new industries locate in communities where an adequate workforce is assured and will seek other locales when labor is not available. As a result, the community loses needed tax revenue and established businesses in the community do not benefit from a new customer base. It is a cyclical process that can eventually erode a local community. The aforementioned implication is directly tied to the Human Capital Theory upon which this study is based. The HCT suggests individuals seek to maximize their wealth and will acquire needed education for that end. Likewise, business and industry benefit from an educated workforce as it provides a workforce possessing required skills for the respective industry.

It is important to note that program misalignment resulting in a job quotient under one and subsequent overabundance of available employees may be desirable for business and industry. This scenario increases competition among prospective employees and provides business and industry greater opportunity to select the best overall employee. Conversely, misalignment resulting in a job quotient over one and subsequent overabundance of available positions may be desirable for prospective employees. This situation ensures available jobs for the locally trained workforce and may work to increase population of the respective community as available workers from other areas may relocate in relation to available jobs. Future research should include investigation of acceptable deviances from a job quotient of one which is satisfactory to both industry and prospective employees.

As indicated in the findings, adjusted job quotients were compiled utilizing labor market projected annual openings while current and projected quotients utilized existing and projected labor markets without consideration of hiring needs. This researcher believes adjusted job quotients are a better measure of labor needs as they consider employment opportunities for trained workers rather than the total workers already employed. Users of this study's findings should determine which quotient is more applicable to their needs. As mentioned in the study, accurate projections are difficult. Labor market evaluation should include demographic analysis of the specific labor market as well as employment trends which might impact current and future labor needs.

Again, this study focused on a rural Appalachian region in Kentucky. However, this study's rationale could be applied nationally. From the bottom up, we are local communities coming together as states, and individual states coming together as a nation.

Our country's success and ability to compete globally is ultimately contingent upon the success of our local communities. Community economic success is dependent upon its ability to sustain and recruit business and industry. In turn, sustainment and recruitment of industry is dependent upon the community's ability to offer a workforce skilled in both technical and soft skills. Future research should be applied at both the state and national levels.

Likewise, at the local level, future research should include specific counties to better assist local governments in business recruitment. However, before county research can be conducted, reliable data sets must be made available. While it is understood national and state data is not often disaggregated to that level due to low sample size, it would be beneficial for local governments to conduct research and collect data reportable at the local level.

The review of literature demonstrated an absence of a widely accepted measurement for soft skills. As this study emphasized the importance of soft skills for worker success in the 21st century, future research is warranted to better define soft skills both categorically and industry specific. Likewise, research should investigate reliable and relevant soft skill measurement instruments emphasizing the need for data collection and ensured proficiency.

Despite the fact that program alignment is critical for overall health of the community and business and industry, the expense of changing programs within an ATC can be exorbitant. When factoring in equipment and supply costs of any given CTE program, establishment of a new program could entail hundreds of thousands of dollars. As mentioned, CTE struggles for adequate funding. This lack of funding complicates

any efforts to realign programs through establishment and termination of programs. As a result, research should be conducted to assist decision makers when program alignment is not apparent.

The review of literature reveals diverse oversight of career and technical education in Kentucky as programs may be embedded in traditional secondary institutions, stated owned centers, or locally owned centers. This study focused on alignment within state owned area technology centers. However, program alignment issues apply to all career and technical education programs regardless of fiscal oversight. Future research should consider fiscal agents of all programs as barriers to program alignment may be unique to each venue.

It should also be considered that career and technical education programs are selected by students based on their individual needs and career goals. Considering this, it is possible that even if program alignment were evident, respective labor forces would not increase due to student non-enrollment. For this reason, future research should include analysis of student advisement for careers including but not limited to student access to career pathway forms as well as career coaches knowledgeable in community labor needs.

Conclusion

As the 21st century unfolds, it is imperative for education to adequately prepare students for workplace success. The United States needs skilled workers proficient in not only technical skills, but critical thinking and problem solving skills that will enable workers to adjust to ever changing 21st century needs. To prepare for the 21st century, career and technical education should be included not only in education's immediate

future, but long-term vision and goals. Despite overwhelming evidence of CTE as an integral component of the educational process, it is critical for policy and decision makers to understand the relevance of CTE in promoting and increasing the well being of respective communities. Embracing the Human Capital Theory, solid CTE programs can increase the presence of business and industry in communities which increases the ability of community members to find sustaining work, and finally, an increased quality of life within the community.

To ensure CTE continues to adequately prepare students for the 21st century, a concentrated effort must be made to reinforce measureable soft skills. Although embedded within ATC program curriculum, changes need to be made. First, Kentucky Occupational Skills Standards should be reevaluated to reflect changes in hard and soft skill since their inception. Too, a formal system of soft skill measurement should be adopted. As noted, this is a difficult task in that soft skills are not identical across industries. Other assessments should be investigated that might better measure student attainment of soft skills.

Literature attests that lack of funding is an issue for sound career and technical education programs. In order for CTE to fully achieve its potential in training an adequate workforce which subsequently benefits the overall local community, it is critical for legislatures at both the national and state level to guarantee adequate funding. This is increasingly relevant considering the projected lack of skilled workers for the future.

Funding issues are two sided. First, lack of sufficient operating funds inhibits the ability of CTE to provide students needed hands-on training and many of the operational requirements of CTE programs are substantial. Supply costs for CTE programs have

increased with some programs experiencing above average increases. As an example, the price of copper has surged in recent years greatly impacting the supply costs of electrical programs. Secondly, funding for new program establishment is virtually nonexistent in this economy. As a result, programs that are not aligned with local business and industry are likely to remain in place thus preventing CTE from training needed labor outside the scope of the respective program. This scenario is directly tied to the HCT and is the start of the downward spiral of local community growth and sustainment. Although, funding issues were not the focus of this study, it is evident CTE funding plays a major role in the United States' ability to remain competitive in a global market and should be prioritized in a national budget.

The Human Capital Theory is based on the desire to improve one's situation. As discussed, arguments exist that not all people are driven by increased wealth and status (Gilead, 2009; Baptiste, 2001). It is also argued that some people are held captive by their socio-economic situation and not able to achieve increased education and training required for socio-economic improvement (Baptiste, 2001). While these disputes may have credence, this researcher believes in the Human Capital Theory premise that everyone wants a better life and will take advantage of available and accessible resources for achievement. This study shows CTE is a venue for a means to the end both at the secondary and post-secondary levels. To ensure continued resources for citizens and business and industry and the desired outcomes from the Human Capital Theory, continued research and support of CTE must remain at the forefront of not only educators, but legislators and all community members.

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APPENDIX A:

ATC Program Enrollment Capacities

Appendix A

ATC PROGRAM ENROLLMENT CAPACITIES

Table A1
Enrollment Capacities by Program and ATC

Program	Wayne	Clinton	Casey	Green	Lake Cumberland	Pulaski	Total
Automotive Technology	160	180	120	140	140	120	860
Construction Carpentry	160	180			140	120	600
Electrical Technology		180	120	140	140		580
Health Sciences	160	180	120	140	140	120	860
Industrial Maintenance					140		140
Machine Tool	160			140	140		440
Welding	160	180	120	140	140	120	860
Information Technology						120	120
Office Technology	160	180	120	140			600
Horticulture			120				120
Wood Manufacturing				140			140
Accounting and Finance	160		120	140			420

APPENDIX B:

ATC Program Occupational Data

Appendix B

ATC PROGRAM OCCUPATIONAL DATA

Table B1
Accounting and Finance Data

Occupation Code	Description	Current Labor	Projected Labor	Total Annual Openings
433000	Financial Clerks	2633	2800	67
433011	Bill and Account Collectors	867	940	27
433031	Bookkeeping, Accounting Clerks	1581	1674	28
433051	Payroll and Timekeeping Clerks	114	97	3
433071	Tellers	119	89	3
434000	Information Record Clerks	3077	3455	134
434131	Loan Interviewers and Clerks	96	101	3
434151	Order Clerks	84	49	2
411011	First-Line Supervisors/Managers of Retail Sales Workers	1694	1751	42
411012	First-Line Supervisors/Managers of Non-Retail Sales Workers	231	235	5
412011	Cashiers	2283	2348	110
412021	Counter and Rental Clerks	270	256	7
412031	Retail Salespersons	1907	2016	64
431000	Supervisors, Office and Administrative Support Workers	867	940	27
431011	First-Line Supervisors/Managers of Office and Administrative	867	940	27
434051	Customer Service Representatives	1102	1370	62
434081	Hotel, Motel, and Resort Desk Clerks	143	154	6
439021	Data Entry Keyers	113	107	2

Source: Kentucky Office of Employment and Training (KOET). (2011). *Workforce Kentucky*. Occupational Projections (Future Job Growth). Retrieved from *http://www.workforcekentucky.ky.gov/cgi/dataanalysis/PeriodSelection.asp?menuchoice=occprj*

Table B2
Automotive Technology Data

Occupation Code	Description	Current Labor	Projected Labor	Total Annual Openings
493021	Automotive Body and Related Repairers	86	89	2
493023	Automotive Service Technicians and Mechanics	400	412	9
493042	Engines	40	44	1
493093	Tire Repairers and Changers	93	92	2
53300	Motor Vehicle Operators	3,180	3,316	72
533031	Driver/Sales Workers	175	191	5
533041	Taxi Drivers and Chauffeurs	45	47	1
536031	Service Station Attendants	30	31	1
537061	Cleaners of Vehicles and Equipment	225	224	8
537062	Laborers and Freights, Stock and Material Movers	1607	1392	52
537064	Packers and Packagers, Hand	456	467	9

Source: Kentucky Office of Employment and Training (KOET). (2011). *Workforce Kentucky*. Occupational Projections (Future Job Growth). Retrieved from *http://www.workforcekentucky.ky.gov/cgi/dataanalysis/PeriodSelection.asp?menuchoice=occprj*

Table B3
Construction Carpentry Data

Occupation Code	Description	Current Labor	Projected Labor	Total Annual Openings
517011	Cabinetmakers and Bench Carpenters	181	174	4
470000	Construction and Extraction Occupations	4112	4240	88
471000	Supervisors, Construction and Extraction Workers	304	318	7
471011	First-Line Supervisors/Managers of Construction Trades and E	304	318	7
472021	Brickmasons and Blockmasons	123	123	3
472031	Carpenters	763	764	10
472051	Cement Masons and Concrete Finishers	51	51	1
472061	Construction Laborers	737	803	12
472121	Glaziers	53	51	2
472141	Painters, Construction and Maintenance	69	69	1
472152	Plumbers, Pipefitters, and Steamfitters	135	133	3
472161	Plasterers and Stucco Masons	44	42	1
472181	Roofers	103	97	2
473000	Helpers, Construction Trades	83	89	3
473013	Helpers--Electricians	53	59	2
474000	Other Construction and Related Workers	522	533	17
474099	Construction and Related Workers, All Other	375	377	13

Source: Kentucky Office of Employment and Training (KOET). (2011). *Workforce Kentucky.* Occupational Projections (Future Job Growth). Retrieved from *http://www.workforcekentucky.ky.gov/cgi/dataanalysis/PeriodSelection.asp?menuchoice=occprj*

Table B4
Electricity Data

Occupation Code	Description	Current Labor	Projected Labor	Total Annual Openings
472111	Electricians	222	213	5
473013	Helpers-Electricians	53	59	2

Source: Kentucky Office of Employment and Training (KOET). (2011). *Workforce Kentucky.* Occupational Projections (Future Job Growth). Retrieved from *http://www.workforcekentucky.ky.gov/cgi/dataanalysis/PeriodSelection.asp?menuchoice=occprj*

Table B5
Health Sciences Data

Occupation Code	Description	Current Labor	Projected Labor	Total Annual Openings
310000	Healthcare Support Occupations	3,437	4,396	133
311000	Nursing, Psychiatric, and Home Health Aides	2,672	3,486	108
311011	Home Health Aides	1,570	2,184	77
312000	Occupational and Physical Therapist Assistants and Aides	101	133	4
319000	Other Healthcare Support Occupations	664	777	21
319099	Healthcare Support Workers, All Other	110	122	2

Source: Kentucky Office of Employment and Training (KOET). (2011). *Workforce Kentucky*. Occupational Projections (Future Job Growth). Retrieved from *http://www.workforcekentucky.ky.gov/cgi/dataanalysis/PeriodSelection.asp?menuchoice=occprj*

Table B6
Horticulture Data

Occupation Code	Description	Current Labor	Projected Labor	Total Annual Openings
371012	First-Line Supervisors/Managers of Landscaping, Lawn Service	43	44	1
373000	Grounds Maintenance Workers	556	620	14
373011	Landscaping and Groundskeeping Workers	507	574	13
452092	Farmworkers and Laborers, Crop, Nursery, and Greenhouse	1,161	1,063	31

Source: Kentucky Office of Employment and Training (KOET). (2011). *Workforce Kentucky*. Occupational Projections (Future Job Growth). Retrieved from *http://www.workforcekentucky.ky.gov/cgi/dataanalysis/PeriodSelection.asp?menuchoice=occprj*

Table B7
Industrial Maintenance Data

Occupation Code	Description	Current Labor	Projected Labor	Total Annual Openings
472111	Electricians	222	213	5
472152	Plumbers, Pipefitters, and Steamfitters	135	133	3
472211	Sheet Metal Workers	36	35	1
491011	First-Line Supervisors/Managers of Mechanics, Installers, an	195	199	5
492094	Electrical and Electronics Repairers, Commercial and Industrial	154	149	3
499041	Industrial Machinery Mechanics	263	274	5
499042	Maintenance and Repair Workers, General	688	734	16
518000	Plant and System Operators	178	197	6
518031	Water and Liquid Waste Treatment Plant and System Operators	113	134	4
512000	Assemblers and Fabricators	1423	1395	32
514000	Metal Workers and Plastic Workers	2103	1889	48
514031	Cutting, Punching, and Press Machine Setters, Operators, and	249	200	5
514121	Welders, Cutters, Solderers, and Brazers	536	490	16
510000	Production Occupations	9939	9358	213
519198	Helpers--Production Workers	277	262	5

Source: Kentucky Office of Employment and Training (KOET). (2011). *Workforce Kentucky.* Occupational Projections (Future Job Growth). Retrieved from *http://www.workforcekentucky.ky.gov/cgi/dataanalysis/PeriodSelection.asp?menuchoice=occprj*

Table B8
Information Technology Data

Occupation Code	Description	Current Labor	Projected Labor	Total Annual Openings
113021	Computer and Information Systems Managers	30	33	1
150000	Computer and Mathematical Occupations	508	625	24
151000	Computer Specialists	506	622	24
151031	Computer Software Engineers, Applications	31	33	0
151041	Computer Support Specialists	317	407	18
151051	Computer Systems Analysts	34	35	1
151071	Network and Computer Systems Administrators	74	84	2
439021	Data Entry Keyers	113	107	2

Source: Kentucky Office of Employment and Training (KOET). (2011). *Workforce Kentucky.* Occupational Projections (Future Job Growth). Retrieved from *http://www.workforcekentucky.ky.gov/cgi/dataanalysis/PeriodSelection.asp?menuchoice=occprj*

Table B9
Machine Tool Data

Occupation Code	Description	Current Labor	Projected Labor	Total Annual Openings
514041	Machinists	170	162	2
514111	Tool and Die Makers	47	41	0
512000	Assemblers and Fabricators	1423	1395	32
514000	Metal Workers and Plastic Workers	2103	1889	48
514031	Cutting, Punching, and Press	249	200	5

	Machine Setters, Operators, and			
510000	Production Occupations	9939	9358	213
519198	Helpers--Production Workers	277	262	5

Source: Kentucky Office of Employment and Training (KOET). (2011). *Workforce Kentucky.* Occupational Projections (Future Job Growth). Retrieved from *http://www.workforcekentucky.ky.gov/cgi/dataanalysis/PeriodSelection.asp?menuchoice=occprj*

Table B10
Office Technology Data

Occupation Code	Description	Current Labor	Projected Labor	Total Annual Openings
110000	Management Occupations	3886	3927	102
112022	Sales Managers	54	58	1
113021	Computer and Information Systems Managers	30	33	1
119000	Other Management Occupations	2349	2456	59
119081	Lodging Managers	46	48	1
150000	Computer and Mathematical Occupations	508	625	24
151000	Computer Specialists	506	622	24
230000	Legal Occupations	277	316	8
232000	Legal Support Workers	127	154	5
319094	Medical Transcriptionists	78	83	2
393031	Ushers, Lobby Attendants, and Ticket Takers	38	42	2
411000	Supervisors, Sales Workers	1925	1986	47
412000	Retail Sales Workers	4540	4701	184
419099	Sales and Related Workers, All Other	59	63	1
432000	Communications Equipment Operators	51	45	1
433021	Billing and Posting Clerks and Machine Operators	370	400	9
434071	File Clerks	119	89	3
434121	Library Assistants, Clerical	116	127	6
434171	Receptionists and Information Clerks	974	1073	36
434199	Information and Record Clerks, All Other	62	56	2

435081	Stock Clerks and Order Fillers	2020	2239	69
436000	Secretaries and Administrative Assistants	2386	2466	42
436011	Executive Secretaries and Administrative Assistants	696	739	13
436012	Legal Secretaries	77	85	2
436013	Medical Secretaries	284	331	9
439000	Other Office and Administrative Support Workers	1114	1171	24
439061	Office Clerks, General	927	999	20
411011	First-Line Supervisors/Managers of Retail Sales Workers	1694	1751	42
411012	First-Line Supervisors/Managers of Non-Retail Sales Workers	231	235	5
412011	Cashiers	2283	2348	110
412021	Counter and Rental Clerks	270	256	7
412031	Retail Salespersons	1907	2016	64
431000	Supervisors, Office and Administrative Support Workers	867	940	27
431011	First-Line Supervisors/Managers of Office and Administrative	867	940	27

Table B10 (Continued)

Occupation Code	Description	Current Labor	Projected Labor	Total Annual Openings
434051	Customer Service Representatives	1102	1370	62
434081	Hotel, Motel, and Resort Desk Clerks	143	154	6
439021	Data Entry Keyers	113	107	2
413000	Sales Representatives, Services	618	621	18

Source: Kentucky Office of Employment and Training (KOET). (2011). *Workforce Kentucky*. Occupational Projections (Future Job Growth). Retrieved from *http://www.workforcekentucky.ky.gov/cgi/dataanalysis/PeriodSelection.asp?menuchoice=occprj*

Table B11
Welding Data

Occupation Code	Description	Current Labor	Projected Labor	Total Annual Openings
510000	Production Occupations	9,939	9,358	213
514121	Welders, Cutters, Solderers, and Brazers	536	490	16
519198	Helpers—Production Workers	277	262	5

Source: Kentucky Office of Employment and Training (KOET). (2011). *Workforce Kentucky*. Occupational Projections (Future Job Growth). Retrieved from *http://www.workforcekentucky.ky.gov/cgi/dataanalysis/PeriodSelection.asp?menuchoice=occprj*

Table B12
Wood Manufacturing Data

Occupation Code	Description	Current Labor	Projected Labor	Total Annual Openings
510000	Production Occupations	9939	9358	213
519198	Helpers--Production Workers	277	262	5
519032	Cutting and Slicing Machine Setters, Operators, and Tenders	206	228	6
517000	Woodworkers	1483	1503	34
517011	Cabinetmakers and Bench Carpenters	181	174	4
517021	Furniture Finishers	43	42	1

Source: Kentucky Office of Employment and Training (KOET). (2011). *Workforce Kentucky.* Occupational Projections (Future Job Growth). Retrieved from *http://www.workforcekentucky.ky.gov/cgi/dataanalysis/PeriodSelection.asp?menuchoice=occprj*

APPENDIX C:

Kentucky Occupational Skills Standards Assessment Passage Rates

Appendix C

KENTUCKY OCCUPATIONAL SKILLS STANDARDS ASSESSMENT

PASSAGE RATES

Table C1
Casey Co. KOSSA Passage Rate

Program	06-07	07-08	08-09	09-10
Automotive Technology	.25	.40	.17	.25
Electrical Technology	.75	1.00	.57	.63
Health Sciences	1.00	.50	.70	.56
Welding	.50	.75	.11	.00
Office Technology	.67	.14	.00	.00
Horticulture	.50	.50	.33	N/A
Accounting and Finance	.67	.69	1.00	.00

Note: N/A denotes none tested

Table C2
Clinton Co. KOSSA Passage Rate

Program	06-07	07-08	08-09	09-10
Automotive Technology	.50	1.00	.14	.25
Welding	1.00	. 50	.83	.25
Office Technology	1.00	.46	.21	.19
Construction carpentry	.00	.50	.25	.20
Health Sciences	.92	.60	1.00	N/A
Electricity	.50	1.00	N/A	N/A

Note: N/A Denotes none tested. Clinton Co. closed electricity program in 2008

Table C3
Green Co. KOSSA Passage Rate

Program	06-07	07-08	08-09	09-10
Automotive Technology	. 75	1.00	.33	.50
Welding	.83	. 33	.33	.25
Office Technology	1.00	.20	.15	.00
Health Sciences	1.00	1.00	.65	1.00
Electricity	.67	.60	.40	.63
Machine Tool	.17	1.00	.23	.40
Wood Manufacturing	.33	N/A	.50	.11
Accounting	1.00	N/A	N/A	N/A

Note: N/A denotes none tested

Table C4
Lake Cumberland KOSSA Passage Rate

Program	06-07	07-08	08-09	09-10
Automotive Technology	. 36	.73	.20	.29
Welding	.17	. 75	.53	.33
Health Sciences	.00	.57	.55	.65
Industrial Maintenance	.57	.50	.00	.89
Machine Tool	.39	.88	.50	.63
Electricity	.75	1.00	.00	.00
Carpentry	.22	.43	.00	.20

Table C5
Pulaski Co. KOSSA Passage Rate

Program	06-07	07-08	08-09	09-10
Automotive Technology	N/A	.20	.41	.14
Welding	N/A	. 75	.25	.00
Health Sciences	1.00	.71	.54	.42
Information Technology	N/A	.50	.47	.50
Construction carpentry	N/A	.40	.43	.00

Note: N/A denotes none tested. Pulaski started services with the 06-07 school year.

Table C6
Wayne Co. KOSSA Passage Rate

Program	06-07	07-08	08-09	09-10
Automotive Technology	.60	.67	.36	.00
Welding	1.00	. 00	.15	.20
Health Sciences	1.00	1.00	.63	.25
Office Tech	1.00	.20	.06	.13
Construction carpentry	1.00	1.00	.09	.33
Machine Tool	.50	.67	.56	.14
Accounting	1.00	1.00	.50	.00