THE EFFECTS OF OPEN DOOR POLICIES FOR COMMUNITY COLLEGES AND ACHIEVING ACCOUNTABILITY

A DISSERTATION
SUBMITTED TO THE GRADUATE SCHOOL
IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE
DOCTOR OF EDUCATION

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MUNCIE, INDIANA

MAY 2015
ABSTRACT

DISSERTATION PROJECT:  The Effects of Open Door Policies for Community Colleges and Achieving Accountability

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DEGREE:  Doctor of Education

COLLEGE:  Teachers College

DATE:  May 2015

PAGES:  157

The history behind the evolution of the American postsecondary education has imitated the European system with the exception of the community college. The community college strives to meet the needs of all students with an enrollment open door policy. This study examined relationships between student demographics and the achievement of core performance indicators by Ohio community colleges. The core performance indicators measure technical skill attainment; credential, certificate, or degree achievement; student retention or transfer; student placement; and nontraditional participation and completion. Using archived data from 2007-2013 required by the Carl D. Perkins Career and Technical Education Act of 2006, a linear mixed model analysis was performed discovering significant relationships between the core performance indicators and other demographic factors such as, gender, race, students who meet the definition of students with disabilities, students who are economically disadvantaged, students who are displaced homemakers, students with limited English proficiency, and those students pursuing nontraditional careers for their gender. The linear mixed model was used due to the fixed effects of the student demographics, and the Ohio community colleges as random factors. The cohort years comprised the repeated measure. The results of the LMM indicated
that the factor of gender was significant under two of the core performance indicators with positive impact towards achieving the target goal by the community college. Race was found significant under all core performance indicators with positive impact. Students meetings the definition of disabilities, displaced homemakers, and those students seeking nontraditional career paths each had significance under one core performance indicator. Students meeting the definition of economically disadvantaged were found significant under three different core performance indicators with positive impact. Single parent status negatively impacted the achievement of the core performance indicators. Students with limited English proficiency were found to be significant twice under different core performance indicators, once with positive impact and once with negative impact. Understanding the relationships of the effects may enable Ohio community colleges to better use their limited resources based on the needs of the students attending each statewide location.
ACKNOWLEDGEMENTS

Thanks to my committee, Kianre, my family, my faithful yoga students, my friends, Pastor’s positive thoughts (and prayers for me), my therapist, my editors, and especially my kids who all kept me going. Thanks to Dr. Shelly who picked me up and guided me through the journey inside and outside of the classroom. Thanks to Sarah who reminded me that learning is fun, how to write, and gave me an invaluable research method. Thanks to my ancestors who believed in lifelong learning.

A special thank you to state and federal education representatives, who took the time to meet with me, and provided valuable insight to the effects of legislation, especially the Perkins Acts and postsecondary education.
DEDICATION

To my late husband and sister-in-law who always supported me.
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CHAPTER ONE:
INTRODUCTION

During the latter part of the 20th century, systems of accountability in postsecondary education expanded from the limited and voluntary peer accreditation system already in place. Since the publication of *A Nation at Risk* in the 1980s, the accountability movement spread from elementary and secondary institutions to postsecondary institutions, with the stated goal of providing a means of ensuring quality (Bogue, 1998). Billions of dollars are allocated on state and federal levels to provide access and funding to postsecondary institutions. Student enrollment has doubled since 1970 with tuition costs escalating as well. While the benefits of postsecondary education are not disputed, students and other stakeholders lacked verification that public funds and tuition promoted student learning in the most efficient manner (Piereson, 2011).

Institutions as well as policy makers at state and federal levels began implementing measurement systems (Borden & Zak, 2001). Burke (2001) completed one of many surveys to understand the impact of the accountability requirements. The measures that states use to determine funding levels had shifted from being focused on inputs such as number of students enrolled, to being focused on outputs such as graduation and employment rates.

Piereson (2011) argued that institutions of postsecondary education did not clearly understand their own purpose or mission. Piereson (2011) stated that students entered institutions of postsecondary education with the goal of learning, but the institution itself employed faculty in order to conduct research. In addition, postsecondary institutions can have long-term purposes for individuals and societies; learning extends from inside institutional walls to a lifetime outside academic ivory towers (Freire, 1985; Mezirow, 1978).
Statement of the Problem

In recent decades, institutions of higher education throughout the United States have been impacted by calls for greater accountability and transparency (Alfred, Shults, & Seybert, 2007; Burke, 2002; Smith-Mello, 1996). In a globalized, post-industrial economy, communities and public officials have increasingly linked effective education and training to economic competitiveness with institutions of higher education operating as the key providers of this training (Alexander, 2000; Kirsch, Braun, Yamamoto, Sum, & ETS Policy Information Center, 2007; Smith-Mello, 1996). Spurred by these economic pressures, state and federal governments began measures to oversee and regulate publicly funded institutions (Marcus, 2003). Starting in the 1970s, the introduction of management principles developed in businesses and corporations have been applied to higher education, in order to provide accountability and transparency (Conlon, 2004; Dill, 1998; Smith-Mello, 1996).

In the 1980s and 1990s, state-mandated accountability measures in many states had focused on performance reporting, requiring institutions to report on their success in achieving various measures for educational quality and beneficial educational outcomes (D’Allegro, 2002; Sanders, 1995). The measures then shifted to performance budgeting and performance funding, where certain portions of public funds are distributed based on institutions’ achievement on the measures (Alexander, 2000). During the same time period, rising tuition costs and public disinvestment in higher education led to widespread concerns among students and parents about higher education affordability, particularly for access among low-income and minority students (Alexander, 2000; Conlon, 2004; O’Brien, Shedd, & Institute for Higher Education Policy, 2001; Smith-Mello, 1996). With strong demands from the general public, the states and the federal government integrated measures for efficiency and cost-effectiveness to ensure that public funds
and tuition dollars are well spent (Alexander, 2000; Parsons & Hennessey, 2012; Smith-Mello, 1996). Beyond federal and state governments, other higher education stakeholders including students, faculty, parents, local communities, and business leaders have called on colleges to demonstrate results in a transparent and responsive manner (Burke, 2002; D’Allegro, 2002). The need for transparency is due to simple explanations not disclosing root causes of problems within postsecondary education (Goldrick-Rab, 2010).

Ohio community colleges have a system of performance indicators monitored by the Ohio Board of Regents that drive performance funding as mandated by federal laws discussed in Chapter 2. As the Ohio Board of Regents (OBR) stated, “measurement of education is not a simple task” (OBR, personal communication). Making meaning of the data collected from the federally mandated performance indicators guides the purpose of this study.

Impacts on Community College

Among institutions facing the increasing demands for higher education accountability, community colleges have unique challenges and opportunities. Community colleges operate with missions and goals different from those of four-year institutions by highlighting unique values, such as a focus on teaching, affordability, responsiveness to local needs, and open access for low-income students, minority students, non-traditional students, and students in need of remedial coursework (Burke, 2002; Roueche, Richardson, Neal, & Roueche, 2008; Smith-Mello, 1996; Spann & Education Commission of the States, 2000). Therefore, performance measurement poses a particular challenge for community colleges because externally developed indicators often fail to consider and to ultimately measure these distinctive goals (Burke, 2002; Neutzling & Columbus State Community College, 2003). Community colleges have also found challenges in defining the general goals listed above and corresponding measurements of the
level of goal attainment because of the significant diversity of stakeholders that community colleges serve (Bresciani, 2008; Burke, 2002; Neutzling & Columbus State Community College, 2003; Spann & Education Commission of the States, 2000).

Demands for accountability in higher education have met with much controversy, as scholars and practitioners debate the merits of performance measurement (Etzioni, 1964). Criticisms include concerns that corporate management principles cannot be universally translated to the world of higher education and that collecting the data required for performance measurement is inefficient and expensive (Conlon, 2004; Hossain, 2010). Proponents claim that performance measures can serve as an opportunity for engaging stakeholders and providing essential transparency to them and that institutions themselves can use the information to improve services to their students and other stakeholders (D’Allegro, 2002; Harbour, 2003; Hossain, 2010; Neutzling & Columbus State Community College, 2003). Whether for or against, performance measurement systems are unlikely to go away any time soon (Alexander, 2000).

In these times of changing economic realities and shifting vocational trends, community colleges play an essential role, linking the working population to economic growth (American Association of Community Colleges, 2006; Kirsch et al., 2007; Spann & Education Commission of the States, 2000). Successful navigation and management of performance measurements will continue to be necessary for community colleges to retain competitiveness and serve all stakeholders (Alexander, 2000; Harbour, 2003).

Focus of the Study

This study focused on core performance indicators, their development, and emergence in Ohio community colleges. The relationship between demographic factors (gender,
race/ethnicity, individuals with disabilities, economically disadvantaged, single parents, displaced homemaker, limited English proficient, nontraditional enrollees, and size of institution) and the achievement of the six Perkins performance indicators were studied using a linear mixed model analysis with random effect for community colleges in Ohio. These indicators include:

1P1 Technical Skill Attainment

2P1 Credential, Certificate, or Degree

3P1 Student Retention or Transfer

4P1 Student Placement

5P1 Nontraditional Participation

5P2 Nontraditional Completion (Ohio Higher Education University System of Ohio, Accountability web site, n.d.).

Purpose of the Study

Within the literature on core or key performance indicators, little previous research has been focused on the specific situation of community colleges (Kane & Rouse, 1999). One major study by Hossain (2010) was conducted analyzing key performance indicators for community colleges in South Carolina in the late 1990s. Another study by Lingrell (2004) examined the community colleges of Ohio, but focused only on the student factors that affected persistence. The current study is similar to Hossain’s (2010), in that the performance indicators of community colleges was included, but differs in the use of a linear mixed model analysis with random effect was employed rather than a trend analysis for indication of relationships between the demographic factors and the achievement of Perkins performance indicators for the community college. Providing transparency and accountability to all stakeholders of postsecondary education continues to rise as a priority (Piereson, 2011). Therefore an analysis of
core performance indicators aids stakeholders in understanding the data, as well as offer a method of comparability among institutions. In the prior study, Hossain (2010) stressed that little analysis was available to the student or other stakeholders. Data analysis enables the stakeholders to visualize trends of core performance indicators in one institution or to compare trends of core performance indicators to other postsecondary institutions. While in theory, other comparisons could be made with other states, the state representatives caution that definitions within the Carl D. Perkins Acts can be broadly interpreted (Gallet, 2007; OBR representatives, personal communication).

The robust study reported here included all community colleges as defined by the State of Ohio that report on the core performance indicators overseen by the Ohio Board of Regents. A linear mixed model analysis with random effect using IBM/SPSS, Version 22 was conducted.

**Importance of the Study**

This study provided a current review of the Ohio community college performance indicators. While a few studies related to performance indicators at community colleges have been completed over the last 30 years, the level of assessment and the indicators themselves have changed significantly. In 1976, Kinnison reviewed all community college measurements nationwide. Dunlop-Loach (2000) performed a qualitative study documenting how community college stakeholders obtained and used information, specifically to document institutional performance as now required. More recently, Lingrell (2004) examined Ohio performance indicators calculates solely to determine persistence rates for Ohio community college. Lenthe (2006) surveyed Ohio community college chief academic officers for perceptions of faculty rewards. Johnson’s (2012) more recent study focused on the influence of Ohio governors and community college policies.
There have been a few studies related to understanding student experiences within the community college, relationships between student demographics, student higher education achievement, and student higher education persistence; however, no recent studies have been found documenting relationships between student demographic and the performance indicators of community colleges in Ohio (Erk, 2013; Latz, 2011; Pascarella & Terenzini, 1999). The present study differs in that a linear mixed model analysis with random effect is the analytical tool, which provides all shareholders with insight into the relationships between student and institutional demographics, and current accountability measurements for community colleges in Ohio.

**Theoretical Framework**

This study utilized Parsons’ social action theory (1949) as the framework to explain the actions or actors, as interpreted by the norms of the societal system surrounding the actor. Social action theory, also referred to as action theory or theory of human action, examines the behavior of actors within situations in society.

Originally, Parsons identified the system of action with the sphere of instrumental or hypothetical action and the sphere of categorical or obligation action (Munch, 1982). The world of postsecondary education, including the community college, has been moving from the system of hypothetical to required accountability.

Parsons revised his model to three systems. Every action by an actor was a result of the interpenetration of the cultural system, social system, and personality system. Parsons chose interpenetration rather than interdependence as the systems may contain parts of each system, but may not rely on the systems (Munch, 1982). The community college (actor) acts and fulfills its needs within the parameters allowed by the other actors: federal and state government including
laws and policies, society, businesses, and four-year institutions (Goldrick-Rab, 2010). Parsons’ theory attempted to explain and interpret human action, whether simple or complex within and upon the social system (Mitchell, 1967). Social action theory differs from a theory of behavior in that it takes into account values, norms, and motivations, which guide, direct, and control behavior (Parsons, 1949).

Parsons (1978) understood the role of accessibility to higher education as teaching and preserving democratic values. Parsons (1977) proposed that higher education met the need for persons capable of handling the complexities for society. Society now used higher education as the gatekeeper for individual access to the workplace.

Parsons’ social action theory explains how the values of society, students, and other stakeholders (actors according to Parsons, 1978) interact within the social system of institutions of postsecondary education. The actors take actions or steps motivated by various needs with perspectives put into phases. One such phase for postsecondary educational institutions resulted from the change away from the system of traditional peer review to the system of core performance indicators (Lackey, 1987; Mitchell, 1967). Community colleges are major actors in the social system of laws and policies affecting postsecondary education. The norms have changed from no federal role in postsecondary education to federal laws requiring the documentation of achievement by students during and after study at the community college (Pascarella & Terenzini, 1999).

**Research Question**

The study answered this research question.
Are there any significant relationships between the student subgroup demographics and the achievement of the six core performance indicator scores for Ohio community colleges?

Null Hypothesis – There are no significant relationships between student demographics and the overall achievement of the six performance indicators for Ohio community colleges.

Delimitations

This study was limited to accountability for public community colleges, focusing only on those in Ohio. The measurements were the accountability standards, core performance indicators, for community colleges in Ohio since the Carl D. Perkins Career and Technical Education Act of 2006 (Perkins IV). No comparisons were conducted with the indicators of other states as each are negotiated with the U. S. Department of Education and can vary widely. This study did not address the needs of the various stakeholders such as students, faculty, or policy makers. As the missions of the two-year community college differ from the missions of four-year institutions of higher education, no analysis or comparisons was made between the two types of institutions in Ohio. The validity of the core indicators collected from the community colleges by the Ohio Board of Regents was not questioned. This study did not address whether or not the core indicators disclose accountability for institutions of higher education.

Definition of Terms

The following are key terms to be used in the study.

Accountability refers to the systematic analysis of information to obligate those responsible to produce outcomes consistent with the goals of the institutions (Bowen, 1974; Education Commission of the States, 1998). Accountability under the Perkins Act requires
measurements of student participation in and completion of career and technical education programs that lead to non-traditional fields (Department of Education, n.d.).

*Assessment* is the continuous use of multiple measures and feedback as the key indicator of quality (Marchese, Hutchings, & American Association for Higher Education, 1987).

*Benchmark* is a quantitative measure of a standard, threshold, minimum achievement level, aspirational, or defines the norm (Bers, 2006).

*Community college* is a college that offers programs leading to certificates or associate's degrees in preparation for transfer or employment (State of Ohio, n.d.).

*Core performance indicator* is the performance measurement term used by the State of Ohio as stipulated under the Carl D. Perkins Vocational and Applied Technology Education Amendments of 1998. For purposes of this dissertation, core performance indicator is the same as the key performance indicator found in the literature review (State of Ohio, n.d.).

*Disadvantaged* means individuals (other than handicapped individuals) who have economic or academic disadvantages and who require special services and assistance in order to enable them to succeed in vocational education programs. Such term includes individuals who are members of economically disadvantages families, migrants, individuals with limited English proficiency and individuals who are dropouts from, or who are identified as potential dropouts from secondary school (Barro, SMB Economic Research, & Decision Resources Corp., 1989).

*Displaced homemaker* is defined by the Ohio Revised Code, Title 33, Section 3354.19 as twenty-seven years of age or older; has worked without pay as a homemaker for his or her family; is not gainfully employed and has had, or would be likely to have, difficulty in securing employment; and has either been deprived of the support of a person on whom he or she was
dependent, or has become ineligible for public assistance as the parent of a needy child (State of Ohio, n.d.).

_Economically disadvantaged_ means such families or individuals who are determined by the Secretary to be low-income according to the latest available data from the Department of Commerce (United States & United States, 1985).

_Handicapped_ means individuals who are mentally retarded, hard of hearing, deaf, speech impaired, visually handicapped, seriously emotionally disturbed, orthopedically impaired, or other health impaired persons, or persons with specific learning disabilities who by reason thereof require special education and related services, and who, because of their handicapping condition cannot succeed in the regular vocational education program without special education assistance (United States & United States, 1985).

_Individual with Limited English Proficiency_ is defined under the Perkins Act as a secondary school student, an adult, or an out-of-school youth, who has limited ability in speaking, reading, writing, or understanding the English language, and (A) whose native language is a language other than English; or (B) who lives in a family or community environment in which a language other than English is the dominant language (Association for Career and Technical Education & Brustein, 2006; Department of Education, n.d.).

_Individual with a Disability_ means under the Perkins Act: (A) an individual with any disability as defined in section 3 of the Americans with Disabilities Act of 1990; (B) individuals with disabilities means more than 1 individual with a disability (Association for Career and Technical Education & Brustein, 2006; Department of Education, n.d.).

_Institutional effectiveness_ sets goals and uses the data to form assessments in an ongoing cycle (Grossman, Duncan, National Alliance of Community and Technical Colleges, & Ohio State University, 1989; Manning, 2011).
Key performance indicators (KPIs) represent a set of current measures focusing on critical aspects of organizational performance (Parmenter, 2007).

Non-traditional students delay enrollment, attend part time, work full time, are financially independent, have dependents, are a single parent, or do not have a high school diploma (U. S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, & Integrated Postsecondary Education Data Systems, 2002).

Non-traditional training and employments means occupations or fields of work, including careers in computer science, technology, and other emerging high skill occupations, for which individuals from one gender comprise less than 25 percent of the individuals employed in each such occupation or field of work (Department of Education, n.d.).

Ohio Board of Regents (OBR) is a body, which oversees all universities, community colleges, and technical colleges in Ohio (Sanders, 1995; State of Ohio, n.d.).

Performance indicators refer to quantitative values that allow an institution to publicly compare its position in key strategic areas to peers, to past performance, or to goals (Bogue & Hall, 2003; Marcus, 2003; Polytechnics and Colleges Funding Council & Morris, 1990).

Postsecondary career and technical education (CTE) concentrator is defined by the Perkins Act as a postsecondary/adult student who: (1) completes at least 12 academic or CTE credits within a single program area sequence that is comprised of 12 or more academic and technical credits and terminates in the award of an industry-recognized credential, a certificate, or a degree; or (2) completes a short-term CTE program sequence of less than 12 credit units that terminates in an industry-recognized credential, a certificate, or a degree (Department of Education, n.d.).
Postsecondary education is a formal academic or vocational program designed primarily for students beyond the compulsory age for high school (Department of Education, n.d.).

Postsecondary education institution has the provision of postsecondary education as one of its primary missions (Department of Education, n.d.).

Remediation is a key function of community colleges, to provide necessary academic knowledge and essential skills for otherwise unprepared students (Spann & Education Commission of the States, 2000).

Single parent means an individual who (A) is unmarried or legally separated from a spouse, and (B) has a minor child or children for which the parent has either custody or joint custody (United States & United States, 1985).

Special populations is defined by the Section 3(29) of the Carl D. Perkins Career and Technical Education (CTE) Act of 2006 as individuals with disabilities; individuals with economically disadvantaged families including foster children; individuals preparing for non-traditional fields; single parents, including single pregnant women; displaced homemakers; and individuals with Limited English Proficiency (Department of Education, n.d.).

Stakeholder is a person or entity with an interest in some process, concept, or object (Hom, 2011).

Technical skill attainment is defined by the Perkins Act as student attainment of career and technical skill proficiencies, including student achievement on technical assessments, that are aligned with industry-recognized standards if available and appropriate (ACTE & Brustein, 2006; United States & United States, 1985).

Two-year institution is a postsecondary institution that offers programs of at least two, but less than four years’ duration (U. S. Department of Education, Institute of Education
Summary of Chapter One

The stakeholders of institutions of higher education have demanded accountability to document the spending of funds, especially in state institutions. Higher education links education to the economic resources of the nation. Community colleges, as all institutions of higher education, now have core performance indicators to tie their funds to performance, providing transparency to stakeholders. Few studies have examined the relationships of core performance indicators to the missions and stakeholders of community colleges in Ohio. This study provided documentation of the relationships between various demographics and the achievement of core performance indicators for community colleges in Ohio. This study utilized Parsons’ social action theory (1949) as the framework to undergird the findings from the core performance indicators and to examine the behavior of actors within situations in society.
CHAPTER TWO:
LITERATURE REVIEW

To understand the development of performance indicators in Ohio community colleges, a review of the history of the role of community colleges within higher education in the United States is necessary. Focusing on Ohio, the emergence of the community college as a unique addition to the American community college system, is explored in this study.

Public institutions in the United States are currently subjected to Federal and State legislation, but this was not in place in the early history of postsecondary education. Federal legislation has promoted access to postsecondary education and focused on preparing students for the work world. As the history of postsecondary education indicates, the stakeholders and their accountability needs emerged and the academic world struggled to provide transparency. This is the very idea behind Parsons’ Social Action Theory where all components react to the requirements of the stakeholders (Lackey, 1987; Mitchell, 1967). In the literature review, multiple assessment and accountability methods to provide quality and institutional information to all stakeholders of postsecondary education were explored, concentrating on the core performance indicators.

**History and Legislation**

At its inception, the American postsecondary education system was modeled after the existing European system, which had originated under the premise of teaching religious values (Smith, Cannan, & Teichgraeber, 1985; Zwerling, 1976). The Constitution of the United States does not mention education, so the federal government was not initially given the right to govern institutions of postsecondary education institutions and assumed a data maintenance role. The individual states thus governed institutions of postsecondary education (Kells, 1986). Federal
programs were not developed until the mid-1960s, and no national ministry or department of education existed until 1980 (Orfield, 2001).


A series of Carl D. Perkins Acts to increase vocation and industrial education also influenced the development of the community college. The Carl D. Perkins Vocational Education Act of 1984 arrived with the purpose of funding for vocational education and adding social issue targets as the needs of students with disabilities and disadvantages (American Vocational Association, 1998). The Carl D. Perkins Vocational and Applied Technology Education Act (Perkins II) was passed in 1990, with federal monies set aside for stipulated
populations, emphasizing vocational and academic programs (American Vocational Association, 1998). Hull (2005) theorized that Congress recognized a need to change career and technical education. With the reauthorization in the Carl D. Perkins Vocational Technical Education Act of 1998 (Perkins III), more flexible federal assistance was added (American Vocational Association, 1998). The Carl D. Perkins Career and Technical Education Improvement Act of 2006 (Perkins IV) strengthened accountability requirement both for results and program improvements. Perkins IV required target levels and sanctions when targets were not met. Perkins IV dropped the academic target, but retained technical skill proficiency. Targets and measurements were required for student placement (ACTE & Brustein, 2006).

Federal reporting requirements further increased with Perkins IV, which has four key components: alignment, collaboration, accountability, and innovation. Through these four components, the Perkins Act stressed job skills for an entire career, not just one job, highlighting the benefit that these job skills provided for the communities as a whole, and not only for the individual students (Office of Vocational and Adult Education, 2012).

The Perkins Act was enacted with the purpose to increase focus on academic achievement of career and technical education students, improve links between secondary and postsecondary education, and ameliorate accountability on the state and local levels (U. S. Department of Education, n.d.). Laanan (2001) stressed that each state now had to create core indicators to stipulate levels of performance and measurements of performance under the Perkins Act. Performance levels are specified in four categories: student attainment of vocational, technical, and academic skill proficiencies; acquisition of secondary or postsecondary degrees or credentials; placement and retention in postsecondary education or employment; and completion
of vocational and technical programs that lead to nontraditional training and employment (Laanan, 2001).

As can be seen by the series of the Perkins Acts initiated by the United States government, politics and the world of postsecondary education are very strongly linked (Ruppert, Educational Systems Research, & NEA, 1996). Indeed, higher education continues to be a high-profile issue for the federal government. In the 2012 State of the Union address, President Obama challenged every adult to commit to one year of postsecondary education or training with the following: “America’s ability to build a competitive workforce hinges on whether—and to what extent—educators and leaders can find innovative solutions for preparing all students for college and careers” (Office of Vocational and Adult Education, 2012, p. 13).

**Advantages and Challenges of Postsecondary Education**

Postsecondary education has the potential to benefit the nation on many different levels, from government to individuals, as well as society as a whole. According to Ruppert (1995), government relies on the research conducted by institutions of postsecondary education, the nineteenth largest industry in the United States with $120 billion in total costs annually.

Astin (1985) divided the benefits for students into three types: educational, fringe, and existential. Vught (1995) referred to the search for truth and pursuit of knowledge as the intrinsic qualities behind higher education while the extrinsic qualities signified the ability to act upon the ever-changing needs of society. Investments in postsecondary education correlate to higher lifetime earnings for students (Kirsch et al., 2007; Phillippe et al., 2005; Ruppert, 1995; Smith-Mello, 1996; Spellings et al., 2006). On non-financial measures, college graduates enjoyed better health and tended to contribute to the community (Hout, 2012).
Governments rely on colleges as part of their economic strategies, to build human capital by training workers for higher-skilled industries and generally higher-paying jobs. This role is increasingly more important in the era of globalization, when skilled workers are necessary for the state and nation to compete internationally. As skilled workers are the crucial resources that companies use to compete, then education becomes a key component in providing workers with needed resources (Alexander, 2000). Education increases productivity, which benefits the individual, workplace, community, and society (Wellman, 2001). With postsecondary education, improvements would evolve on many levels (Hout, 2012).

However, other writers pointed to shortfalls of postsecondary education, including a decline in the economic value of postsecondary education. There are also concerns that institutions will promote interests counter to social values, and charges that the stated goals of higher education can be more efficiently achieved through other means.

In an uncertain economy, a diploma from higher education no longer carries the assurance of secure employment, higher wages, and career opportunities as in previous times (Godofsky, Van Horn, Zukin, & Heldrich Center for Workforce Development, 2011; Pincus, 1986; Smith-Mello, 1996). Those graduates that are able to secure employment are more likely to work outside their fields, take part-time work, or engage in employment without educational requirements (Godofsky et al., 2011). In addition, these graduates emerge in debt and are at risk for bad credit ratings due to loans for postsecondary education (Gray & Herr, 2006; House, 2012; Piereson, 2011). Postsecondary education was not considered essential for most professions in the early 1900s; rather, job skills were usually obtained through apprenticeships. As the postsecondary curriculum came under attack as coursework was considered irrelevant to society, postsecondary institutions responded by claiming that prospective workers needed
credentials to obtain desirable job, leading employers to change the requirements for employment to include more postsecondary credentials. As a result, the United States has become the most credentialed nation in the world, which has no relationship to productivity and can actually be counterproductive (Collins, 1979).

While the sheer numbers of institutions already exceed demands, costs continue to escalate due to the large number of institutional administrators, construction of luxurious housing units and expensive athletic facilities, and prioritizing faculty research over teaching (Collins, 1979; Piereson, 2011). Graduates are not finding the great rewards that were promised and anticipated (Berg & Gorelick, 1970).

In contrast to traditional four-year research institutions, the community college provides specific benefits. With a focus on vocational education, businesses hired skilled workers with training provided at the taxpayers’ expense (Cohen & Brawer, 1987). The community college has an open-door policy, is located in close proximity to students, maintains low costs, and offers a multiplicity of programs (Medsker & Tillery, 1975). Alexander (2001) stressed that whenever the tuition increased at four-year institutions, enrollment at community colleges increased. About half of the nation’s undergraduates and half of all first-time freshmen receive their education at community colleges (Laanan, 2001; Medsker & Tillery, 1975; Spellings et al., 2006).

**Challenges to the Community College.**

To many observers, the advantages of postsecondary education and its mission would seem overwhelmingly positive for business, individuals, and society. However, the community college has been criticized for its appearance as an open-access college with such a broad mission that the community college cannot possibly cover the needs of all students. The concept
of open access enrolls students who may have poor academic histories or other challenges (Goldrick-Rab, 2010).

Other critics claim that community colleges serve as a site for the perpetuation of gender bias (Gittell, 1986). Rigid class and student service hours added to the frequent lack of day care centers or other assistance for the problems that women students, especially single mothers, encounter remain major issues (Brown & Amankwaa, 2007; Gittell, 1986; Miller, Pope & Steinmann, 2006).

The community college has been criticized for failing to adequately meet the needs of minority students. Critics pointed out failures in this part of the community college mission. The main critique has been that community colleges in reality maintain economic and social classes since community college students were actually more unlikely to attend and complete a four-year institution, while appearing to be a helping hand for change (Karabel, 1986). Even though students now have access, students remained in the same economic class. Only an appearance of change was accomplished (Cohen & Brawer, 1996; Wilson, 1986; Zwerling, 1976). Karabel (1986) stated that financial gain for students was not achieved; in fact, the net financial result was negative.

Community colleges have historically served as a bridge to the four-year institution of postsecondary education, yet transfer rates are declining (Bernstein, 1986). Transferring from one institution to another challenges students (Goldrick-Rab, 2010). Critics proposed that community colleges gave quick score tests, which failed to prepare students for the essays and reports of four-year institutions. Another cause for low transfer rates was due to the time spent in developmental studies, which caused students to abandon further classwork (Bernstein, 1986; Goldrick-Rab, 2010). Pincus (1986) advised students to proceed directly to four-year
institutions. While racial minority students, low socio-economic background, and low academic ability could benefit the most from completion of a four-year program, the study found they were the least likely to transfer (Orfield & Paul, 1992).

In their attempt to serve the broad mission, community colleges cannot serve all populations (Dougherty, 1994; Spann & Education Commission of the States, 2000). The European immigrant was able to use higher education to change status, but this has not been the case for the African Americans and Hispanics who will soon comprise over one third of the population in the United States (Wilson, 1986).

The Unique Community College

The particular history, mission, positive, and negative aspects of the community college followed the path of the four-year university with distinct differences. The development of the community college is unique to the United States (Bers, 2006). The community college must struggle with policies mandated at local, state, and national levels (Dougherty, 1994). The community college evolved from the escalation of research at the four-year institutions, changes in the public education system, demands for vocational education, adult, and community education, and increases in open doors to education for students (Cohen & Brawer, 1987; Ratcliff, 1994).

In the 1800s, much discussion was debated among four-year higher education administrators about whether the existing four-year institutions of postsecondary education should delegate the first two years to separate institutions more suited to providing career-based instruction. This movement gained momentum in the 1850s and 1860s when the concept of junior colleges was promoted (Dougherty, 1994). Also in the 1880s, a Baltimore school emphasized manual education (Hull, 2005). In the early twentieth century, the first junior
college was created in Illinois and the second followed shortly in the west (Dougherty, 1994). California’s junior college emphasized technical education (Phillippe et al., 2005; Zwerling, 1976). By 1930, there were 450 junior colleges in place in the United States (Cohen & Brawer, 1996). The numbers of community college students expanded from 300 students in 1900 to 2.5 million in 1976 (Zwerling, 1976).

Others theorized that community colleges evolved as the college for the working class, as opposed to the elite who preferred separate postsecondary institutions. Cohen and Brawer (2008) wrote that four-year institutions produced research, which would maintain the distinction between working class institutions and elite institutions. As Brint and Karabel (1989) state: “Community colleges had two priorities: bring in new sections of the population while keeping these students away from the four-year institutions” (p. 208).

Institutions of postsecondary education, as with any large institution, business, or organization, have numerous purposes and goals (Richman & Farmer, 1974). The missions of community colleges are different than those of the four-year institutions of postsecondary education (Brint & Karabel, 1989; Hudgins, 1993). The mission of the junior college has historically been defined to provide general and liberal education that leads to the baccalaureate degree (Ratcliff, 1994; United States & Zook, 1948). Many legislators believe that community colleges should be the beginning of postsecondary education for more students (Ruppert et al., 1996). The mission statements of community colleges could contain up to six key components: student progress, career preparation, transfer preparation, general education, customized education, and community development (Jackman, 1996).

Community colleges stand for financial affordability (Ratcliff, 1994). With lower tuition costs, easy access, and broad programs, the community college has been dubbed various names:
people’s college, poor man’s college, people’s educational movement, democracy’s college, or the opportunity college (Bogue, 1950; Kurlaender, 2006; Ratcliff, 1994; Roueche & Baker, 1987). Community colleges provided not only dream fulfillment but work world preparation to all potential students, whether socially, financially, or academically disadvantaged (Dougherty, 1994).

In spite of low costs, the community college provides many levels of coursework, including general education and liberal arts courses (Ratcliff, 1994). Community colleges grant shorter certificate programs, offer coursework in remedial and developmental instruction, and provide noncredit instruction in coursework, such as English as a Second Language (Ewell, 2010). In addition, business, career, or vocational training curriculum is also available (Ewell, 2010; Phillippe et al., 2005; Ratcliff, 1994).

Goals for students attending four-year postsecondary institutions can differ substantially from those of students attending community colleges. Students at community colleges may have multiple and different goals (Ewell, 2011; Phillippe et al., 2005; Wild & Ebbers, 2002). Community colleges remain an excellent venue, where due to low tuition rates removing financial barriers, turned today’s needed vocational and technical education into lifelong learning (Phillippe et al., 2005).

The community college student enrolls without necessarily having as her or his objective the goal of degree completion; rather, the community college student’s goal is to obtain workplace skills or upgrade those skills (Bailey & Morest, 2006; Ewell, 2010; Ewell, 2011; Spellings et al., 2006). Students may take coursework from multiple institutions. Others may intend to transfer to four-year postsecondary institutions. However, once employed, many never continue on the four-year baccalaureate path (Bailey & Morest, 2006).
The role of the high school counselors provided focus. With an open door policy, counselors may advise unprepared high school students to attend community colleges rather than four-year institutions of postsecondary education. The study of 27 high school counselors indicated that high school students interpret the open door policy as no need to prepare for postsecondary education (Rosenbaum, Miller, & Krei, 1996). Community colleges have also been referred to as the default college by high school staff and students. With this interpretation, lack of preparation or special coursework is not deemed necessary (Gandara & Civil Rights Project, 2012).

A community college’s curriculum also supports the interests of local areas for a large number of stakeholders. State legislators rely on community colleges for workforce training (Ruppert et al., 1996). Community colleges provide adult and continuing education, recreation, sports, and culture classes (Phillippe et al., 2005; Ratcliff, 1994). Through citizenship classes, community colleges support the civic portion of its mission (Fonte, 2009). Community colleges provide a good environment for students to learn the skills and knowledge needed in the twenty-first century economy that has global implications (Spann & Education Commission of the States, 2000).

Stakeholders

As the need to provide evidence of efficient use of public funds grew, participation and identification of all relevant stakeholders became necessary. Postsecondary education institutions answer to many different stakeholders: policy makers at the local, state, and national level; postsecondary institution system officials and administrators; community members, employers, faculty, students, and parents. Stakeholders can be on or off campus, users or customers, internal or external, primary or secondary (Burke & Modarresi, 1999).
On-campus stakeholders included administrators, administrative staff, institutional researchers, faculty, students, and local trustees (Hom, 2011). The state legislators, students and employers were classified as the primary customers (Ruppert & State Higher Education Executive Officers, 1998). Off-campus stakeholders were accrediting commissions, government oversight and funding bodies, potential students, employers, baccalaureate institutions, K-12 officials and staff, external researchers, special interest groups, taxpayers, and the news media (Alfred et al., 2007; Hom, 2011). Other stakeholders were classified as the business community, primary and secondary schools, media, voters, and taxpayers (Ruppert & State Higher Education Executive Officers, 1998). In addition, postsecondary education must respond to society, federal and state government, courts, law enforcement agencies, and statewide coordination (Mortimer & American Association for Higher Education, 1972).

In 2011, Hom sorted stakeholders according to low or high interest, low or high authority, perceptions and weighted interests. As the student is the primary input in a world of measuring outputs, education for the prospective and current student is crucial. The prospective student infrequently chooses an institution of postsecondary education and may know very little about quality across various institutions of postsecondary education. Accountability data would assist the student in making better selections for postsecondary studies (Dill, 1995; Goldrick-Rab, 2010). The student stakeholder will be hindered, if not prevented, from attending higher education as costs, including tuition, continue to escalate (Smith-Mello, 1996). Funding from public sources and increasing need for remedial coursework has raised concerns for understanding the needs of all stakeholders and the desired outcomes.

Demographics
With many different backgrounds, community college students comprise a diverse group, reflecting the geographical location of the institution itself (Cohen & Brawer, 2008; Ewell, 2011). The community colleges themselves are also diverse. Some offer campus housing, while others are for commuter students only. Some are public and some are private. Some offer distance learning, some offer on-campus learning, and others are email colleges (Jackman, 1996).

Community colleges enroll students, who have never attended postsecondary education before, and who are often overwhelmed by education, economic, and/or social obstacles. Student diversity of socio-economic status, age, and race is often associated with lower achievement scores (Roueche & Baker, 1987), yet community colleges have the fewest resources to serve those students (Bailey & Morest, 2006; Cohen & Brawer, 2008). Recognizing the different demographics, new students at community colleges are assessed through the COMPASS or ACCUPLACER rather than the SAT as used by four-year institutions (Hughes & Scott-Clayton, 2011). Many studies have tried to identify relationships between student success, student persistence, and student graduation with student population demographics including socioeconomic status, race, and ethnicity, and other community college features (Perna, Thomas, & Association for the Study of Higher Education, 2008). The list is not exhaustive.

Tinto’s model of student integration is one of the earlier and well known models exploring how academic and social student integration along with the commitment of the institution can contribute to student persistence (Marx, 2006). Another study found that proximity to postsecondary institutions, parental status, cost, and student experiences in primary and postsecondary education, access to remedial coursework, and the abilities of the student were predictors which secondary students would continue educational studies after graduation.
(Anderson et al., 1972). These authors cautioned that attendees did not accurately reflect the demographics of the surrounding community. Adult students were more affected by the institution’s location than recent secondary graduates (Anderson et al., 1972).

Others argued that persistence as defined by Tinto in 1973 was less applicable to community colleges. The Institution’s Performance Ratio (IPR) was proposed in lieu of graduation rates. Three predictor variables include: student engagement 1 (percentage of part-time faculty, percentage of institutional budget allocated for student services, and percentage of institutional grand aid), student engagement 2 (percentage of students receiving federal aid), and demographics (gender and percentage of minority students) of the student body (Moosai, Walker, & Floyd, 2011). The study of community colleges in three states found that graduation rates increased when aid increased. The study also found that minority and gender demographics had a predictive relationship with graduation rates (Moosai, Walker, & Floyd, 2011). Orfield and Paul (1992) studied the relationship of racial differences, family, social, and economic background, and type of high school in five states. White students were found to be more likely to complete a four-year program than black and Hispanic students.

Early studies focused on the traditional student: white, male, eighteen to twenty-two years old, upper middle class, living on campus, and attending full-time (Wimbish, Bumphus, & Helfgot, 1995). As accessibility opened the doors of institutions of higher education, the impact of minorities, women, lower socioeconomic students, and part-time and older students changed the campus. Five assumptions were identified as models for ethnic groups:

- Personality patterns for ethnic groups develop as a response to racism.
- Some ways to resolve questions of identity are healthier than others.
- Development of cultural identity includes cognitive and affective elements.
Different styles of identity development can be identified and assessed.

The nature of an individual’s culture identification influences both intercultural and intra-cultural interactions. (Wimbish, Bumphus, & Helfgot, 1995, p. 18)

Other studies examined the relationship between race and the needs of the student stakeholder. Gandara, and the Civil Rights Project study (2012) noted that higher socioeconomic white students and Asian students leaned toward four-year institutions of higher education whereas low income, Black and Latino students headed towards community colleges. Allen (1992) found that “increased Black access to higher education was seen as one major solution to the problem of racial inequality” (p. 26). Another factor was the ability to receive financial aid. Allen (1992) reviewed the movement of Black students from 1960 to 1990. Female attendance had increased while male attendance had peaked and decreased. The quantitative study summarized that Black students had limited home resources, lower high school GPAs, and lower test scores. Allen (1992) concluded that postsecondary success was related to the occupational and educational aspirations of the Black student.

House and the Association for Institutional Research (1996) used a regression analysis to determine correlation coefficients in the ethnic groups of male, female, Hispanic, Asian-American, African-American, Native American, and predominately White students and the relationship to academic achievement and other demographic variables. The survey followed 9000 freshmen for four years. The study showed that the ACT score and high school percentile significantly correlated with GPA, as well as enrollment status after two and four years. Non-cognitive measures of academic self-concept, achievement expectancies, high school curriculum, and parental education levels found significant positive correlations with persistence and GPA. Negative correlations were found between persistence and student financial goals, social goals,
and student desire for recognition. Native Americans’ desire for recognition correlated significantly with GPA after one year. Hispanic students’ ACT and high school percentile correlated with GPA after college years one, two, and four years (House & Association for Institutional Research, 1996).

Another Tinto (2012) research project used demographic variables of gender, race, income, first-generation students, high school GPAs, and Pell grants. Even at community colleges, under one third complete the program. As only 36% of community college graduates complete a degree program, a study was conducted to predict which students would complete. The study used part time status, gender, race, ethnicity, disability status, age, prior academic achievement, and socioeconomic variables. Black students had 20% lower probability of completion. Parents with degrees were predictors of graduation. Those in remedial programs had a negative relationship. The desire for job skills also had a positive relationship (Bailey, Jenkins, Leinbach, & Columbia University, 2007).

One solution to racial inequality was simply to increase access to Black students and ensure financial aid (Allen, 1992). Allen (1992) reviewed the movement of Black students from 1960 to 1990. The quantitative study summarized that Black students had limited home resources, lower high school GPAs, and lower test scores. The author concluded that postsecondary success was related to the occupational and educational aspirations of the Black student (Allen, 1992).

Griffin (2010) focused on the Hispanic student attending community colleges. The following variables affected retention and graduation: highest level of education expected, cumulative GPA, importance of having steady work, single parent status, marital status, and
hours worked each week in the last semester of college attendance, income quartile, and the parents’ highest education level.

Orfield, Horn, and Flores (2006) stress doubt that even community colleges present prospects for Latinos. States with increasing numbers of Latinos have found that community colleges, however, are the best gateway to four-year institutions of higher education. One of the major barriers to success at institutions of higher education can be related to family responsibilities, economic background, and a non-English native speaker (Gandara & Civil Rights Project, 2012; O’Brien, Shedd, and the Institute for Higher Education Policy, 2001).

Kurlaender (2006) stressed that the choice of college is affected by socioeconomic status, prior academic achievement, degree object, and differences found in different state institutions of higher education. Tinto (2007) also found that students of lower socioeconomic status entered the doors of higher education, but yet degree completion was still lacking.

The New England Student Success Study (O’Brien, Shedd & Institute for Higher Education Policy, 2001) focused on pre-college preparation, financial aid, connections to institutions, and attendance factors. Interviews were conducted with 350 low-income students in the New England region. The study found that low-income and minority students face the most challenges in persistence at institutions of higher education as pre-college preparation, financial aid, campus involvement, and attendance are critical.

When the State of Kentucky adopted standards based for reforming primary and secondary education, a case study was conducted to determine if reform was in fact accomplished (Knoeppel & Brewer, 2011). The state’s primary concern was that economics was a barrier to educational achievement. The study employed multiple regression over four years of achievement data. The dependent variables included the CATS Index, proficiency rate in
reading, and proficiency rate in math. Independent variables included percentage of students participating in free and reduced lunch programs, percentage of students qualifying for special education service, and percentage of students participating with limited English proficiency. The study had five major findings including the following: wealth is still a significant predictor of math proficiency; student demographics significantly predict student achievement. The authors stated that standards are used in today’s education systems to provide and monitor progress in other areas, including Ohio (Knoeppel & Brewer, 2011).

As one of the basic goals of community colleges is the transfer to the four-year university, several studies looked for links. In the Laanan article of January 2001, the link between the GPA before and after the transfer was reviewed; the GPA actually increased after the transfer shock. Zamani (2001) examined the connection between minorities and low income students and lower transfer rates. As a result, the study recommended more outreach and stronger college partnerships. In the Tharp study of 1998, the predictor variables were high school percentile, entry status, first semester hours, and GPA. Using a regression design, the study found that GPA and first-semester hours were significant as dropout predictors. Students with associate degrees had better persistence rates. The Gandara and the Civil Rights Project (2012, p. 15) study found that Asian students were most likely to transfer, followed by Whites, African Americans, and Latino students.

A primary goal of standards-based reform is high standards and improved achievement for all students. Accountability programs can help address the achievement gap between students of different socioeconomic, racial, ethnic, and language backgrounds, and between students with different education needs by providing information on the nature of the gap and creating incentives for educators to narrow these differences (Goetz, 2001, p. 56).
The Development of the Ohio Community College

A primary service of the state government is to provide development to individuals to improve themselves and society. For this service, Ohio depends on citizens with education. The purposes of postsecondary education include: broaden human horizons, foster intellectual qualities essential for growth and achievements, extend knowledge, transmit values and wisdom over time, and produce skilled graduates (Ohio Board of Regents, 1977).

Ohio opened community college campuses as one of the last in the United States (Brint & Karabel, 1989). The authors speculated that this was due to the open enrollment policies of the existing public four-year institutions of postsecondary education. Two-year campuses started as branches of four-year institutions until the 1950s in Ohio (Brint & Karabel, 1989). Community colleges in Ohio were authorized by legislation in 1961 after six failed previous attempts. The governing body, Ohio Board of Regents, was established in 1963 (Sanders, 1995). The four-year public universities were a primary challenger, due to concerns that limited government funds would create tensions and competition for those funds.

In the 1960s, Ohio started on its goal of establishing a two-year campus within commuting distance of every resident. Some of these were university branches, some were technical colleges, and others were community colleges. The first opened in Cleveland in 1962. By 1975, five had been established (Sanders, 1995).

A 1970 study conducted by the Ohio Board of Regents found duplication of resources and facilities between technical colleges, community colleges, and university branches. The report recommended a system with better integration (Sanders, 1995). After finding the Ohio number of educated adults below the national average in the 1990s, the Board of Regents recommended that community colleges provide technical, developmental, non-credit, and career
courses. For better preparation for the workforce, community colleges needed to develop business, community, and government partnerships. The community college served as an important link for students from high schools to four-year postsecondary institutions. Costs should be a primary concern (Ohio Board of Regents, 1993; Ohio board of Regents, 1994).

In addition, the Board of Regents in 1993 made nine specific recommendations for community colleges:

1. A range of career/technical programming preparing individuals for employment in a specific career at the technical or paraprofessional level.
2. Commitment to an effective array of developmental education services providing opportunities for academic skill enhancement.
3. Partnerships with industry, business, government and labor for the training and retraining of the workforce and the economic development of the community.
4. Non-credit continuing educational opportunities.
5. College transfer programs or the first two years of a baccalaureate degree for students planning to transfer to four-year institutions.
6. Linkages with high schools to ensure that graduates are adequately prepared for post-secondary instruction. These linkages should include a student-oriented focus and marketing strategies to ensure that high school students are aware of their education opportunities within the community.
7. Student access and program quality provided at an affordable price and at a convenient schedule. The Regents believe that fees on branch campuses should be approximately the same as for community colleges offering the same educational
services. Courses should be offered at convenient times for the students, with attention given to evening and weekend offerings for nontraditional students.

8. Two-year colleges must ensure that student fees are kept as low as possible, especially where local taxes support the college.

9. A high level of community involvement in decision making in such critical areas as course delivery, range of services, fees and budgets, and administrative personnel. (Ohio Board of Regents, 1993, p. 15).

These goals remain in place. The Perkins indicators enacted by the State of Ohio and provided in Chapter One, show that the Board of Regents still value and are pursuing the above recommendations. The goals for the community colleges of Ohio are to place students (4PI) within the institution for the best possibility of attaining technical (1PI) skills and/or certificate or degree (2PI). With correct placement, the student will complete the desired program or transfer (3PI) to a four-year institution. The Board of Regents recognized that community college students are nontraditional (5PI): over age 24, working, and attending classes on a part-time basis. The Ohio Board of Regents noted the shift in priority of higher education access: “No longer is higher education a luxury. It is a necessity for economic and social advancement” (Ohio Board of Regents, 1993, p. 1).

Public Calls for Accountability

The public became concerned about accountability when the cost to the student continued to rise as the resources of the states began to dwindle (Alexander, 2001). Institutions of postsecondary education were no longer allowed to accept public funds without questions, even when for the good of the public (Powell, Gilleland & Pearson, 2012).
With public financing declining for the first time in the 1960s and 1970s, stakeholders were apprehensive that quality at postsecondary levels would suffer (Medsker & Tillery, 1975; Richman & Farmer, 1974; Ruppert, 1995; Sizer, Spee, & Bormans, 1972). The need for accountability rose as costs rose, state funds were limited necessitating increases in federal funds, and more requirements were attached for faculty and researchers (Folger, 1977; Richman & Farmer, 1974). Bogue, Creech, Folger, and the Southern Regional Education Board (1993) also pointed out that competition was stiff for the declining public revenues at the same time that the public was losing trust in postsecondary education. Burke (2005) proposed that as more of the masses entered the doors of the institutions of postsecondary education, more accountability would be required, in the form of performance measures at the state, and later federal, level.

While the literature varies on exact dates, the movement to increase accountability beyond simple peer accreditation began in the 1940s and increased dramatically in the 1960s (Spellings et al., 2006). The report, *A Nation at Risk*, was a major catalyst for accountability in primary and secondary education, spreading to the postsecondary level (Head, 2011; Nedwek & Neal, 1994). *A Nation at Risk* was written by the National Commission on Excellence in Education formed by the then Secretary of Education. The report advocated for implementation of standards and expectations for primary, secondary, and postsecondary education (United States, 1983). The taxpayers have tired of public officials who raise taxes endlessly, cut spending, and yet never solve any issues (Osborne & Gaebler, 1992). In the 1970s, state systems used methods of assessments, standards, reports on performance, and funding or denial of funding when standards were not met (Goetz, 2001).

Until the 1990s, postsecondary institutions only had to assure stakeholders that all services were provided. Assurances were not enough when postsecondary funding reached
billion dollar levels (Hudgins, 1993). In the 1990s, 40 states had begun the process of mandating accountability or had standards in place (Bogue, et al., 1993; Hudgins, 1993). On the state level, community colleges receive less funding than four-year institutions. However, in percentages, the amount is a larger share of the community college’s budget. On the federal level, President Obama has placed a high proportion of accountability on community colleges. The Carl Perkins programs also have accountability stipulations on the funds implemented (Erwin, 1991; Ewell, 2011). Accountability measurements, which had been encoded in state-level policies since the 1970s, made their appearance on the federal level when measures were included in the 1992 Reauthorization of the Higher Education Act of 1965 (Wyman, 1997).

Accountability was the key for the institutions to verify that resources were indeed used well. Accountability was a means for providing checks and balances, oversight, surveillance, and constraints on power as well as a means for explanation, monitoring, justification, enforcement, and sanctions (Mortimer & American Association for Higher Education, 1972; Schedler, 1999). To prevent abuse of power, Schedler (1999) recommended sanctions, transparency, and required justification of actions. Stakeholders have access to institutional goals, missions, and the resulting performance due to the accountability process (Hudgins, 1993; Wellman, 2001).

Hossain’s dissertation (2010) reviewed the journey of the community colleges in South Carolina to provide accountability in the face of declining public faith and rising postsecondary costs. In 1998, South Carolina legislature passed the Education Accountability Act. Performance indicators were an integral part of the South Carolina Performance Funding Act 359 of 1996 (Hossain, 2010). The southern state had 13 indicators; however, the research followed seven in the study: faculty credentials, compensation of faculty, accreditation of
degree-granting programs, graduation rate, scores of graduates on professional and certification tests, and accessibility to the institution of all citizens of the state. The trend analysis conducted found that the mean increased from 2.645 in 1997 to 2.703 by 2005 with a significant curvilinear relationship between variables. After four years, the average score increased rather than decreased (Hossain, 2010).

At the same time, the demographics of students were changing from recent secondary graduates, to increasing numbers of older adults and part-time students (Alexander, 2000). Minority enrollment numbers also continued to increase (Ruppert, 1995). Following the Civil Rights movement and other public programs, more legislation was used to document the use of public funds (Barr, Dreeben, & Wiratchai, 1983; Richman & Farmer, 1974). Historically, minimum levels have been established by the states in the form of accountability (Goetz, 2001).

Accountability did not come without problems and drawbacks. With complex, multiple, abstract, non-material, value laden, tenuous and controversial objectives or outputs of postsecondary education, accountability became difficult (Bowen, 1974; Etzioni, 1964). An additional problem for Bowen was that the outcomes may not be known for some time in the future or impossible to measure. The concept of student learning was more difficult than numbers of students or credit hours; student learning was the difficult concept of applying measurements to knowledge (Marchese et al., 1987). Measurements for and by state policymakers may be ill defined terms for use by other stakeholders (Ruppert & State Higher Education Executive Officers, 1998). Higher education has been inundated with simultaneous demands for accessibility and efficiency. The achievement of these goals was hindered without proper implementation of responsibility on all levels, the access to power, and the removal of impedance (Sibley, 1974).
However, Burke (2005) forecast that accountability will survive resistance. Although accountability appears to be a burden, Smith-Mello (1996) proposed that the self-examination would actually revitalize education. Community colleges have multiple missions and multiple stakeholders, so accountability can and will be difficult (Orfield, Horn, & Flores, 2006).

In his inaugural address in 1991, Governor Voinovich of Ohio stated,

Gone are the days when public officials are measured by how much they spend on a problem. The new realities dictate that public officials are now judged on whether they can work harder and smarter and do more with less. (Johnson, 1991, p. 2)

**Assessment**

Many authors have examined assessment, measuring education results to demonstrate quality, and outlined methods, criteria, and problems with the assessment process.

Government officials and society wanted verification that the intended results were achieved with the use of public funds. Policymakers required these results to determine if in fact public funds were disbursed correctly and used wisely as the performance of the institutions can have legal and ethical responsibilities (Spellings et al., 2006; Wagner, 1989). Postsecondary institutions of education needed to react to the information requirements of society and the political pressures (Rossman & El-Khawas, 1987). Assessment provided a format to obtain data to document and measure the outcome of student learning. Assessment contained the following assumptions: focus on performance, matter of method, improvement of performance, and reflections (Marchese et al., 1987).

The overall broad concept of assessment contained accountability as a part of the process to provide documentation of efficient and effective use of funds to multiple stakeholders. As various approaches were defined, examined, and implemented, the need to match the
accountability system to the mission of the postsecondary education institution became predominant. Assessments began as early as the 1940s, with six approaches in place at the time: centers, self-assessment, program monitoring, learning and growth, testing, and/or capstone experience (Marchese et al, 1987).

Rossmann and El-Khawas (1987) found the following benefits when implementing and using assessment programs: academic introspection, information for recruitment, context for planning, readiness for accreditation studies, improvements in teaching and learning, better student retention, improved public relations, and fund-raising gains. Goal assessment has the following advantages according to Romney and Bogen (1978): accountability, internal growth, reduced risk of stagnation, demystification, ethics, error reduction, public trust, goal relevance, resource allocation, community information, and objective formation. Serban (1998) stressed that assessment focused learning, establishing comprehensive data collection methodology, and emphasizing program reviews.

Other writers were concerned about problems with assessment. Goal assessment has disadvantages including marginal returns, higher than anticipated costs, unrealistic expectations, morale problems, forced directions, non-measurability, increased rigidity, and one-dimensional research (Romney & Bogen, 1978, p. 22). Assessment does not fix the problems that were disclosed during the process and serves only to divert from the primary purpose of learning (Benjamin, 1990: Marchese et al., 1987). In addition, assessment is subjective based on the biases and opinions of the evaluator (Marchese et al., 1987).

Head’s (2011) three components of institutional effectiveness were: assessment of the student, evaluation of the program, and institutional research. Every aspect of the community college comprised institutional effectiveness. Alfred (2011) gave additional characteristics to
effectiveness. The accountability system must address effectiveness as valuation (perception of stakeholders of goods received from higher education), stretch (how far can funds reach), and interpretation (what do measures really measure).

Accountability was the broad term to measure whether institutions of postsecondary education met their missions effectively and efficiently. This encountered the difficulty of defining quality and adapting those concepts to accountability. Quality was the means to determine if the missions of the institutions of postsecondary education were in fact accomplished well (Walsh, 1991). The literature varied on the measurement of the product of student learning. Quality was broken into many components to define the method to measure the primary product of student learning.

In the 1960s and 1970s, the focus was on accessibility to postsecondary education. In the 1980s, the focus changed to quality. Public agencies and policymakers increasingly came to view institutions of postsecondary education as investments, not as a public service (Ewell, 1991). In the 1980s, the public wanted verification that postsecondary education produced a quality product (Gaither, Nedwek, Neal, ERIC, & Association for the Study of Higher Education, 1994).

In the past, stakeholders including students and policymakers, used the postsecondary institutions’ reputations as a means to determine quality rather than outcomes (Piereson, 2011). Quality was only measured by financial inputs and the institution’s resources. Previously, there was no information available for students and families to determine the effectiveness of learning across institutions (Spellings et al., 2006). Green and the Society for Research (1994) pointed out that quality depended on the needs of the customers or stakeholders.
Quality has two components: the product itself and the relationship of the product to the user (Walsh, 1991). The product either meets the specifications or the product doesn’t meet the requirements. Walsh (1991) viewed quality as a product of the public’s right to know about institutions of postsecondary education.

In institutions of postsecondary education, the product was primarily the quality of student learning or at least as good as the offerings at competitor institutions (Bers, 2006; Green & Society for Research into Higher Education, Ltd., 1994). Quality can be viewed as the information a student obtains while shopping for postsecondary education. Quality information can be difficult and costly to gather and for the student to find. Without quality data, the students’ decisions are inefficient (Nelson, 1970). The definition and measures of quality must adapt as the needs change. As time passes, needs of the various stakeholders change and purposes can be multiple (Green & Society for Research into Higher Education, Ltd., 1994). Anderson, Bowman, and Tinto (1972) mandate continual reflection on understanding the varied needs and priorities of all community college stakeholders.


**Methods of Accountability**

The business world had implemented various means to reflect efficient use of resources to effectively produce the desired product, which were adopted by various institutions of postsecondary education to address the difficulties in proving the efficient and effective production of student learning. Various attempts were made to pursue the illusive concept of
measuring student learning. Different methods of accountability that have been involved with higher education, including testing, total quality management, benchmarks, budgets, and balanced scorecards are discussed.

Testing was used to demonstrate student learning with statistics readily available and was very common in the 19th century. A test measured a sample of behavior, under controlled conditions, to raise inferences about performance in some larger domain of behavior (Marchese et al., 1987). The tendency was to simply test, which was considered a quick fix, and easy to measure and track (Ewell & Boyer, 1988).

Total quality management provided a means to measure not only efficiency and effectiveness, but quality as well. Deming revolutionized the business world with the concept of meeting the customer’s demands through Total Quality Management (TQM) in the 1950s. One of the primary concepts behind TQM is that quality can be achieved only if measured (Dill, 1995). Smith-Mello (1996) recommended the TQM system to aid institutions of higher education for efficiency and responses to customer needs. Understanding the customers’ needs and the use of performance indicators would be the best method to provide measurement for the desired goals of the student and the institution (Banta & Borden, 1994). Mize and the Community College League of California (1999) proposed that higher education did follow the TQM business movement.

Benchmarks have been used in the business world to provide standards of efficiency and effectiveness from company to company and industry to industry. Benchmarks in such areas as student access, retention, learning and success, educational costs, and productivity provide means of accountability and improvement for the institution itself (Spellings et al., 2006). However, Bers (2006) pointed out that benchmarks have different meanings from institution to
institution, state to state. Hope and Fraser (2003) proposed benchmarks for postsecondary institutions in the format of key or core performance indicators.

Budgets provided easy access to numbers that can be understandable to all stakeholders. Budgets emerged in the 1920s to track the flow of money as companies and institutions grew larger (Hope & Fraser, 2003). From the 1950s, budgeting systems and zero-based budgeting were used by the states to distribute and allocate funds to higher education (Serban, 1998). While a numerical system is meant to be unbiased and provide clear measurements, budgets are often accompanied by problems. Strict and inflexible budgets result in ethical violations. Folger (1977) suggested that accountability cannot be based solely on dollar amounts.

The balanced scorecard emerged in the 1990s as a stronger method to prove accountability. Kaplan and Norton (1992) stated that budgets were not a strong or complete means of measuring the effective and efficient use of company monies. The Balanced Scorecard used customer, internal, innovation, and financial perspectives to best determine how to efficiently and effectively operate. Complex systems became very simple with minimal data. First, the mission statement must be broken into measures reflecting quality. In addition, this system required that all staff members be aware of the data and measurements to implement timely and accurate tracking (Kaplan & Norton, 1992). Four to seven measures were needed for each of the four perspectives. The balanced scorecard approach focused on the future rather than what is occurring today. Kaplan and Norton (1996) projected that both for-profit and non-profit organizations could use the balanced scorecard approach.

Lyddon and McComb (2008) noted that the fifteen to twenty indicators should be measurable and actionable. These indicators provided a brief overview with a target, middle, and worst measurement. The scorecard consisted of target results, actual results, the difference
between the target and actual results, and benchmarks. The benefits from the balanced scorecard included identification of low performance, changing of perspectives, providing the same data to everyone, and maintaining corporate culture based on evidence rather than myths (Lyddon & McComb, 2008, p. 165).

The balanced scorecard approach can be used in various ways, including diversity. Vega and Martinez (2012) used an eight measure scorecard approach for assisting Latino students in evaluation of Universities in Texas. Higher education adapted the Balanced Scorecard to its specific needs, with the use of key or core performance indicators.

**Core Performance Indicators**

Performance indicators emerged as a system to provide assessment and accountability as policy makers felt more pressure to ensure well-spent tax dollars yet maintain flexibility and provide incentives for improvement (Alfred et al., 2007; Borden & Bottrill, 1994). An indicator system tends to be a quantitative measurement which clarifies problems quicker, offers means for improvements and forecasts, and provides useful trend data and benchmarks for determining consequences (Brown, 1970; Nedwek & Neal, 1994; Orfield, 2001; Shavelson, McDonnell, Oakes, & ERIC Clearinghouse on Tests, Measurement and Evaluation, 1991). However, this system was never intended to be a quick fix as the development of the indicators should take ten to fifteen years (Innes, 1975).

Key performance indicators must be simple, free of bias, clearly defined, and standardized for comparison basis (Gaither et al., 1994; Polytechnics and College Funding Council & Morris, 1990). Quick changes can be made when key performance indicators are designed well, allowing for continuous improvement (Gaither et al., 1994).
Indicators should be considered as guidelines rather than absolutes, linking mission to goal achievement as well as providing strategies for the future (Alfred et al., 2007; Malo & Weed, 2006; Sizer et al., 1992; Wagner et al., 2003; Wang, Ran, Liao, & Yang, 2010). Borden and Bottrill (1994) noted that a measure or statistic becomes a performance indicator when it is explicitly associated with a goal or objective. Measurement goals then get accomplished and valued (Parmenter, 2007; Ruppert, 1995). Performance indicators have value that can increase or decrease. Therefore, performance indicators should specify whether the increase or decrease in value is the desired level of outcome or performance. For performance indicators to operate well, a point of reference is needed (Borden & Bottrill, 1994). Indicator systems need constant monitoring, communication, analysis and judgment to determine quality, effectiveness, and efficiency. Interpretative judgments follow the analysis (Alfred et al., 2007; Hom, 2008; Hope & Player, 2012; Innes, 1978; Orfield, 2001; Parmenter, 2007; Sizer et al., 1992). However, KPIs do not measure perception, but rather focus on current or possible problems, have reliability, validity, transferability, flexibility, and feasibility (Brown, 1970; Shavelson et al., 1991).

In addition to various opinions on the characteristics, purposes, and functions of key performance indicators, the number necessary to inform all stakeholders about accountability varied as well. When states implemented performance funding programs, the number of indicators ranged from five in California to forty in Florida (Mize & Community College League of California, 1999). Ruppert (1995) found 15 to 25 indicators in most states.

As authors could not agree on specific numbers of KPIs that are ideal, others stipulated possible ranges. Parmenter (2007) used a range of 10 KRIIs (key result indicators), 80 PIs, and 10 KPIs. Hope and Player (2012) recommended at least three key performance indicators for each factor or value, as one would not give an accurate or complete picture. There must be a
sufficient number to measure the complex issues, subject to continual improvement (Gaither et al., 1994). Burke and Modarresi (1999) pointed out that too many indicators produce trivial and meaningless results. Too few draw an incomplete picture with missing components. “Standard histories of the two-year college invariably begin with numbers because numbers have come to be both the blessing and the curse of public higher education in America” (Zwerling, 1976, p. 41).

As the missions of community colleges are different from those of four-year postsecondary institutions, the standards and the KPIs should reflect these differences (Ewell, 2011; Hudgins, 1993). Ewell (2011) noted that community colleges have four distinct tracking problems: students often obtain part of their studies at other institutions; most students attend part-time; many students started at another institution; and a certain proportion of students never intend to obtain a degree. Grossman et al. (1989) identified six areas using 38 indicators, which should apply to all missions of all two-year institutions: access and equity, employment preparation and placement, college/university transfer, economic development, college/community partnerships, and cultural and cross-cultural development.

Whether for the two or four year institution of postsecondary education, KPIs come with disadvantages. Many authors pointed out the shortcomings of the KPIs system. The reasons varied from the difficulty of translating qualitative data into quantitative formats to punishing institutions already performing well.

The new concept of accountability and performance indicators formed in the 1980s began to crack in the 1990s (Ewell, 1994). The quickly formed performance indicator system contained ambiguous indicators with undefined terms causing confusion rather than clarification (Astin, 1974; Ewell, 1994; Gaither et al., 1994).
The indicator system itself has limitations as much of education is qualitative and quantititative performance indicators focus on what is measurable, observable, available, and countable rather than quality (Cave, Hanney, & Kogan, 1991; Frackmann, 1987; Kells, 1990; Layzell, 1998; Ruppert, 1995). Teaching, education, outcomes, or outputs are therefore very difficult to quantify or measure (Astin, 1974; Green & Society for Research into Higher Education, Ltd., 1994). Education is a complex structure that does not want to, nor should education produce the same product or outcome each and every time (Borden & Bottrill, 1994; Frackmann, 1987).

If it can be measured or quantifiable, then it tends to end up as a performance indicator (Nedwek & Neal, 1994; Ruppert, 1995). Borden and Bottrill (1994) wrote that what could be found tended to be measured, yet measurable data may or may not indicate true problems. Frackmann (1987) highlighted that performance indicators attempted to simplify a complex situation. Yet the sheer massive numbers of indicators can make issues more complex rather than clearer (Gaither et al., 1994; Layzell, 1998).

According to Etzioni (1964) constant measurement itself can serve to distort the data, as some areas are more easily measured than others. Constant measurement focuses the institution on measurement rather than attainment of the outcomes. Institutions tend to focus their energy on those outcomes, which are achievable rather than those that are more difficult. This very focus on the more achievable or more easily achievable measures distracts from the overall goals of the institution (Etzioni, 1964). With challenges resulting from imprecise or invalid measures, unclear relationships between achievement of desired outcomes and public funds, and failure to account for student demographics, Dougherty and Hong (2006, p. 68) found that performance indicators made only a small impact.
Unintended results of KPI systems must also be addressed. By establishing desired outcomes and indicators, behavior is changed which invalidates the results (Darling-Hammond, 1992). Dougherty and Hong, (2006) found that academic standards were lowered to meet the desired outcomes. Also, the community college, which was based on an open-door policy, was closing doors to some students. College missions were being revised to meet the desired outcomes.

The literature review stipulated that the base purpose of KPI systems was institutional improvement rather than just data collection. Banta and Borden (1994) cautioned that measurement alone does not ensure or guarantee improvement. If the institution is already meeting the levels desired, how will the institution improve? As key performance indicators are designed for program improvements, financial incentives should never be linked or attached. Rewarding for particular outcomes may skew the results (Darling-Hammond, 1992).

**Performance Budgeting and Performance Funding**

Not all authors agreed with Darling-Hammond (1992) that meeting goals should not be rewarded. Public and legislators’ concerns about postsecondary education have focused on accountability, productivity, and quality (Serban, 1998). From the 1950s, planning-programming, budgeting systems, zero-based budgeting, and other methods have been used by individual states to distribute and allocate funds to higher education systems; following these methods were incentive funding, categorical funding, and block grants (Serban, 1998). Performance funding was launched during the 1970s, with performance indicators tied to performance funding or budgeting (Serban, 1998, p. 18). Performance budgeting was the policy of designing budget levels based on achievement reports; performance funding links the allocation of funding based on performance levels (Burke & Serban, 1997). These decades were
A time of rising costs occurring at institutions of postsecondary education and diminishing federal and state funding (Fulks, 2001).

The states have shown an increasing trend of using performance funding and/or performance budgeting since the 1970s. Tennessee was the first state to implement performance funding in 1975; by 1998, 45 states had the program in place or pending (Mize & Community College League of California, 1999). Fulks (2001) stated that by the late 1990s, 75% of states had performance reporting and by 2000, 37 states had implemented performance funding.

Burke and Modarresi (1999) reported that the most effective state accountability programs tied the results of the key performance indicators by the postsecondary institution to performance budgeting or performance funding. Performance funding also provided accountability (Gaither, 1997). Those institutions that met the desired goals received full funding or additional funding. Programs need periodic review to modify key performance indicators as necessary. Performance funding, according to Burke and Modarresi (2001, p. 52), contained potential goals, performance indicators, funding weights, success standards, funding levels, and funding sources. Ohio’s accountability program included performance funding. Performance funding has been increasing as a method of accountability.

Performance funding had the following drawbacks: overly detailed prescriptions, inadequate consultation with stakeholders, poor design, hurried implementation, too little or too much funding, a reluctance of higher education to identify and assess learning outcomes, and focus by state officials on attractive possibilities rather than real issues (Burke & Modarresi, 1999, p. 9). Serban (1997) added other disadvantages: difficulty of measuring results, budget instability, and cost of implementation. Fulks (2001) wrote that the allocation of funds remained unclear and pointed to examples where funding was used for urgent needs rather than meeting
the outcomes behind the funding. Tracking and reporting required excessive amounts of time and technology.

Performance funding is not a passing fad. This system provides incentives for those institutions that meet the targets, but can also create internal costs to collect and analyze the data (Mize & Community College League of California, 1999). President Obama proposed in the 2012 State of the Union Address that funding from the Perkins Act should be based on performance indicators, rewarding those institutions that achieved exceptional results (Office of Vocational and Adult Education, 2012).

Ohio Measurements

The Measuring Up issued report cards for postsecondary institutions for all states across six categories: preparation, participation, affordability, completion, benefits and learning (National Center for Public Policy and Higher Education, 2004, 2008). The National Center for Public Policy and Higher Education compiled the data to provide information for stakeholders.

A sampling of two years’ scores showed how well Ohio measured up.

In 2004 under the Measuring Up program, Ohio was measured against its own past performance in 1992. The report found that Ohio had made no notable progress in the past decade in preparation, participation, or affordability. Ohio had made notable improvement in completion and saw an increase in benefits in the past decade. The grades for Ohio in 2004 were C+ in preparation, C+ in participation, F in affordability, B in completion, B- in benefits, and Incomplete in student learning.

In 2008, Ohio received the following grades: B- in preparation (based on scores on exams for college entrance), C- in participation (based on the number of adults enrolling beyond high school), F in affordability (based on the percentage of family income needed to afford college),
B- in completion (based on the number of students earning degrees), C+ in benefits (based on the number of degrees beyond high school), and Incomplete on student learning, as all states did, due to lack of sufficient data to assess student learning. Ohio’s performance in the *Measuring Up* report was stable or increased in all areas except affordability.

In Parsons’ (1949) social action theory, the values, norms, and motivations drive the actions of the actors (stakeholders). The Ohio community colleges (and other stakeholders) value education. As the history from Chapter Two indicated, the norm is now to have core performance indicators to demonstrate accountability. The Ohio community colleges are motivated to achieve the target levels for the six core performance indicators prescribed in Ohio since Perkins IV of 2006. With the information provided from the linear mixed model, the Ohio community colleges can better guide, direct, and control the behavior needs to attain this accountability goal.

**Summary of Chapter Two**

The literature review has followed the path of institutions of postsecondary education from peer review to the federal and state mandated core performance indicator system to provide transparency and accountability. Postsecondary education followed business models and combined a benchmark and balanced scorecard approach with the key or core performance indicator system. The need to provide accountability has dogged the steps of postsecondary education since the 1960s, but the Perkins Act required all states to implement an indicator system. While not perfect, the core performance indicators can provide insight for institutions. Many studies have tried to find the perfect demographic student who will persist in their studies, helping the community college to exceed the State of Ohio’s standards of performance. However, few if any studies have been conducted to provide the relationships between the
systems at the community college and reaching desired levels of performance on the key performance indicators.
CHAPTER THREE:
METHODOLOGY

The literature review disclosed the benefits and challenges to postsecondary education and provided some of the history of, background to, and unique qualities within the community college. During the late twentieth century, internal and external stakeholders demanded documentation that public funds and student tuition efficiently and effectively produced desired outcomes, including student learning. After utilizing several alternate methods, the Ohio Board of Regents designed a performance funding system based around the core performance indicator measurements stipulated by the Carl D Perkins Career and Technical Education Improvement Act of 2006, Perkins IV.

The purpose of this study is to determine relationships between core performance indicators (core indicators) as specified under the Perkins IV for all qualifying two-year colleges in Ohio and student and institutional demographics for a six-year period. Linear mixed model analysis was used towards this end. Each two-year college will then be able to compare performance individually and compared with all other Ohio two-year colleges.

This study combines aspects and approaches of the Hossain (2010) study of South Carolina community colleges and key indicator performance longitudinal study, the Lingrell (2004) regression study of student persistence at Ohio community colleges, and the Weltman (2007) study of the linear mixed model with education practices. The study is limited to Ohio two-year colleges because:

1. There is very little research on community college accountability, especially in Ohio at this time.
2. As the call to accountability grows, more reporting frameworks provide access and information useful for all stakeholders referred to in Chapter 2.

3. Due to the Perkins Act, all Ohio community colleges have a critical stake in achieving key performance indicators.

4. This study provided predictive models that can also be used in other higher educational institutions as well.

**Research Question**

The study answered this research question.

Are there any significant relationships between the student subgroup demographics and the achievement of the six core performance indicator scores for Ohio community colleges?

Null Hypothesis – There are no significant relationships between student demographics and the overall achievement of the six performance indicators for Ohio community colleges.

**Linear Mixed Model (LMM)**

For over 60 years, statistics have enabled schools and other interested stakeholders to discover the average student attendance, grade point, and other measures of accountability as used by each stakeholder (McCulloch, Searle, & Neuhaus, 2008). According to Cunnings (2012), multiple independent variables whether continuous, categorical, or mixtures can be studied in the mixed model. Dependent variables can be continuous or categorical in the LMM. Another property is that the LMM can change over a time period. The random effects can model different types (Cunnings, 2012).
Researchers and stakeholders constantly strive to discover effectiveness, often with institutional comparisons (Goldstein, 1991). With sophisticated statistical software development since the 1980s and 1990s, social science has increased the use of the more sophisticated, insightful, flexible, and powerful linear mixed model (LMM) method rather than the regression model (Baayen, 2012; Speer, 2012; Stroup, 2013). The LMM was chosen for this study as both fixed and random factors are contained (Hox & Roberts, 2011; Weltman, 2007). When the study involves both fixed and random effects, Baayen (2012) stated that classical analysis of variance and regression tends to have problems, especially with repeated measures. The linear mixed model has seven advantages:

- Provides straightforward predictions for unseen levels of random effect factors.
- Allows for fine-grained hypotheses about the random-effects structure of the data.
- Better able to directly model heteroskedasticity.
- Can handle autocorrelational structure in data elicited from subjects over time.
- Estimates provided by the model for adjustments to population parameters are shrinkage estimates. A danger inherent in fitting a statistical model to the data is overfitting.
- More than two random-effect factors can be included.
- Better able to detect effects as significant. Offer a slight increase in power without giving rise to inflated Type I error rates. (Baayen, 2012, p. 672).

The linear mixed model has two probabilistic properties: the unknown constants are independently and identically distributed (i.i.d) and with a zero mean, all have the same variance (McCulloch, Searle, & Neuhaus, 2008). The study followed the Gaussian assumption that the distribution is normal (Stroup, 2013).
In the mixed model, there are two kinds of effects. The fixed effects have a finite set of levels that occur in the data. The random effects have an infinite set of levels, which allow inferences about the populations (Searle, Casella, & McCulloch, 1992). In this study, the 21 community colleges create the random effect. All other independent variables are fixed effects in this model. This study is not concerned with the levels of the random effect. The purpose is to study the effects of various demographics to the achievement of outcomes for the two-year institutions of higher education.

The linear mixed model also works better with missing data (West, Welch, & Galecki, 2007). The authors stated that the LMM has the advantage of treatment of subjects who are studied over a time period to have unequal measurements. In addition, different subjects can have different time points for measurement collections under the LMM. According to the Ohio Board of Regents, all two-year institutions report all required data. The OBR does not publish data for the public when a student could be identified. Therefore, besides “zero,” or “Not Applicable,” sometimes data fields are shaded. These indicate such a small number of students that the data are not published (OBR representatives, personal communication).

**Target Population**

Ohio currently contains 23 two-year public colleges. The colleges are: Belmont College, Central Ohio Technical College, Cincinnati State Community College, Clark State Community College, Columbus State Community College, Cuyahoga Community College, Eastern Gateway Community College, Edison Community College, Hocking College, James Rhodes State College, Lakeland Community College, Lorain County Community College, Marion Technical College, North Central State College, Northwest State Community College, Owens Community College, Rio Grande Community College, Sinclair Community College, Southern State
Community College, Stark State College, Terra Community College & University of Toledo Consortium, Washington State Community College, and Zane State College (State of Ohio, n.d.).

These constitute the target population of this study, except Rio Grande, which does not qualify for funding under the Perkins IV. The University of Toledo, a four-year institution, is in consortium with two-year, Terra Cotta and these two institutions record data as one institution and are therefore considered as one in this study. The titles of these two-year colleges range from technical, to community, and state community institutions. According to the Ohio Board of Regents (OBR), if a community college falls below Perkins IV required levels, that college will often form a consortium with another community college (OBR representatives, personal communication). For example, in the 2012-2013 cohort year, Washington State Community College and Eastern Gateway Community College are listed as a consortium. All of these 21 (as of the cohort year of 2012-2013) are considered two-year institutions and are the target population for this study. In this study, data are compiled on the institutional or consortium level rather than individual campuses. Some institutions have multiple campuses, but these were considered only as one institution as all data are compiled on an institutional level.

**Procedures for Data Collection**

The most recent year of the Postsecondary Institution Perkins Performance Report is accessed on the web site (www.ohiohighered.org/perkins/performance) for the Ohio Board of Regents. The data are recorded by each two-year college and a statewide summary for each year starting 2008 to 2009. See https://www.ohiohighered.org/perkins/performance. This institutional report provides percentages of students by gender, race/ethnicity standards, and special populations achieving each of the six key performance indicators. The reports also provide the number of students in each demographic subgroup for each key performance
indicator. The website also contains the statewide report for the years of 2008 to current with percentages and by number of students (www.ohiohighered.org/perkins/performance, n.d.).

The Ohio Higher Education Information System (HEI) collects the data annually. The procedure is documented on the website (www.ohiohighered.org/hei, n.d.).

An email was sent to the Ohio Board of Regents’ email address provided on the website (see Appendix A) requesting the individual annual reports by each individual two-year institution or consortium for all prior years. The archived data was provided in PDF copies for cohort years 2007-2008 through 2011-2012. The data for 2012-2013 was contained on the Ohio Board of Regents website. The Ohio Board of Regents response stated that the implementation of Perkins IV provided for data collection to start with the school year of 2007-2008. Therefore, no data was available prior to that time.

The data was imported into IBM/SPSS, Version 22 to perform the linear mixed model analysis for each of the dependent variables, the core performance indicators.

The core indicators are defined by Perkins IV. The Ohio Board of Regents (OBR) selected the six core indicators as required and stipulated by the federal law (OBR representatives, personal communication). Technical Skill Attainment refers to student technical skill proficiencies as defined in Chapter One. Credential, certificate or degree refers to the attainment by a student of an industry-recognized certificate or a degree. Student retention or transfer indicates the students who remained enrolled (autumn to autumn measurement) in their original postsecondary institution or transferred either to a different two-year institution or a four-year institution. Student placement contains the number of students who were placed in military service, or apprenticeship programs within stated time limits. Nontraditional participation counts students from underrepresented gender groups who participated in a
program leading to nontraditional fields of employment. Nontraditional completion captures the underrepresented gender groups that completed the program leading to nontraditional fields of employment (OBR, 2013). The linear mixed model with random effect was performed for each of the performance indicators for the school years spanning from 2007 – 2013.

**Study Variables**

The dependent variables since 2006, due to the passage of the Perkins Act, for Ohio community colleges are the following six key performance indicators: Technical Skill Attainment (1P1), Credential, Certificate or Degree (2P1), Student Retention or Transfer (3P1), Student Placement (4P1), Nontraditional Participation (5P1), and Nontraditional Completion (5P2). These dependent variables have been the same across the study period from 2007 to 2013. Prior to Perkins IV, academic attainment was required and reported. According to the Ohio Board of Regents, community colleges protested that this was unnecessary and the requirement was dropped (OBR representatives, personal communication).

The numerators and denominators have slightly different definitions depending on the core indicator. A full chart is found at https://www.ohiohighered.org/sites/ohiohighered.org/files/uploads/perkins/POSTSEC%20State%20Performance%20Targets_121112_0.pdf. Normally the numerator reflects success in achievement of the core indicator by the student while the denominator indicates participants. The numerators were used in this study.

This study employed student and institutional independent variables that were performed using a linear mixed model analysis with random effect on the key performance indicators. The institution was used as a separate observation each year and was treated as a random effect. In each model the student independent variables consist of:
1. Percentage of students by gender,
2. Percentage of students by race,
3. Percentage of individuals with disabilities (ADA),
4. Percentage of economically disadvantaged students,
5. Percentage of students who are single parents,
6. Percentage of students who fall under the definition (Chapter 1) of displaced homemakers,
7. Percentage of students with limited English proficiency, and
8. Percentage of defined as nontraditional enrollees.
9. The institutional independent variable was the percentage of students by core performance indicator.

This information is also collected and reported by the Ohio Board of Regents. The data for this study was retained as percentages. As previously stated, the OBR also publicizes the information by number.

**Data Analysis Procedures**

The Ohio Board of Regents with the Ohio Higher Education Information (HEI) system annually reports this information. For the initial years, migrant populations and tech preparation numbers were recorded. However, as the data did not span all years of the study, these independent variables were not included in this study.

The linear mixed model analysis with random effect was run on the archived data collected by the Ohio Higher Education Information (HEI) system. The HEI collects much data. The data is public domain. In depth information can be found on the HEI web site at [http://www.regents.state.oh.us/hei/](http://www.regents.state.oh.us/hei/). The data for the study was obtained from the Ohio Board of
Regents through the website and by email (see Appendix A) for archived data (www.ohiohighered.org/perkins/performance). The Ohio Board of Regents collects annually the data by number and percentage of students under each of the six core performance indicators.

After obtaining the current year from the public website and archived data from the Ohio Board of Regents, the researcher entered the information into an Excel spreadsheet for importing into IBM/SPSS, Version 22. The data for this study was analyzed using the IBM/Statistical Package for the Social Sciences (IBM/SPSS), version 22.

The data for the independent and dependent variables were collected for the cohort years of 2007-2013. This archived data is the only data available at the time of this study.

A linear mixed model was run, based on Akaike’s minimum information, using each of the six key performance indicators as the criterion variable with the same set of student and institutional numbers as predictor variables because of its robustness in nature and its predictability of the relationships between the dependent and independent variables. Each community college served as an observation for each year and was treated as the random effect. The school year was treated as a categorical independent variable. The level of significance was set at $\alpha = .05$ (5%). The study’s limitation was the inability to run interactions. As the data did not contain enough observations, even a two-way interaction, could not be run.

A total of six linear mixed models (LMM) was run. The following formula was used.

$$CPI_{ti} = \beta_{1}G_{ti} + \beta_{2}R_{ti} + \cdots + \beta_{9}S_{ti} + u_{1iBelmont} + \cdots + u_{21iZane} + \epsilon_{ti}$$

CPI represents the core performance indicator. The value of $t$ which is the cohort years ($t = 1, \ldots, n_i$), indexes the $n_i$ longitudinal observations on the CPI which is the dependent variable for a given college, and $i$ ($i = 1, \ldots, 21$) indicates the $i^{th}$ college. We assume that the
model involves two sets of covariates, the fixed and random effects. We assume that $\beta_1 \ldots \beta_9$ coefficients are associated with the fixed effects of gender, race, individuals with disabilities (ADA), economically disadvantaged students, single parent students, displaced homemaker students, students with limited English proficiency, and nontraditional students. The $\varepsilon$ are associated with the random effects, which are the Ohio community colleges alphabetically from Belmont to Zane.

In Parsons’ (1949) social action theory, the values, norms, and motivations drive the actions of the actors (stakeholders). The Ohio community colleges (and other stakeholders) value education. As the history from Chapter Two indicated, the norm is now to have core performance indicators to demonstrate accountability. The Ohio community colleges are motivated to achieve the target levels for the six core performance indicators prescribed in Ohio since Perkins IV of 2006. With the information provided from the linear mixed model, the Ohio community colleges can better guide, direct, and control the behavior needs to attain this accountability goal.

**Summary of Chapter Three**

Chapter Three has highlighted the advantages and need for the Linear Mixed Model (LMM) in this study. The robust study covers all archived data collected by the Ohio Board of Regents since the most current version of the Carl D. Perkins Act, Perkins IV, which is six years. The student demographics are the independent variables, all qualifying community colleges are the random effect and target population, and the cohort years from 2007 to 2013 are the repeated measure. The study used the LMM to discover the relationships between the student demographic variables and the ability of the community colleges to successfully achieve the
accountability requirement of Perkins IV, the six core performance indicators and therefore the dependent variables.
CHAPTER FOUR:
ANALYSIS OF RESULTS

The Linear Mixed Model (LMM) analysis was run for each of the six core performance indicators, the dependent variables. To provide demographic background, Table 1 provides an overview of the community colleges in the state of Ohio participating in the Perkins program for the most recent year of 2012-2013. The information is presented by percentages. If an individual could be identified, then Ohio Board of Regents disaggregates the data. Thus, there will be some blank columns in the charts by design. Each of the six core performance indicators are presented by the community colleges in the Appendix B. The Ohio Board of Regents reported total headcount enrollment for fall semester for Ohio’s 23 community colleges as 171,770 in 2007, 179,622 in 2008, 203,508 in 2009, 211,260 in 2010, 204,460 in 2011, and 176,960 in 2012 (Ohio Board of Regents, 2012; Ohio Board of Regents, 2012a).
Table 1

*Ohio Perkins Statewide Performance Report for 2012-2013 by Percentage*

<table>
<thead>
<tr>
<th>Performance rates by Subgroup</th>
<th>Technical Skill Attainment (1P1)</th>
<th>Credential, or Degree (2P1)</th>
<th>Student Retention or Transfer (3P1)</th>
<th>Student Placement (4P1)</th>
<th>Non-traditional Participation (5P1)</th>
<th>Non-traditional Completion (5P2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grand Total</td>
<td>78.37%</td>
<td>57.86%</td>
<td>63.64%</td>
<td>81.15%</td>
<td>24.01%</td>
<td>18.42%</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>82.28%</td>
<td>64.24%</td>
<td>62.11%</td>
<td>78.33%</td>
<td>19.42%</td>
<td>9.52%</td>
</tr>
<tr>
<td>Male</td>
<td>72.89%</td>
<td>48.89%</td>
<td>65.60%</td>
<td>86.36%</td>
<td>29.86%</td>
<td>38.30%</td>
</tr>
<tr>
<td>Race/Ethnicity Standards</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>American Indian or Alaskan Native</td>
<td>100%</td>
<td>71.43%</td>
<td>12.50%</td>
<td></td>
<td>0.00%</td>
<td></td>
</tr>
<tr>
<td>Asian or Pacific Islander</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>Black or African American</td>
<td>61.54%</td>
<td>46.15%</td>
<td>74.51%</td>
<td></td>
<td>47.37%</td>
<td></td>
</tr>
<tr>
<td>Hispanic/Latino</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td></td>
<td>0.00%</td>
<td></td>
</tr>
<tr>
<td>Native Hawaii or Other</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>Pacific Islander</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>78.35%</td>
<td>58.07%</td>
<td>63.24%</td>
<td>82.03%</td>
<td>23.19%</td>
<td>17.87%</td>
</tr>
<tr>
<td>Two or More Races</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.00%</td>
<td>25.00%</td>
</tr>
<tr>
<td>Unknown</td>
<td>100.00%</td>
<td>63.64%</td>
<td>59.26%</td>
<td>85.71%</td>
<td>14.29%</td>
<td></td>
</tr>
<tr>
<td>Special Populations and Other Student Categories</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Individuals with Disabilities (ADA)</td>
<td>69.57%</td>
<td>52.17%</td>
<td>57.41%</td>
<td>75.00%</td>
<td>20.93%</td>
<td>12.50%</td>
</tr>
<tr>
<td>Economically Disadvantaged</td>
<td>74.14%</td>
<td>52.24%</td>
<td>65.23%</td>
<td>77.27%</td>
<td>26.15%</td>
<td>19.61%</td>
</tr>
<tr>
<td>Single Parents</td>
<td>70.00%</td>
<td>50.00%</td>
<td>62.18%</td>
<td>78.89%</td>
<td>22.43%</td>
<td>20.22%</td>
</tr>
</tbody>
</table>
In Table 1, the definitions of the special population groups are restated and the percentage of achievement of the core indicators for each of the groups is compiled for the full Ohio community college student population. Special populations are defined by Section 3(29) of the Carl D. Perkins Career and Technical Education Act of 2006 as individuals with disabilities; individuals with economically disadvantaged families including foster children; individuals preparing for non-traditional fields; single parents, including single pregnant women; displaced homemakers; and individuals with limited English proficiency (Department of Education, n.d.). Economically disadvantaged means such families or individuals who are determined by the Secretary to be low-income according to the latest available data from the Department of Commerce (United States & United States, 1985). The displaced homemaker is defined under Ohio Revised Code as twenty-seven years of age, has worked without pay as a homemaker for his or her family; is not gainfully employed and has had, or would be likely to have difficulty in securing employment; and has either been deprived of the support of a person on whom he or she was dependent, or has become ineligible for public assistance as the parent of a needy child (State of Ohio, n.d.). Non-traditional training and employments means occupations or fields of work, including careers in computer science, technology, and other emerging high skill occupations, for which individuals from one gender comprise less than 25 percent of the individuals employed in such occupation or field of work (Department of Education, n.d.).

<table>
<thead>
<tr>
<th>Special Population Group</th>
<th>Displaced Homemaker</th>
<th>Limited English Proficient</th>
<th>Nontraditional Enrollees</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>82.09%</td>
<td>0.00%</td>
<td>79.01%</td>
</tr>
<tr>
<td></td>
<td>59.70%</td>
<td>0.00%</td>
<td>61.73%</td>
</tr>
<tr>
<td></td>
<td>60.12%</td>
<td>0.00%</td>
<td>65.53%</td>
</tr>
<tr>
<td></td>
<td>85.00%</td>
<td>0.00%</td>
<td>90.00%</td>
</tr>
<tr>
<td></td>
<td>21.88%</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td></td>
<td>19.35%</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
</tbody>
</table>
The analysis was run for each of the core performance indicators. Technical Skill Attainment refers (from Chapter 1) to student attainment of career and technical skill proficiencies, including student achievement on technical assessments, that are aligned with industry-recognized standards if available and appropriate (ACTE & Brustein, 2006: United States & United States, 1985).

The estimates of fixed effects for the Technical Skill Attainment are displayed in Table 2.
Table 2

Estimates of Fixed Effects for Technical Skill Attainment

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Estimate</th>
<th>Std. Error</th>
<th>Df</th>
<th>T</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>-.220621</td>
<td>2.629709</td>
<td>45.426</td>
<td>-.084</td>
<td>.934</td>
</tr>
<tr>
<td>F</td>
<td>.423476</td>
<td>.091434</td>
<td>42.803</td>
<td>4.631</td>
<td>.000</td>
</tr>
<tr>
<td>W</td>
<td>.254697</td>
<td>.067682</td>
<td>44.659</td>
<td>3.763</td>
<td>.000</td>
</tr>
<tr>
<td>ADA</td>
<td>-.004100</td>
<td>.007848</td>
<td>40.545</td>
<td>-.522</td>
<td>.604</td>
</tr>
<tr>
<td>ED</td>
<td>.469212</td>
<td>.079609</td>
<td>43.475</td>
<td>5.894</td>
<td>.000</td>
</tr>
<tr>
<td>SP</td>
<td>-.117061</td>
<td>.056665</td>
<td>43.476</td>
<td>-2.066</td>
<td>.045</td>
</tr>
<tr>
<td>DH</td>
<td>-.008285</td>
<td>.011765</td>
<td>43.618</td>
<td>-.704</td>
<td>.485</td>
</tr>
<tr>
<td>LEP</td>
<td>.006198</td>
<td>.006266</td>
<td>34.223</td>
<td>.989</td>
<td>.330</td>
</tr>
<tr>
<td>NONE</td>
<td>-.013150</td>
<td>.028921</td>
<td>42.220</td>
<td>-.455</td>
<td>.652</td>
</tr>
</tbody>
</table>

Note. F = female; W= white, ADA = individuals with disabilities as defined by the Americans with Disabilities Act; ED = individuals defined by Perkins IV as economically disadvantaged; SP = single parents; DH = individuals defined by Perkins IV as displaced homemaker; LEP = individuals defined by Perkins IV with limited English proficiency; and NONE = individuals pursuing fields of study in non-traditional training and employment as defined by Perkins IV.

This data within Table 2 indicates that gender (F), race (W), economically disadvantaged (ED), and single parents (SP) factors have a significant effect on Technical Skill Attainment. While factors of gender (F), economically disadvantaged (ED), and race (W) have a positive effect on TSA, single parent (SP) has a negative effect. For interpretation, in the significance column (Sig.), any of the numbers in the column less than .050 have been found to be a significant result. These results are the focus for each of the Tables that follow. Once findings of significance were located, then the estimate column is checked. For those (that had significance) with positive numbers, the significant factor positively affected the outcome. If the
estimate numbers are negative, the factor hindered reaching the outcome. For example, F, which stands for gender, had a significant result of .000 (Sig. column on the far right). Then in the estimate column, the number is .423476, which is positive. These results are further explained in Chapter Five.

Table 3 presents the covariance parameters for computing the intraclass correlation coefficient. The intraclass correlation coefficient computes the relationship among variables of a common class. These variables share both their metric and variance (Bakeman & Quera, 2011; McGraw & Wong, 1996). The intraclass correlation coefficient provides the ability to generalize the data (Bakeman & Quera, 2011).
Table 3

Estimates of Covariance Parameters\(^a\) for Technical Skill Attainment

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Repeated Measures</td>
<td>AR1 diagonal</td>
</tr>
<tr>
<td></td>
<td>AR1 rho</td>
</tr>
<tr>
<td>Intercept + Abbreviation</td>
<td>AR1 diagonal</td>
</tr>
<tr>
<td></td>
<td>AR1 rho</td>
</tr>
</tbody>
</table>

Note. Repeated Measures = cohort years of the study; Abbreviation = abbreviation for each of the Ohio community colleges in the study; total = Technical Skill Attainment.
\(^a\)Dependent Variable: Total.

According to Table 3, 18% of the variance the attainment of technical skills can be attributed to the colleges because they are the random factor in this study. This is the calculation that provided the 18% figure: (.222895/(.222895+.996539). This is a small proportion of the equation, which indicates that the larger variance is due to the student demographics. The intraclass correlation provides an estimate of the generalizability of observations (Wiggins, 1973).

An analysis of \(R^2\) was then run. Table 4 has the Model Summary.
Table 4

*Model Summary for the Technical Skill Attainment*

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R²</th>
<th>Std. Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.994&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.988</td>
<td>.988</td>
<td>.86818</td>
</tr>
</tbody>
</table>

<sup>a</sup>Predictors: (Constant), Predicted Values

*R<sup>2</sup>* is the statistic most often used to measure how well the dependent variable can be predicted from knowledge of the independent variables (Allison, 1999). In this analysis, the dependent variable is the attainment of technical skills by the students at the Ohio community colleges. The independent variables are the demographics of the students such as gender, race, etc. *R<sup>2</sup>* is a measure of variance accounted for with a value range of zero to one (Winter, 2013). When *R<sup>2</sup>* has a value close to one, the implication is that more of the variability in the dependent variable is therefore explained by the independent variable in the model (Montgomery, Peck, & Vining, 2012). The high value of *R<sup>2</sup>* explains that 98% of the variation in the attainment of technical skills is accounted for by student demographics.

The next set of three tables analyze the second dependent variable, which covers the core performance indicator for students who were eligible or did receive credentials, certificates, or degree completion as recognized by industry and left postsecondary education.
Table 5

*Estimates of Fixed Effects for Credential, Certificate or Degree*

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Estimate</th>
<th>Std. Error</th>
<th>Df</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>.048498</td>
<td>1.849814</td>
<td>35.784</td>
<td>.026</td>
<td>.979</td>
</tr>
<tr>
<td>F</td>
<td>.210208</td>
<td>.064203</td>
<td>46.047</td>
<td>3.274</td>
<td>.002</td>
</tr>
<tr>
<td>W</td>
<td>.592914</td>
<td>.051514</td>
<td>49.742</td>
<td>11.510</td>
<td>.000</td>
</tr>
<tr>
<td>ADA</td>
<td>.000764</td>
<td>.010206</td>
<td>46.541</td>
<td>.075</td>
<td>.941</td>
</tr>
<tr>
<td>ED</td>
<td>.024055</td>
<td>.030747</td>
<td>21.150</td>
<td>.782</td>
<td>.443</td>
</tr>
<tr>
<td>SP</td>
<td>.089457</td>
<td>.045714</td>
<td>34.586</td>
<td>1.957</td>
<td>.058</td>
</tr>
<tr>
<td>DH</td>
<td>.015318</td>
<td>.011926</td>
<td>40.340</td>
<td>1.284</td>
<td>.206</td>
</tr>
<tr>
<td>LEP</td>
<td>-.026350</td>
<td>.011979</td>
<td>36.072</td>
<td>-2.215</td>
<td>.033</td>
</tr>
<tr>
<td>NONE</td>
<td>.035333</td>
<td>.023005</td>
<td>43.789</td>
<td>1.536</td>
<td>.132</td>
</tr>
</tbody>
</table>

*Note.* F = female; W = white, ADA = individuals with disabilities as defined by the Americans with Disabilities Act; ED = individuals defined by Perkins IV as economically disadvantaged; SP = single parents; DH = individuals defined by Perkins IV as displaced homemaker; LEP = individuals defined by Perkins IV with limited English proficiency; and NONE = individuals pursuing fields of study in non-traditional training and employment as defined by Perkins IV.

The data within Table 5 shows that for credentials, certificates, or degrees, the factors of gender, race, and limited English proficiency were found to be significant. Gender and race impacted the achievement of the second core performance indicator positively where limited English proficiency had a negative impact.

Table 6 presents the covariance parameters for computing the intraclass correlation coefficient.
### Table 6

*Estimates of Covariance Parameters*\(^a\) for Credential, Certificate, or Degree Completion

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Repeated Measures</td>
<td></td>
</tr>
<tr>
<td>AR1 diagonal</td>
<td>1.058238</td>
</tr>
<tr>
<td>AR1 rho</td>
<td>-.673282</td>
</tr>
<tr>
<td>Intercept + Abbreviation</td>
<td></td>
</tr>
<tr>
<td>AR1 diagonal</td>
<td>1.345919</td>
</tr>
<tr>
<td>AR1 rho</td>
<td>.251279</td>
</tr>
</tbody>
</table>

*Note.* Repeated Measures = cohort years of the study; Abbreviation = abbreviation for each of the Ohio community colleges in the study; total = Credential, Certificate, or Degree completion.

\(^a\)Dependent Variable: Total.

This chart indicates that 56% of the variance in credential, certification, or degree completion can be attributed to the community colleges (1.345919/(1.345919+1.058238).

An analysis of \(R^2\) was completed. Table 7 has the Model Summary.
Table 7

*Model Summary for Credential, Certification, or Degree Completion*

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R²</th>
<th>Std. Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.995&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.989</td>
<td>.989</td>
<td>.86640</td>
</tr>
</tbody>
</table>

<sup>a</sup>Predictors: (Constant), Predicted Values

$R^2$ measures how well the dependent variables (the core performance indicator) could be predicted with only knowledge of the independent variables (student demographics) from this model (Allison, 1999). The high value of $R^2$ accounts for almost 99% of the variation in credential, certification, or degree completion. Next was the linear mixed model analysis of the third independent variable, which is the core performance indicator for students who remained enrolled in the original postsecondary institution or transferred to another institution (Ohio Board of Regents, n.d.).
Table 8

Estimates of Fixed Effects for Student Retention or Transfer

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Estimate</th>
<th>Std. Error</th>
<th>Df</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>.333357</td>
<td>1.293629</td>
<td>54.349</td>
<td>.258</td>
<td>.798</td>
</tr>
<tr>
<td>F</td>
<td>-.043573</td>
<td>.057062</td>
<td>48.014</td>
<td>-.764</td>
<td>.449</td>
</tr>
<tr>
<td>W</td>
<td>.750973</td>
<td>.046458</td>
<td>37.032</td>
<td>16.165</td>
<td>.000</td>
</tr>
<tr>
<td>ADA</td>
<td>-.010227</td>
<td>.006025</td>
<td>55.701</td>
<td>-1.697</td>
<td>.095</td>
</tr>
<tr>
<td>ED</td>
<td>.203191</td>
<td>.054229</td>
<td>47.492</td>
<td>3.747</td>
<td>.000</td>
</tr>
<tr>
<td>SP</td>
<td>.031069</td>
<td>.034902</td>
<td>48.364</td>
<td>.890</td>
<td>.378</td>
</tr>
<tr>
<td>DH</td>
<td>.015337</td>
<td>.006362</td>
<td>54.114</td>
<td>2.411</td>
<td>.019</td>
</tr>
<tr>
<td>LEP</td>
<td>-2.385277E-5</td>
<td>.002457</td>
<td>44.503</td>
<td>-.010</td>
<td>.992</td>
</tr>
<tr>
<td>NONE</td>
<td>.044546</td>
<td>.009858</td>
<td>43.594</td>
<td>4.519</td>
<td>.000</td>
</tr>
</tbody>
</table>

Note. F = female; W = white, ADA = individuals with disabilities as defined by the Americans with Disabilities Act; ED = individuals defined by Perkins IV as economically disadvantaged; SP = single parents; DH = individuals defined by Perkins IV as displaced homemaker; LEP = individuals defined by Perkins IV with limited English proficiency; and NONE = individuals pursing fields of study in non-traditional training and employment as defined by Perkins IV.

Table 8 highlighted the estimates of fixed effects for student retention or transfer. Race, economically disadvantaged, displaced homemakers, and nontraditional enrollees were found to be significant. All four factors had positive effects for the achievement on the attainment of retention of students or transfer of students.

Table 9 presents the covariance parameters for computing the intraclass correlation coefficient.
Table 9

*Estimates of Covariance Parameters*\(^a\) for Student Retention or Transfer

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Repeated Measures</td>
<td></td>
</tr>
<tr>
<td>AR1 diagonal</td>
<td>.112484</td>
</tr>
<tr>
<td>AR1 rho</td>
<td>-.110345</td>
</tr>
<tr>
<td>Intercept + Abbreviation</td>
<td></td>
</tr>
<tr>
<td>AR1 diagonal</td>
<td>.110432</td>
</tr>
<tr>
<td>AR1 rho</td>
<td>.178727</td>
</tr>
</tbody>
</table>

Note. Repeated Measures = cohort years of the study; Abbreviation = abbreviation for each of the Ohio community colleges in the study; total = Student Retention or Transfer.

\(^a\)Dependent Variable: Total.

This chart indicates that almost half (49.5\%) of the variance in student retention or transfer can be attributed to the community colleges (.110432/(.110432+.112484)).

An analysis of \(R^2\) was completed. Table 10 contains the Model Summary.
Table 10

*Model Summary for Student Retention or Transfer*

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R²</th>
<th>Std. Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.998(^a)</td>
<td>.995</td>
<td>.995</td>
<td>.28368</td>
</tr>
</tbody>
</table>

\(^a\)Predictors: (Constant), Predicted Values

For the core performance indicator, student retention or transfer, the $R^2$ indicates that this set of independent variables (student demographics) accounts for a little over 99% of the students who stay at the community college or transfer (Allison, 1999).

The next three tables disclose the results for the core performance indicator, student placement. This indicator reports students placed in employment, military service, or apprenticeship programs upon leaving postsecondary education (Ohio Board of Regents, n.d.).
Table 11

Estimates of Fixed Effects for Student Placement

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Estimate</th>
<th>Std. Error</th>
<th>Df</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>-5.230495</td>
<td>1.539403</td>
<td>22.046</td>
<td>-3.398</td>
<td>.003</td>
</tr>
<tr>
<td>F</td>
<td>.010479</td>
<td>.073121</td>
<td>27.407</td>
<td>.143</td>
<td>.887</td>
</tr>
<tr>
<td>W</td>
<td>.722594</td>
<td>.067981</td>
<td>37.950</td>
<td>10.629</td>
<td>.000</td>
</tr>
<tr>
<td>ADA</td>
<td>.009552</td>
<td>.006892</td>
<td>29.795</td>
<td>1.386</td>
<td>.176</td>
</tr>
<tr>
<td>ED</td>
<td>.260700</td>
<td>.082746</td>
<td>24.779</td>
<td>3.151</td>
<td>.004</td>
</tr>
<tr>
<td>SP</td>
<td>.020957</td>
<td>.042897</td>
<td>24.162</td>
<td>.489</td>
<td>.630</td>
</tr>
<tr>
<td>DH</td>
<td>-.006237</td>
<td>.007368</td>
<td>24.727</td>
<td>-.847</td>
<td>.405</td>
</tr>
<tr>
<td>LEP</td>
<td>-.000594</td>
<td>.006476</td>
<td>16.687</td>
<td>-.092</td>
<td>.928</td>
</tr>
<tr>
<td>NONE</td>
<td>.044226</td>
<td>.021806</td>
<td>36.047</td>
<td>2.028</td>
<td>.050</td>
</tr>
</tbody>
</table>

Note. F = female; W = white, ADA = individuals with disabilities as defined by the Americans with Disabilities Act; ED = individuals defined by Perkins IV as economically disadvantaged; SP = single parents; DH = individuals defined by Perkins IV as displaced homemaker; LEP = individuals defined by Perkins IV with limited English proficiency; and NONE = individuals pursuing fields of study in non-traditional training and employment as defined by Perkins IV.

Table 11 contains the estimates of fixed effects for student placement. Race, and economically disadvantaged were found to be significant, both with positive impacts on the attainment of student placement.

Table 12 shows the covariance parameters for computing the intraclass correlation coefficient.
Table 12

Estimates of Covariance Parameters for Student Placement

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Repeated Measures</td>
<td></td>
</tr>
<tr>
<td>AR1 diagonal</td>
<td>.781077</td>
</tr>
<tr>
<td>AR1 rho</td>
<td>-.734661</td>
</tr>
<tr>
<td>Intercept + Abbreviation</td>
<td></td>
</tr>
<tr>
<td>AR1 diagonal</td>
<td>.419015</td>
</tr>
<tr>
<td>AR1 rho</td>
<td>.551218</td>
</tr>
</tbody>
</table>

Note. Repeated Measures = cohort years of the study; Abbreviation = abbreviation for each of the Ohio community colleges in the study; total = Student Placement.

*Dependent Variable: Total.

This chart indicates that almost 35% of the variance in student placement can be attributed to the community colleges (.419015/(.419015+.781077)).

An analysis of $R^2$ was completed. Table 13 contains the Model Summary.
Table 13

Model Summary for the Student Placement

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R²</th>
<th>Std. Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.997a</td>
<td>.995</td>
<td>.994</td>
<td>.74565</td>
</tr>
</tbody>
</table>

*R²* calculations account for the improvement in the ability to predict data compared to the ability to predict without the relationship between the dependent variables, core performance indicators, and independent variables, student demographics (Heiman, 1998). The high value of *R²* explains over 99% of the variation in student placement.

The next tables cover the dependent variable, nontraditional participation (5P1). This indicator reports students from underrepresented gender groups participating in school programs leading to employment in nontraditional fields (Ohio Board of Regents, n.d.).
Table 14

Estimates of Fixed Effects for Nontraditional Participation

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Estimate</th>
<th>Std. Error</th>
<th>Df</th>
<th>T</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>-2.472066</td>
<td>2.147821</td>
<td>12.548</td>
<td>-1.151</td>
<td>.271</td>
</tr>
<tr>
<td>F</td>
<td>-.222337</td>
<td>.076977</td>
<td>27.870</td>
<td>-2.888</td>
<td>.007</td>
</tr>
<tr>
<td>W</td>
<td>.717020</td>
<td>.134697</td>
<td>21.588</td>
<td>5.323</td>
<td>.000</td>
</tr>
<tr>
<td>ADA</td>
<td>-.043237</td>
<td>.038053</td>
<td>23.152</td>
<td>-1.136</td>
<td>.267</td>
</tr>
<tr>
<td>ED</td>
<td>.317979</td>
<td>.247319</td>
<td>27.793</td>
<td>1.286</td>
<td>.209</td>
</tr>
<tr>
<td>SP</td>
<td>.308142</td>
<td>.150564</td>
<td>25.481</td>
<td>2.047</td>
<td>.051</td>
</tr>
<tr>
<td>DH</td>
<td>.008781</td>
<td>.045791</td>
<td>24.114</td>
<td>.192</td>
<td>.850</td>
</tr>
<tr>
<td>LEP</td>
<td>.014777</td>
<td>.014119</td>
<td>25.923</td>
<td>1.047</td>
<td>.305</td>
</tr>
</tbody>
</table>

*Note.* F = female; W = white, ADA = individuals with disabilities as defined by the Americans with Disabilities Act; ED = individuals defined by Perkins IV as economically disadvantaged; SP = single parents; DH = individuals defined by Perkins IV as displaced homemaker; LEP = individuals defined by Perkins IV with limited English proficiency; and NONE = individuals pursuing fields of study in non-traditional training and employment as defined by Perkins IV.

The first of the two regarding nontraditional core performance indicators concentrates on student participation in a career considered nontraditional as shown in Table 14. Gender and race were found to be significant. Gender impacted the achievement of nontraditional participation negatively where race had a positive effect.

Table 15 shows the covariance parameters for computing the intraclass correlation coefficient.
Table 15

Estimates of Covariance Parameters\(^a\) for Nontraditional Participation

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Repeated Measures</td>
<td>AR1 diagonal</td>
</tr>
<tr>
<td></td>
<td>AR1 rho</td>
</tr>
<tr>
<td>Intercept + Abbreviation</td>
<td>AR1 diagonal</td>
</tr>
<tr>
<td></td>
<td>AR1 rho</td>
</tr>
</tbody>
</table>

Note. Repeated Measures = cohort years of the study; Abbreviation = abbreviation for each of the Ohio community colleges in the study; total = Nontraditional Participation.

\(^a\)Dependent Variable: Total.

This chart indicates that 55% of the variance for nontraditional participation can be attributed to the community colleges (.959584/(.959584+.771531)).

An analysis of \(R^2\) was completed. Table 16 contains the Model Summary.
Table 16

*Model Summary for Nontraditional Participation*

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R²</th>
<th>Std. Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.991&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.983</td>
<td>.982</td>
<td>.57111</td>
</tr>
</tbody>
</table>

<sup>a</sup>Predictors: (Constant), Predicted Values

$R^2$, which is also referred to as the proportion of variance accounted for, means that the proportion of total variance in the core performance indicator is accounted for by the relationship with the student demographics (Heiman, 1998). The high value of $R^2$ explains over 98% of the variation for nontraditional participation.

The last analysis focused on the completion by students in an area considered nontraditional based on the gender of most workers in the field versus the gender of the student. Table 17 presents the LMM analysis.
Table 17

Estimates of Fixed Effects for Nontraditional Completion

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Estimate</th>
<th>Std. Error</th>
<th>Df</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>.682009</td>
<td>.780303</td>
<td>11.407</td>
<td>.874</td>
<td>.400</td>
</tr>
<tr>
<td>F</td>
<td>.152745</td>
<td>.055482</td>
<td>28.605</td>
<td>2.753</td>
<td>.010</td>
</tr>
<tr>
<td>W</td>
<td>.762650</td>
<td>.070607</td>
<td>24.236</td>
<td>10.801</td>
<td>.000</td>
</tr>
<tr>
<td>ADA</td>
<td>.035164</td>
<td>.013684</td>
<td>32.121</td>
<td>2.570</td>
<td>.015</td>
</tr>
<tr>
<td>ED</td>
<td>.128970</td>
<td>.074439</td>
<td>18.635</td>
<td>1.733</td>
<td>.100</td>
</tr>
<tr>
<td>SP</td>
<td>.023735</td>
<td>.044582</td>
<td>35.236</td>
<td>.532</td>
<td>.598</td>
</tr>
<tr>
<td>DH</td>
<td>-.016557</td>
<td>.018473</td>
<td>35.643</td>
<td>-.896</td>
<td>.376</td>
</tr>
<tr>
<td>LEP</td>
<td>.025034</td>
<td>.011351</td>
<td>22.473</td>
<td>2.205</td>
<td>.038</td>
</tr>
</tbody>
</table>

Note. F = female; W= white, ADA = individuals with disabilities as defined by the Americans with Disabilities Act; ED = individuals defined by Perkins IV as economically disadvantaged; SP = single parents; DH = individuals defined by Perkins IV as displaced homemaker; LEP = individuals defined by Perkins IV with limited English proficiency; and NONE = individuals pursuing fields of study in non-traditional training and employment as defined by Perkins IV.

Tracking nontraditional completion in Table 17, the analysis found the ensuing results: gender, race, students with disabilities, and limited English proficiency were significant with positive impact on the achievement of nontraditional completion career studies.

Table 18 presents the covariance parameters for computing the intraclass correlation coefficient.
Table 18

*Estimates of Covariance Parameters*<sup>a</sup> for Nontraditional Completion

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Repeated Measures</td>
<td></td>
</tr>
<tr>
<td>AR1 diagonal</td>
<td>.575269</td>
</tr>
<tr>
<td>AR1 rho</td>
<td>-.381019</td>
</tr>
<tr>
<td>Intercept + Abbreviation</td>
<td></td>
</tr>
<tr>
<td>AR1 diagonal</td>
<td>.165223</td>
</tr>
<tr>
<td>AR1 rho</td>
<td>.019981</td>
</tr>
</tbody>
</table>

*Note.* Repeated Measures = cohort years of the study; Abbreviation = abbreviation for each of the Ohio community colleges in the study; total = Nontraditional Completion.

<sup>a</sup>Dependent Variable: Total.

This chart indicates that over 22% of the variance in nontraditional completion rate can be attributed to the community colleges following the formula of (.165222/(.165222/.575269)).

An analysis of $R^2$ was completed. Table 19 contains the Model Summary.
Table 19

*Model Summary for Nontraditional Completion*

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R²</th>
<th>Std. Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.990&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.979</td>
<td>.979</td>
<td>.065667</td>
</tr>
</tbody>
</table>

<sup>a</sup>Predictors: (Constant), Predicted Values

When there’s a higher proportion of a variance accounted for by a relationship, the more accurately difference could be predicted and the relationship is more useful (Heiman, 1998). The high value of $R^2$ explains over 97% of the variation in nontraditional completion rate.

**Summary of the Data**

In summary, gender (F) was significant for technical skill attainment, credential, certificate, or degree completion, nontraditional participation and nontraditional completion with a negative impact under NTP. Race (W) was significant under all core performance indicators with a positive impact under each performance indicator. Students with disabilities were found to be significant only under nontraditional completion with a positive impact. Students determined to be economically disadvantaged were significant under technical skill attainment, student retention and transfer, and student placement with positive impact. Students who are single parents were found significant only under technical skill attainment with negative impact. Students meeting the definition of displaced homemakers were significant only under student retention and placement with a positive impact. Students with limited English proficiency were found significant under credential, certificate, or degree completion with a negative impact and having significance under nontraditional completion with a positive impact. Students who pursue nontraditional career paths were significant under student retention and transfer with...
positive impact. The null hypothesis was rejected. The intraclass correlation ranged from 18 to 56%. The $R^2$ values ranged from 97 to 99%.

**Summary of Chapter Four**

In summary, for technical skill attainment (TSA), gender, race, economically disadvantaged, and single parents are significant which means the test is conclusive. The test for credential, certificate, or degree completion (CCD) is conclusive for gender, race, and limited English proficiency. For student retention or transfer (SRT), race, economically disadvantaged, displaced homemakers, and nontraditional career path students are significant and the test is conclusive. For student placement (SPL) race and economically disadvantaged are significant and therefore the test is conclusive. Under nontraditional participation (NTP), gender and race are significant and the test has been found to be conclusive. Finally, under nontraditional completion (NTC) conclusive test results were found for gender, race, students with disabilities, and students with limited English proficiency. The intraclass correlation ranged from 18 to 56%. The $R^2$ values ranged from 97 to 99%. Chapter Five discusses these results.
CHAPTER FIVE:
CONCLUSIONS AND RECOMMENDATIONS

Community colleges, with their open door policies, accept students with varied demographics and backgrounds. The purpose of this study was to explore the relationships between student and institutional demographics to the achievement of the core performance indicators by Ohio community colleges. In Chapter Four, the analysis of the Linear Mixed Model (LMM) found significant results. The importance of those results, highlighting demographic effects and core performance indicators, and recommendations are discussed in this chapter.

This study focused on institutional achievement, rather than student achievement as found prevalent in available studies. All Ohio community colleges are required under the Perkins laws, most currently, Perkins IV, to meet requirements to provide accountability to all stakeholders. This study sought and found relationships between demographic data collected by the overseeing body, the Ohio Board of Regents, and the accomplishment of the six core performance indicators chosen by the Ohio Board of Regents under the guidance of Perkins IV. The research answered the research question:

Are there any significant relationships between the student subgroup demographics and the core performance indicator scores? The researcher proposed the hypotheses with confidence of 95 percent.

Null Hypothesis – there is no significant relationship in the mean of the overall performance indicators for the community colleges.

As the findings were conclusive in Chapter Four, the Null Hypothesis was rejected and the conclusions are presented below.
Demographic Effects

As stated by Deil-Amen (2005), diverse backgrounds are more prevalent at community and other two-year colleges than four-year colleges due primarily to the open door policies for student enrollment. The adult learner can be affected by the lack of time due to work and family obligations in addition to the cost of postsecondary education (Kazis, United States, Jobs for the Future, Inc. Eduventures, & FutureWorks, 2007). This section discusses each of the demographic factors found significant in the Linear Mixed Model (LMM). One of the original purposes of the Perkins Act is to provide quality technical postsecondary education. The Act strives to adapt the technical postsecondary education system, reaching students who fall within or close to the poverty level. The Perkins Act, which has initiated and maintained the core performance indicator system, provides institutional funding rather than funding at the student level. The Perkins Act does provide requirements and funding at the secondary level as well (NASDCTEc representatives, personal communication).

As presented in Chapter Two, there is much literature concerning the effects of student demographics on student achievement, but little on the effects of demographics on core performance indicators for the institution. It is important that the results demonstrated in Chapter Four show that race (W) was significant for each of the core performance indicators with positive impact. One example of the many studies about race is Clery’s (2011) study, which found that race and gender affected the transfer of students to four-year colleges (white or Asian/Pacific Islander, non-Hispanic, and women are more likely).

In the findings of Chapter Four, gender (F) was found significant for four of the six core performance indicators. The negative impact was under the nontraditional career path, which
could explain why one gender might have a more difficult time pursuing nontraditional jobs normally held by the other gender.

The results from Chapter Four found that students who met the definition as students with disabilities had significance, with positive impact under the core performance indicator, credential, certificate, or degree completion. A California report found positive results when specific programs were designed for the needs of students with disabilities (Scott-Skillman & California Community Colleges & Board of Governors, 1992). There are other studies concerning accommodations for students with disabilities, but these address student success rather than core performance indicators and achievement for the institution (Graham-Smith & Lafayette, 2004).

Community colleges with a higher percentage of students who met the definition as economically disadvantaged were found significant under three of the core performance indicators, all with positive impact with the institution in achieving performance and accountability. These core performance indicators were: technical skill attainment, student retention and transfer, and student placement. A California study found that Pell Grant and Cal Grant (California loan program) were found to be more likely to be transfer ready (Woo & MPR Associates, 2009). These would be students considered economically disadvantaged. While these positive results appear to negate previous results and assumptions, the Richburg-Hayes, et al. (2009) findings stressed that programs designed to help low income and students who are parents have good outcomes. The researcher would speculate that institutions with high numbers of low socioeconomic status students would be more likely to provide multiple support programs for this population, therefore having a positive impact on the achievement of core performance indicators.
Students who are single parents were found to be significant under technical skill attainment, with a negative impact. Assumptions could be made that single parents are balancing many roles and school completion could come last. A study conducted by Goldrick-Rab and Sorensen (2010) followed unmarried parents, who were often low income as well. Several interventions including contextualized learning programs, special counseling services, stipends for using services, and support for academic and social needs helped this group complete degree or certification programs. Arriving at the community college campus with often incomplete academic preparation and few financial resources, this group needed the access to additional resources in order to continue in postsecondary education, thus benefitting themselves as single parents and their children.

The category, students meeting the definition of displaced homemakers, was found significant under student retention or transfer and with a positive effect for the community college to score high on this core performance indicator. For displaced homemakers to succeed, links need to be made with other social agencies to provide for the needs of these students. When programs in place are used, this group of students can be successful (Alfred, 2010).

In Chapter Four, students with limited English proficiency were found significant under the credential, certificate, or degree completion with a negative impact. Speculation would lead to the difficulty in completing a desired program especially with a language barrier. However, students with limited English proficiency had positive impact for achieving nontraditional career paths. For students with limited English proficiency, a few studies grouped this population under immigrant status. These studies found that the immigrant and also limited English proficiency needed additional resources in order to complete postsecondary studies (Kim & Diaz, 2013).
Students following nontraditional career paths (for example females training for jobs normally held by males) were significant under the student retention or transfer core performance indicator with positive achievement for the community colleges. The Silverman study (1999) found high school level programs including career fairs, community college and employer visits, and workshops provided the necessary background for students making career decisions, especially when considering the nontraditional career path.

There are very few studies that approach the concept of achieving core performance indicators. Goldrick-Rab and Columbia University (2007) followed the effects of demographics on community college enrollment, completion, and transfer. Gender, race, and economic status had effects on all levels from prospective student to student graduation.

**Relationship to Parsons’ Social Action Theory**

This research has followed Parsons’ social action theory framework. One of Parsons’ major interests was understanding institutional change (Fox, 1997).

Parsons broke human action to its base level as an actor in a situation. The actor performed the act or action based on the values of the actor (Munch, 1982). In this study, the actors are the various stakeholders, whether internal or external to the Ohio community colleges. Chapter Two listed many stakeholders or actors (Alfred et al., 2007; Burke & Modarresi, 1999; Hom, 2011; Morimer & American Association for Higher Education, 1972; Ruppert & State Higher Education Executive Officers, 1998). Each of the stakeholders (actors) interacts and assists to meet mutual and respective needs (Munch, 1982). Many actors have taken many actions, but one of the common values is the value of education (Astin, 1985; Ruppert, 1995; Vught, 1995). Each one of these actors or stakeholders has performed various actions: students and taxpayers have demanded accountability from postsecondary institutions of education,
policy makers on the state and federal level have implemented many laws for many reasons, including the various Perkins Acts for accountability, and the educational institutions have acted in response to the needs and values of the stakeholders. The Ohio community colleges strive to meet the targeted levels of the six core performance indicators as required by the federal and state laws.

Parsons’ three-part system of social action theory included the personality, cultural, and social concepts (Parsons, 1951). The actor performs actions to fulfil needs under the personality system. Using the community college as the actor, the community college has acted to fulfill the needs of the conditions of the Perkins Act and would therefore receive performance funding.

As the social action continues, symbols develop meaning (Munch, 1982). The history of postsecondary education in Chapter Two related that the citizens of the United States valued education, including postsecondary education (Astin, 1985; Hout, 2012; Ruppert, 1995; Vught, 1995). Postsecondary education provides many benefits to businesses, students, and other stakeholders (Kirsch et al., 2007; Phillippe et al., 2005; Ruppert, 1995; Smith-Mello, 1996; Spellings et al., 2006). The core performance indicators reinforce the meaning of several symbols. The technical skill attainment (1P1) is a symbol of attainment for the students, businesses, and the community college. A diploma is an example of a symbol in the cultural system that has meaning to the student, businesses, and the community college under the core performance of credentials, certificates, or degrees (2P1). Student retention or transfer, core performance indicator 3P1, is a symbol with primary significance to the student, the community college, and other postsecondary institutions. The core performance indicator 4P1, student placement in the work world, symbolizes meaning for the student, community college, businesses, and society. The last two core performance indicators, 5P1 and 5P2, provide
meaning for students, businesses, society, and the community college. Participation and completion of a nontraditional career path symbolizes changes in the workforce demographics.

The social system continues to adapt as the actors and the symbols interact, striving for continued achievement or gratification. Within the social system, Parsons (1977) specified obstacles. The social system of the community college is constantly confronted with Parsons’ four functional problems: pattern maintenance, integration, goal attainment, and adaptation (Parsons, 1977).

As the community college continues commitment to its open door policy for all students, Parsons’ pattern maintenance is experienced. Low tuition rates are a primary means to keep community college doors accessible to all student demographics.

Integration of the rights and expectations of all actors within community colleges is at play each and every day as students have grades, small tuition rates, and other expectations. The community college expects students and state agencies to provide financial support. The community college expects primary and secondary educational institutions to prepare the students adequately for postsecondary levels. The taxpayers and policy makers expect the community college to strive and meet core performance indicator targets for accountability.

The implementation of special programs for students with special needs characterizes the community college’s emphasis on goal attainment (Scherer & Anson, 2014). Goal attainment is displayed when the community college strives and meets the target levels for the core performance indicators. The core performance indicator achievement interacts with the accountability goals for other stakeholders including students, taxpayers, society, and policy makers.
Degree programs, online programs, and other shifts indicate the community college’s adaptation to the changing social and cultural systems (Alfred, 2010; Kazis, et al., 2007; Scherer & Anson, 2014). Adapting community college programs to meet the needs of stakeholders interacts with the need of the community college to attain required core performance indicator levels.

Parsons stressed that all actors interact with interpenetration within these three systems; the actors interchange parts, maintaining independence, and continue new acts (Munch, 1982).

The community college history from Chapter Two followed the conception of the community college from the needs of society and educational institutions (Cohen & Brawer, 1987; Ratcliff, 1994). The stakeholders (actors) continue to act and interact within the social system evolving into the current core performance indicator system which has value and symbolized meaning for the Ohio community colleges. In the current social system, the Ohio community colleges must continue actions to achieve the core performance indicators under Perkins IV.

**Programs for These Demographic Populations**

While all community college stakeholders appear to be aware of the challenges affecting students and institutions, no easy solution has been found (Goldrick-Rab & Columbia University, 2007). Currently four community colleges (including one in Ohio) have tried different strategies designed to help low income students achieve success. Requirements of attempted programs vary, but primarily students have a specified advisor with required meetings and an incentive scholarship.

The supportive educational programs had impact on academic success, but the successful impact did not last beyond the program trial period. While the programs were designed to
increase wages, the Louisiana program found success primarily for females and single parents (Richburg-Hayes & Manpower Demonstration Research Corp., 2008).

Bourdon, Carducci, and California University (2002) reported on various community college programs including early alert systems, peer mentoring, intervention programs, student success courses, English as a Second Language (ESL) courses within ESL students, academic and cultural courses for Limited English Proficient students, and academic advising especially for economically disadvantaged students and students with disabilities with benefits to the college and students.

In summary, most studies found combined demographic effects influencing students from the application process to the completion of certificate or degree and transferring to a four-year program. Most studies agreed with Goldrick-Rab and Sorensen (2010) that additional resources enabled these students to succeed which helped the institution achieve the desired success rate for the core performance indicators.

Core Performance Indicators and Accountability

There are many suggestions for improving the core performance indicator system. While accountability continues to evolve in the core performance indicator system, Hull (2005) reminds stakeholders that data collection and documentation require time and money. Richardson (1994) voiced that data now measured, takes on a new light to stakeholders. Another caution comes from the failure to improve instead of merely proving accountability and quality (Stufflebeam & Phi Delta Kappa, 1971). Performance indicators can be useful tools that track objectives adding value, especially when linked to strategic plans, but can also be diluted to an unimportant point (Wagner et al., 2003). The system must be continually reviewed and revised, since numbers
alone are not full documentation (Darling-Hammond, 1992). Core systems must be based on improvement rather than punishment (Lingenfelter, 2003).

It is unlikely that the core performance indicators will disappear in the next iteration of the federal legislators. According to the National Association of State Directors of Career Technical Education Consortium (NASDCTEc) representatives, Perkins V is hoped to pass in the next few years. The NASDCTEc association represents state leaders who have responsibilities for secondary, postsecondary and adult CTE (career technical education) programs in all 50 states and territories (NASDCTEc representatives, personal communication).

NASDCTEc representatives see the core performance indicators on a national and historical level and provided additional information.

1P1, technical skill attainment, identifies, by state, a minimum threshold for technical skill attainment following completion of the program. There is variability across and between industries and career clusters. The student’s technical proficiency is then measured in any given field via state-identified assessment. Given the variability, it is acknowledged that programs and clear skills can be difficult to measure.

2P1, student attainment, measures an industry-recognized credential, certificate or a degree. The intent is to capture student attainment of credentials, which have labor market value.

3P1, retention and transfer, looks at retention and/or transfer rates of participating postsecondary students. This indicator is also captured at other levels, such as the CTE (career technical education) centers.

4P1, student placement, is an employment metric, measuring where the student landed in the labor market following program completion. While successfully tracked in many states, difficulties happen when states do not have the ability to match individual student records with
workforce data systems such as Social Security. This indicator is more relevant at the secondary level.

5P1 and 5P2, nontraditional participation and completion, provide a focus for employing one gender in jobs traditionally held by the other gender. This program does not exist in all schools as some programs in Ohio (and other states as well) do not have the necessary student population to achieve these indicators in a meaningful way (NASDCTEc representatives, personal communication).

NASDCTEc stressed the need for a complete data system aiding collaboration at the secondary and postsecondary levels including employers as well. The accountability system would first be structured around the state goals of the program. For example, if the goal is to get students into the workforce, metrics need to be designed to gauge the program’s effectiveness of that goal. The key is a state data system with the capacity to do so. This streamlining and new measurement system would also assist when new performance indicators emerge (NASDCTEc representatives, personal communication).

**Recommendations for Future Research**

As demonstrated in the literature in Chapter Two, postsecondary education is beneficial and accountability is in place to provide access to all parties as to the quality of each postsecondary program and adding comparability to other institutions (Kirsch et al., 2007; Phillippe et al., 2005; Ruppert, 1995; Smith-Mello, 1996; Spellings et al., 2006). Currently no easy fix has been demonstrated for community colleges to achieve required levels of core performance indicators as mandated on the state and federal levels.

Success at the community college cannot be easy; research has indicated students arrive with at least one disadvantage and often multiple disadvantages (Goldrick-Rab & Sorensen,
A recommendation for future studies would be, with enough observations, to run interaction models between the demographics.

The Strauss and Volkwein (2002) study focused on campus size as one of many factors in student achievement, with significance for community colleges over four-year postsecondary institutions. Future studies could address whether the campus population/size of the institution affects the achievement of the core performance indicators.

Future studies could better address the achievement by the institution as well as the achievement for students. This study demonstrated that recorded demographic data has significant impact on the achievement of the core performance indicators for Ohio community colleges. This is significant for each community college and all stakeholders. More research may further define or disclose other factors that contribute to the achievement of the core performance indicators by community colleges. With additional information, the limited budget of the community college can be better used to meet the needs of the stakeholders.

**Recommendations for Practice**

With the open door policy, students of all backgrounds will continue to try postsecondary education, but without changes in policies and programs, will there be increases in achievement for minority, single parents, economically disadvantaged, and disabled students with limited English proficiency? The performance funding provided by the Perkins Act and other resources could be wisely used by community colleges in services for these students (Strauss & Volkwein, 2002). Using the results of this study on an individual community college basis, each institution could determine which programs would service the demographics at that particular community college. Research has shown that students benefit from targeted programs (Alfred, 2010). If
students achieve, then it is more likely that the institution will succeed (Alfred, 2010: Scherer & Anson, 2014).

From a personal standpoint, this researcher has been an adjunct at an Ohio community college for over 15 years. Recently, much more emphasis has been placed on teachers to steer students toward programs designed for academic assistance as needed. The early alert system has been phased in from recommended to required, and the number of reports submitted each semester has been increased. A designated advisor receives copies of the alert system, meets with the students, and responds back to the teaching staff (Kazis et al., 2007). The researcher’s institution has implemented this and other programs and will be able to determine if this benefits the students and the institution.

Community colleges deserve positive outcomes, without punishment, for the open door policy, which includes disadvantaged students (Ruppert, 1995). This also helps the community college achieve the state and federal required rates for continued monies. Community colleges provide a trained workforce, the original goal of postsecondary education (Bourdon, Carducci & California University, 2002; Hull, 2005).

**Recommendations for Policymakers**

The study by Gallet (2007) and the Ohio Board of Regents representatives (personal communication) recommended tailoring definitions so that results could be compared across state lines. Currently, each state can set definitions to better suit its own population, but findings and results are kept to minimal effectiveness outside the state (OBR, personal communication).

On a federal level, state longitudinal data systems (SLDS) are key. Although a federal system might be ideal, it is improbable and likely, impossible. Even in a state data system, the state and federal restrictions on collection of data of students in the Kindergarten through grade
system, into the postsecondary, and later the workforce are a monumental challenge. While the state data system could adapt to the challenge, there remain many impediments to the system’s creation and adaptation throughout the country. Even from the federal viewpoint, the data system should be created on the state level. Federal legislation should then permit rather than inhibit the sharing of data across and among the states (NASDCTEc representatives, personal communication).

NASDCTEc has several recommendations for Perkins V to promote global competitiveness, partnerships, preparation for education and careers, programs of study, research and accountability, and state leadership and governance (NASDCTEc representatives, personal communication).

Summary of Chapter Five

This chapter has described and interpreted the findings from the Chapter Four linear mixed model. The findings were further discussed in Chapter Five that were found to be significant and whether that impact was positive or negative or the community college achieving their goal: state targeted scores on the required core performance indicators that produce accountability to all stakeholders. As Parsons (1977) stressed in the social action theory, the actors (stakeholders) on the inside and the outside continue to affect the community college at all levels. The personality, cultural, and social systems of the community college and its stakeholders continue to solve the problems of pattern maintenance, integration, goal attainment, and adaptation to meet the needs and sustain the value of education. Current research continues to focus on the performance of the student. While the student is a very important stakeholder, more research could focus on the performance of the community college and other institutions. With the information from future research, community colleges with their limited resources will
better determine what programs could best be implemented to serve the students arriving through the open doors as well as all other stakeholders...
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U. S. Department of Education (DOE), Institute of Education Sciences (IES), National Center for Education Statistics (NCES), Integrated Postsecondary Education Data System (IPEDS).


Dear Ohio Board of Regents:

I was referred to you. I am looking for the 2007-2011 annual postsecondary institution (campus) Perkins performance reports by community college. I can only find 2011-2012 on the website by institution. The statewide is on the website, but I also need to see the performance indicators by community college.

I have been an adjunct at Cincinnati State for almost 20 years and am ABD at Ball State University in my doctoral program. My dissertation will focus on a regression analysis of the student groups in relationship to the performance indicators.

I have read another Ohio dissertation where the doctoral candidate put into writing that the information was for statistical purposes for the dissertation only.

I would be more than willing to come to the Ohio Board of Regents.

Thank you,
Sara Shierling,

Doctoral candidate
**APPENDIX B:**

Table B1

*Performance Indicator Technical Skill Attainment (IP1) by Ohio Community College for 2012 to 2013 by Percentage*

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<th>College</th>
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*Note.* College = first name of Ohio community college; TOTAL = total percentage of students completing Technical Skill Attainment; M = male; F = female, W = white; AI = American Indian or Alaskan Native; BL = black or African American; AS = Asian or Pacific Islander, HP = Hispanic/Latino; NH = Native Hawaii or Other Pacific Islander; TWO = two or more races; UN = unknown; ADA = disabled under the definition of the Americans with Disabilities Act; ED = economically disadvantaged; SP = single parent; DH = displaced homemaker; LEP = limited English proficiency; None = students following non-traditional career.
Table B2

Performance Indicator Credential, Certificate, or Degree (2P1) by Ohio Community College for 2012 to 2013 by Percentage

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*Note.* College = first name of Ohio community college; TOTAL = total percentage of students completing Credential, Certificate, or Degree; M = male; F = female, W = white; AI = American Indian or Alaskan Native; BL = black or African American; AS = Asian or Pacific Islander, HP = Hispanic/Latino; NH = Native Hawaiian or Other Pacific Islander; TWO = two or more races; UN = unknown; ADA = disabled under the definition of the Americans with Disabilities Act; ED = economically disadvantaged; SP = single parent; DH = displaced homemaker; LEP = limited English proficiency; None = students following non-traditional career.
Table B3

Performance Indicator Student Retention or Transfer (3P1) by Ohio Community College for 2012 to 2013 by Percentage

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**Note.** College = first name of Ohio community college; TOTAL = total percentage of students completing Student Retention or Transfer; M = male; F = female, W = white; AI = American Indian or Alaskan Native; BL = black or African American; AS = Asian or Pacific Islander, HP = Hispanic/Latino; NH = Native Hawaiian or Other Pacific Islander; TWO = two or more races; UN = unknown; ADA = disabled under the definition of the Americans with Disabilities Act; ED = economically disadvantaged; SP = single parent; DH = displaced homemaker; LEP = limited English proficiency; None = students following non-traditional career.
Table B4

*Performance Indicator Student Placement (4P1) by Ohio Community College for 2012 to 2013 by Percentage*

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*Note.* College = first name of Ohio community college; TOTAL = total percentage of students completing Student Placement; M = male; F = female, W = white; AI = American Indian or Alaskan Native; BL = black or African American; AS = Asian or Pacific Islander, HP = Hispanic/Latino; NH = Native Hawaii or Other Pacific Islander; TWO = two or more races; UN = unknown; ADA = disabled under the definition of the Americans with Disabilities Act; ED = economically disadvantaged; SP = single parent; DH = displaced homemaker; LEP = limited English proficiency; None = students following non-traditional career.
Table B5

*Performance Indicator: Nontraditional Participation (5P1) by Ohio Community College for 2012 to 2013 by Percentage*

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Note. College = first name of Ohio community college; TOTAL = total percentage of students in Nontraditional Participation; M = male; F = female, W = white; AI = American Indian or Alaskan Native; BL = black or African American; AS = Asian or Pacific Islander, HP = Hispanic/Latino; NH = Native Hawaii or Other Pacific Islander; TWO = two or more races; UN = unknown; ADA = disabled under the definition of the Americans with Disabilities Act; ED = economically disadvantaged; SP = single parent; DH = displaced homemaker; LEP = limited English proficiency.
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*Note.* College = first name of Ohio community college; TOTAL = total percentage of students in Nontraditional Completion; M = male; F = female, W = white; AI = American Indian or Alaskan Native; BL = black or African American; AS = Asian or Pacific Islander, HP = Hispanic/Latino; NH = Native Hawaiian or Other Pacific Islander; TWO = two or more races; UN = unknown; ADA = disabled under the definition of the Americans with Disabilities Act; ED = economically disadvantaged; SP = single parent; DH = displaced homemaker; LEP = limited English proficiency