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Examining the effect of program design on career and technical program completion, technical skill attainment and job placement

Jennifer Candace Weaver

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Examining the effect of program design on career and technical program completion, technical
skill attainment and job placement

By

Jennifer Candace Weaver

A Dissertation
Submitted to the Faculty of
Mississippi State University
in Partial Fulfillment of the Requirements
for the Degree of Doctor of Philosophy
in Community College Leadership
in the Department of Educational Leadership

Mississippi State, Mississippi

December 2019

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2019

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Community college career and technical education programs struggle with meeting federally-funded Perkins performance measures. To address this need the 30-45-60 program design was developed. The study purpose was to determine if the 30-45-60 program design influenced career certificate, technical certificate or Associate of Applied Science degree completion rates, technical skill attainment, and job placement rates for students enrolled in the welding, precision machining and manufacturing and electrical technology programs.

A Chi-square test of independence indicated no significantly significant relationship between the 30-45-60 program design and completion of a certificate or degree ($p = .222$). A closer look revealed no significantly significant relationship between the 30-45-60 program design and the career certificate ($p = .392$) or the Associate of Applied Science degree (.576) but was statistically significant for technical certificate ($p = .000$). A statistically significant relationship was found for technical skill attainment ($p = .038$) and job placement ($p = .000$).

DEDICATION

I would like to dedicate this dissertation to my parents. While my mother, Jennette, is no longer with us, she provided much love and support throughout my life and during the time of taking coursework. Her steadfast belief that I would complete the coursework and dissertation has kept me going, even while she is in heaven. She fostered a love of learning, people and education and for that I will always be grateful. I would also like to thank my dad for imparting his love and understanding of servitude to God and to others. You have been the best example of what a strong Christian should be and your love for God and others inspires me daily. You are a wonderful testament to God's love. I consider myself blessed for you to have been given to me as a father. Thank you for your continued guidance and prayers throughout this doctoral journey.

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I strive to make a difference. It is for you that we as educators try so hard to develop educational policies that benefit students in order to change their lives. May I always remember that you are the reason for what I am here to do on this earth.

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CHAPTER I

BACKGROUND OF THE STUDY

A study conducted by the think tank, Complete College America, claimed that of the 2011 cohort of certificate and two-year degree seeking students only 12% of students enrolled in a 1 – 2 year certificate program and 5% of students enrolled in a 2 year associate degree program can expect to complete their program of study (Complete College America, 2013b). Community colleges struggle with low completion rates of certificate and associate degree programs that are one or more years in length and how to address the issue of low completion rates in these programs. At the same time, policy makers both at the federal and state levels are asking more data-related questions than ever before. They ask questions in order to help develop policies that support effective strategies to address issues such as low completion rates. Even before the new surge of interest in completion rates, the federal government mandated that all career and technical programs must meet performance indicators as outlined in the Carl D. Perkins Act. In academic year 2017, these included 83% of students completing a certificate or degree, 75% of students obtaining technical skill attainment, and 84% of students obtaining a job. As the two issues of completion rates and high levels of federally-mandated performance measures culminates, strategies must be developed that can address both areas of need (Mississippi Community College Board, 2016).

During 2011, the Governor’s Association worked with Complete College America, in developing a report whereby strategies were developed for policy recommendations. The

Alliance of States was then created which linked Complete College America and the Governor's Association. The Alliance of States created a support network for state government. The report, *Time is the enemy* (Complete College America, 2011) put forth specific recommendations that states could enact for a multitude of issues. Specifically, completion rates were addressed with a recommendation to limit bachelor degree programs to 120 hours when possible, and associate degree programs to 60 hours. From this report, the state governor brought to the Community College Board the report findings. State community colleges immediately began an effort to move programs to no more than 60 semester credit hours. Also created was a stacked credential model for career and technical education programs which would be a new program design. Through the tireless efforts of state and local community college administrators and faculty, the new 30-45-60 program design was implemented that would support the Governor's Association report conducted by Complete College America. Early adoption of this program design was encouraged, and a formalized process was enacted whereby community colleges could apply to adopt the program design prior to state-sponsored program curriculum alignments (Mississippi Community College Board, 2014).

After completion of their report *Time is the enemy* (Complete College America, 2011). for the Governor's Association, Complete College America came out with the 2013 report, *The game changers: Are states implementing the best reforms to get more college graduates?* (Complete College America, 2013a) detailing their findings with regard to performance funding, corequisite education and recommendation of 15 hours as a requirement for full-time enrollment. A companion report, *How full-time are "full-time" students?* reported that students who were enrolled in less than 15 hours per semester were less likely to graduate on time. Additionally, the report revealed that students achieved a higher grade point average when enrolled in 15 hours

rather than the traditional 12. *The game changers: Are states implementing the best reforms to get more college graduates?* (Complete College America, 2013a) report, utilized this finding to recommend institutions implement 15 to Finish. This recommendation involved students taking 15 semester credit hours each semester they were enrolled in order to complete their certificate or degree on time (Complete College America, 2013a). A study by Attewell and Monnaghan (2016), *How many credits should an undergraduate take?* supports this recommendation. Their study reported that academic students taking 15 or more semester credit hours in their first semester had higher rates of completion than students taking fewer credit hours. However, this study included only academic students (Attewell & Monnaghan, 2016). More studies need to be conducted for career and technical education programs to determine if program designs that support multiple-entry, multiple-exit and on-time completion maintain or improve completion rates, technical skill attainment and job placement.

Career and technical education is one of the community college's biggest ties to its community. Through these ties, the community college has supported business and industry by training area citizens for jobs in their local area. In most community colleges, career and technical education is mission critical (Cohen, Brawer & Kisker, 2014). Community colleges need to position themselves to be the leaders in their areas with respect to developing educational opportunities for citizens. Throughout a community college regions partners can be brought together such as key workforce agencies, community organizations, and area employers to bridge the gap and create a career pathway that meets all stakeholder needs (Alssid et al., 2005).

In the latest Advance Career and Technical Education (CTE) brief, the amount of federal dollars allocated to career and technical education dropped dramatically reaching an all-time low in 2013. In 2018, a slight increase to \$1,192,590,000 dollars has finally been seen in federal

appropriations in Perkins Basic State grants. However, this is less than the \$1,545,400,000 allocated in 2004. Particularly in fiscal year 2011 federal Perkins appropriations were at \$1,123,659,000 while in fiscal year 2013, federal Perkins appropriations were at \$1,064,446,000. This was a dramatic drop of \$59,213,000. Since that time there has been an increase in federal Perkins appropriations where states have seen an increase in 2018 of more than \$128,152,000 from its lowest funding level in 2013 (Advance CTE, 2018a).

This is especially so in federal and often state legislation where performance measures have been developed in order to ascertain which career certificate, technical certificate and Associate of Applied Science degrees annually meet business and industry demands as well as garner federal, state and sometimes local funding. The need to meet performance measures coupled with the need to create a career and technical program design whereby students take at least 15 hours per semester and supports program completion is the impetus for the 30-45-60 program design. This design would create a 30-hour career certificate over two semesters, a 45-hour technical certificate over three semesters, and a 60 hour associates degree over four semesters. This would support the 15-semester credit hour enrollment as well as create multiple entry and exit points for a flexible design that would be attractive to students (Attewell & Monnaghan, 2016).

Statement of the Problem

With the onset of greater accountability through performance measures as it relates to funding, community college leaders are more concerned than ever that career and technical students are successfully completing courses for which they enroll and graduate on time as well as to obtain a job. This accountability has been spurred by federal and state policy makers to create performance measures whereby funding affects all educational entities. This type of

accountability is mandated for career and technical education through the federally legislated Carl D. Perkins Act of 2006. It is imperative that career and technical education students be successful in their chosen program of study in order to have the necessary skill sets to graduate and obtain employment. Strategies to improve Perkins indicators such as technical skill attainment, program completion and job placement are of utmost importance in order to meet federal and state funding mandates and keep programs operational. The rural southern community college in this study is a part of a community college system that has begun implementation of a program design for many career and technical education programs that consists of multiple-entry and exit points. This design is meant to provide students with the flexibility to enter and exit as needed and provide shorter time periods for obtaining certificates that can ultimately lead to an Associate of Applied Science degree. This new program design is referred to as the 30-45-60 program, which means that a specific certificate or degree is completed at each numerical value. Therefore, a student would obtain a 30-hour career certificate, at 45-hours a technical certificate and at 60 hours an Associate of Applied Science degree. This program design was implemented in 2014 but has not been researched to determine if programs offering curriculum through this design are sustaining or increasing performance on federal and state mandated performance measures in order to determine if the new program design is successful with respect to those performance measures. However, this program design, while instituted as a policy at the rural southern community college in this study, has not been assessed in order to determine if this program design is effective in meeting federal and state mandated Perkins performance outcomes of completion, technical skill attainment and job placement.

Purpose of the Study

The purpose of this quantitative study was to determine if a new program design influences career certificate, technical certificate and Associate of Applied Science degree completion, technical skill attainment, or job placement rates for career and technical education students at a rural southern community college during the academic years of 2014 and 2015. The study focused on two groups: (1) the 2012 and 2013 cohort of students enrolled in welding, precision machining and manufacturing and electronic technology programs, and (2) the 2014 and 2015 cohort of students enrolled in welding, precision machining and manufacturing and electronic technology programs.

Research Questions

In this quantitative study, three research questions were addressed.

1. Is there a statistically significant difference in the number of welding, precision machining and manufacturing and electrical technology students receiving career certificates, technical certificates and Associate of Applied Science degrees before and after the implementation of the 30-45-60 program design who were enrolled at a rural southern community college?
2. Is there a statistically significant difference in the number of welding, precision machining and manufacturing and electrical technology students' technical skill attainment before and after the implementation of the 30-45-60 program design who are enrolled at a rural southern community college?

3. Is there a statistically significant difference in the number of welding, precision machining and manufacturing and electrical technology students placed or retained in employment or military service before and after the implementation of the 30-45-60 program design who are enrolled at a rural southern community college?

Operational Definitions

1. *15 to finish*: the initiative whereby students are advised to take 15 semester credit hours every semester in order to graduate within two semesters for 30, three semesters for 45 hours and 4 semesters for 60 hours (Complete College America, 2013b)
2. *30-45-60 program design*: a career and technical education program that has three entry and exit points defined as either a 30-hour career certificate, a 45-hour technical certificate or a 60 hour Associate of Applied Science degree and is based on a student taking 15 semester credit hours to be full-time (Mississippi Community College Board, 2014).

3. *Career and technical education program of study*: a program of study that prepares students with the skills necessary to obtain employment upon successful completion and which includes the required courses for each option of the program, which may include the career certificate, technical certificate and Associate of Applied Science degree. Examples of a career and technical education program of study include welding, precision manufacturing and machining and electrical technology (Mississippi Community College Board, 2014)
4. *Completion rate*: the rate of students who begin community college and complete a credential, certificate or degree in the period of time the program of study is offered for completion (Complete College America, 2011).
5. *Credential*: the level of educational attainment a student obtains that is represented by career certificate, technical certificate or Associate of Applied Science degree (Mississippi Community College Board, 2016).
6. *Level 3*: A student completing or leaving a program of study and reported to the state in the academic year after completing or leaving (Mississippi Community College Board, 2016).

7. *Program Design I:* A career and technical education program design that has three entry and exit points defined as either a 30-hour career certificate, a 45-hours technical certificate or a 60 hours Associate of Applied Science degree and is based on a student taking 15 semester credit hours to be full-time that was offered during the academic years of 2011 – 2012 and 2012 – 2013 for this study (Mississippi Community College Board, 2014).
8. *Program Design II:* A career and technical education program design that has three entry and exit points defined as either a 30-hour career certificate, a 45-hours technical certificate or a 60 hours Associate of Applied Science degree and is based on a student taking 15 semester credit hours to be full-time that was offered during the academic years of 2013 – 2014 and 2014 – 2015 for this study (Mississippi Community College Board, 2014).
9. *Technical skill attainment:* the number of students in a career and technical education program who pass the technical skill assessment associated with their program of study (Mississippi Community College Board, 2016).

Conceptual Framework of the Study

In educational settings, effective policy making is paramount to ensure quality improvement. In their article purporting the Dynamite Model for Educational Effectiveness, educational researchers, Creemers and Kyriakides (2010) state the main question of educational effectiveness research seeks to look at factors at different educational levels such as the classroom, school, and system levels to explain differences in student outcomes. This pervasive thought challenges educational administrators to conduct needed assessments of developed

policies in order to determine their effectiveness of quality educational improvement that affects students and student outcomes positively (Creemers & Kyriakides, 2008). It is this model that will provide the conceptual framework for this study. As can be seen in Figure 1, the Dynamic Model of Educational Effectiveness is multi-level and takes into account that the student, teacher, school and system all influence student achievement.

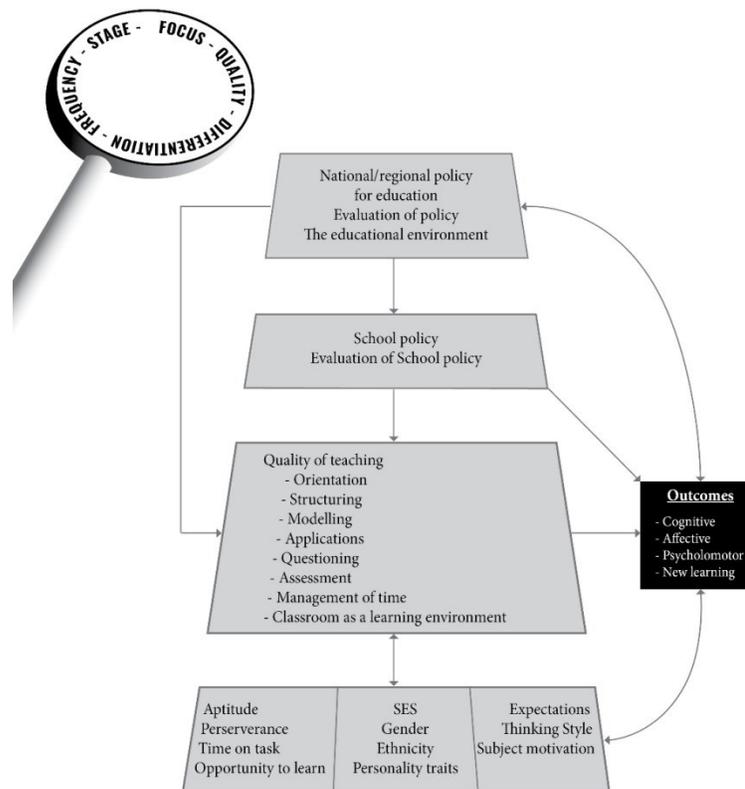


Figure 1. Dynamic Model of Educational Effectiveness (Creemers & Kyriakides, 2008).

As can be seen in this model, the multiple levels interrelate with each other and contain factors related to students and teachers. Through these interrelationships, the model indicates that the factors at each level directly and indirectly affect student achievement and the learning

environment for teachers and students. The Model of Educational Effectiveness relates to this study since national performance measures for career and technical education are mandated for funding. Institutions must set policies to address meeting these outcomes while affecting positive changes in the teaching and learning environments. The study conducted to support this model as a conceptual framework shows how institutional policy can help to promote changes that can address meeting performance measures (Creemers & Kyriakides, 2010).

Figure 2 illustrates the model that will be utilized for this study. This model shows how implementation of a program design were studied to compare difference in three federally mandated performance measures before and after program design implementation. These mandated performance measures are credential, certificate or Associate of Science degree, technical skill attainment and job placement. There are two student cohort groups that will be analyzed: (1) Students enrolled in the welding, precision machining and manufacturing and electrical technology programs during the academic years of 2012 and 2013, and (2) Students enrolled in the welding, precision machining and manufacturing and electrical technology programs during the academic years of 2014 and 2015.

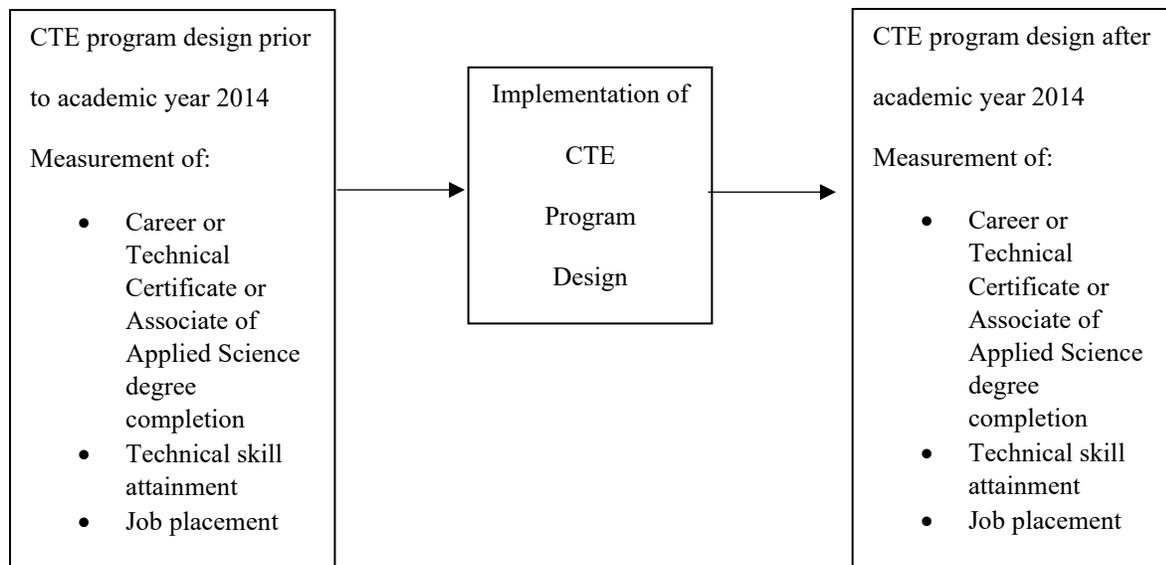


Figure 2. Conceptual framework for study on program design effect on certificate/degree completion, technical skill attainment and job placement.

Overview of Method

Data were collected for this research from all students enrolled in welding, precision machining and manufacturing, and electrical technology programs for the academic years of 2012, 2103, 2014, and 2015 at a rural southern community college. The business software system, Peoplesoft was employed to obtain this data. The study included 198 students of which 133 students were enrolled in the three programs prior to the 30-45-60 program design (Program Design I) implementation and 65 students enrolled after the 30-45-60 program design (Program Design II) implementation.

Non-experimental, quantitative data were used for this study from the existing data obtained through the Peoplesoft system. A chi-square test of independence was employed to focus on the statistically significant difference between two categorical variables: students in a program design (independent variable) and students performance with regard to career

certificate, technical certificate or Associate of Applied Science degree completion, technical skill attainment and job placement (dependent variables).

Participants for this study were students enrolled in the welding, precision machining and manufacturing, and electrical technology programs during the academic years of 2011 - 2012, 2012 - 2013, 2013 - 2014, and 2014 - 2015. These academic years were chosen in order to allow students enough time to enroll and complete an Associate of Applied Science degree prior to the implementation of the study. There was no random sampling of students before or after the 30-45-60 program design implementation. Due to a concern of within-group variances of performance measures, there was a need to increase the power of the statistical test, thus the population of students was utilized for this study instead of a random sample (Gay, Mills, & Airasian, 2009). The population total included in this study was 198 students of which 136 students were enrolled during the academic years of 2012 and 2013 which comprised Program Design I and 66 students were enrolled during the academic years of 2014 and 2015 which comprised Program Design II.

Data were collected for this research from the Career and Technical Education Dean over the welding, precision machining and manufacturing and electrical technology programs and through a program coded by the information technology department at a rural southern community college. Peoplesoft is a management software program that houses all student data and records of enrollment at the rural southern community college in this study. The information technology department developed a program that produced reports that could be combined in Excel to create a database of students who completed a career certificate, technical certificate or Associate of Applied Science degree. Peoplesoft was utilized by the Career and Technical Dean

to create the outcomes of the performance measures, which was also house in Excel. Together these two databases were combined into one Excel database to be used for this study.

Analysis of the data was performed to determine if student performance of certificate/degree completion, technical skill attainment and job placement were statistically significant between Program Design I and Program Design II. Table 1 shows the research question, data utilized for analysis and the statistical analysis utilized for the procedure.

Table 1

Data Analysis Procedure

Research Question	Data	Data Analysis Procedure
<p>Is there a statistically significant difference in the number of welding, precision machining and manufacturing and electrical technology students receiving career certificates, technical certificates and Associate of Applied Science degrees before and after the implementation of the 30-45-60 program design who were enrolled at a rural southern community college?</p>	<p>Student data elements: unique student identifier, student level, program of study code, program design group, certificate/degree completion, Associate of Applied Science degree, technical certificate, and career certificate for academic years 2012, 2103, 2014, and 2015. This information was obtained from two sources: the Career and Technical Dean and a Peoplesoft report generated by the I.T. department at the rural southern community college in this study.</p>	<p>Data were obtained and housed in Excel and analyzed in IBM Statistical Package for Social Science software program. Chi-square analysis was conducted of the two Program Design groups and career or technical certificate completion or Associate of Applied Science degree completion.</p>
<p>Is there a statistically significant difference in the number of welding, precision machining and manufacturing and electrical technology students' technical skill attainment before and after the implementation of the 30-45-60 program design who are enrolled at a rural southern community college?</p>	<p>Student data elements: unique student identifier, student level, program of study code, program design group, technical skill attainment, for academic years 2012, 2103, 2014, and 2015. This information was obtained from two sources: the Career and Technical Dean and a Peoplesoft report generated by the I.T. department at the rural southern community college in this study.</p>	<p>Data were obtained and housed in Excel and analyzed in IBM Statistical Package for Social Science software program. Chi-square analysis was conducted of the two Program Design groups and career or technical certificate completion or Associate of Applied Science degree completion.</p>

Table 1 (continued)

Research Question	Data	Data Analysis Procedure
Is there a statistically significant difference in the number of welding, precision machining and manufacturing and electrical technology students placed or retained in employment or military service before and after the implementation of the 30-45-60 program design who are enrolled at a rural southern community college?	Student data elements: unique student identifier, student level, program of study code, program design group, job placement, for academic years 2012, 2103, 2014, and 2015. This information was obtained from two sources: the Career and Technical Dean and a Peoplesoft report generated by the I.T. at the rural southern community college in this study.	Data were obtained and housed in Excel and analyzed in IBM Statistical Package for Social Science software program. Chi-square analysis was conducted of the two Program Design groups and career or technical certificate completion or Associate of Applied Science degree completion.

Delimitations

For this study, students were delimited to a rural southern community college. The study includes the following delimitations:

- Career and technical students enrolled in either the welding, precision machining and manufacturing or electrical technology programs that have three exit points, referred to as 30-45-60, at a rural southern community college
- The student population for these programs were from the academic years of 2011 - 2012, 2012 - 2013, 2013 - 2014, and 2014 - 2015
- Three 30-45-60 exit points included are the career certificate, technical certificate and the Associate of Applied Science degree
- The control group utilized for prior to the 30-45-60 program design implementation are from the academic years of 2012 and 2013

- The comparison group for after the 30-45-60 program design implementation are from the academic years of 2014 and 2015

Significance of the Study

Today in American history there is a situation that could become a real problem where our children will have less education than their parents. This is recognized at many state levels of government with governors from across the United States calling for action to address this problem. With this challenge comes the unique opportunity for community colleges to modify their educational system to address a program design for career and technical education (Complete College America, 2011).

In the study launched by Complete College America it was found that students completing 30+ credit hours in their first year of college. Research statistics showed that of students taking a 15-hour credit load each semester, 62% graduated when they completed 30+ credit hours within their first year of enrollment (Complete College America, 2013a)

This study adds to the body of knowledge as it relates to program design for career and technical programs of study. The empirical research could impact further development of other career and technical programs of study to incorporate the 30-45-60 program design. If higher levels of performance for completion of a credentials, certificates or Associate of Applied Science degree, technical skill attainment and job placement, the program design could be implemented with the expectation of similar results. If this occurs, then stronger marketing as well as policy development to support the design could be created to help all career and technical students to make gains in those areas. Lastly, research findings could impact pedagogical methodology for instruction by increasing the hands-on experiential learning needed to meet credentialing and to address assessment at each level of the program design.

Chapter Summary

With the onset of greater accountability and performance measures for both students and community colleges, there is a greater need to implement programs that are designed to meet the student need for completion, technical skill attainment and job placement (Complete College America, 2011). In most community colleges, career and technical education can help to meet this need as they are considered critical to the mission of the community college (Cohen et al., 2014). In a community college's region key partners can be brought together to help inform and bridge the gap along with community colleges to create a career pathway that meets all stakeholder needs (Alssid et al., 2005).

The rural southern community college in this study is a part of a community college system that has begun implementation of a program design for many career and technical education programs that has a program design structure called 30-45-60. This design has multiple-entry and exit points and is supported by the Model of Educational Effectiveness which promoted national performance measures for career and technical education to be mandated for funding. Through this type of model institutions can address meeting performance outcomes while affecting positive changes in the teaching and learning environments. The study conducted to support this model as a conceptual framework can inform to institutional policy that can promote changes that address meeting performance measures (Creemers & Kyriakides, 2010). Data were collected for this research from all students enrolled in welding, precision machining and manufacturing, and electrical technology programs for the academic years of 2012, 2103, 2014, and 2015 at a rural southern community college. Analysis of the data were performed to determine if student performance of certificate/degree completion, technical skill attainment and

job placement were statistically significant between program designs prior to and after implementation of the 30-45-60 program design.

CHAPTER II

REVIEW OF RELATED LITERATURE

This review is a discussion of empirical peer-reviewed research that addresses stackable credentials as a program design that impacts federally-mandated performance measures of enrolled students in postsecondary career and technical education. To that end, empirical research used in this review were limited to two-year institutions and programs that offered a pathway of multiple exit points to the Associate of Applied Science degree.

Searches were conducted within the following databased for peer-reviewed articles: EBSCOhost and Google Scholar. It also includes dissertation searches using ProQuest dissertation. Search terms utilized for this study were *stackable credentials, career and technical education program design, career pathway, credentials, technical skill attainment, career and technical completer, career and technical job placement, stacked credentialing, stacked credential, career and technical education* and *Perkins*. In the beginning, there were over 3,500 results which included peer-reviewed and non-peer-reviewed articles. To narrow the research, two or more terms were placed together in the search terms. Seventeen dissertations were found that related to this study. A focus was made to look for peer-reviewed articles that covered program design, completion, technical skill attainment or job placement. After collecting the various studies, a compilation was made where two areas appeared most often. One was the stackable credential program design and the other was program stackable credentials for improvement of student performance outcomes.

To set the tone for the progression of events that have led to the need for a program design that addresses community college student and institutional needs, the history and funding for career and technical education will initially be reviewed.

History of Career and Technical Education

In the early 20th Century, vocational education was a major topic of discussion with most American educators. Many schools had difficulty meeting labor demands in their areas as the economy moved from an agriculture based to an industrial based economy. The result of these discussions moved vocational education to the forefront through the Smith – Hughes Act of 1917. This act supported the notion of vocational education as a separate education system. The end result was the enactment of the Vocational Education Act in 1963. This act created funding for the construction of area vocational schools and broadened the definition of vocational education. In the late 1980s, educational reforms were made due to a decline in the United States' competitiveness in the international market. Poor performance on national and international standardized tests showed that American students were functioning at a lower level than their counterparts in other countries (Cohen et al., 2014). This created the impetus for the national report, *A Nation at Risk*. This report implied that the United States was losing ground, on an international level, to compete globally. This shortfall was attributed to the poor performance of the United States' educational system. Due largely to this report, sweeping changes were made to the educational system. One such change was the Carl D. Perkins Vocational Act of 1984. The act was to improve the job skills of the labor force and to provide equal opportunities to all adults in vocational education with special needs (Hayward & Benson, 1993).

The Perkins Vocation Act of 1984 was reauthorized in 1998 and 2006, but in 2018, the act contained new measures for career and technical programs of study to enhance continued performance improvement (Mississippi Community College Board, 2016). Due to this new law the current state of career and technical education in Mississippi has been prompted by reforms set forth by the U.S. Department of Education in the areas of accountability. At present, there is particular emphasis placed on performance-based funding at the federal and state levels. Thus, career and technical education programs will now need, more than ever, to provide students with applicable, real world, competency-based, hands-on experiential learning in order to better prepare them for the world of work. It will also require career and technical programs to develop the linkages, partnerships and collaborations necessary to provide the best educational experience possible (Kidwai, 2011).

In the state of Mississippi, the legislature requires an end-of-year report from the community college system which is broken down by community college. Specifically, they require information about the performance of programs and student achievement as they relate to expenditures and revenue. There has also been a call for a state report card of postsecondary institutions, whereby, information on the community college system as a whole, for each community college and then for each program at the community college will be reported. Specifically, the information requested will be for completion and retention rates and job placement of each program. Federal and state monies will be tied to these performance measures and with the current state of the economy, dollars will be stretched more than ever to cover program costs and keep them performing and maximum levels to receive such funding. With funding resources in short supply and performance required to be extremely high, community colleges are faced with how to keep programs meeting rural community economic needs and

maintain revenue sources to meet program needs. It is imperative that community colleges and business and industry collaborate to meet the mutual needs of student completion, technical skill attainment and job placement (Mississippi Code Ann. § 37-163-1, 2012).

Perkins Reauthorization

In 2006, the Carl D. Perkins Vocational and Technical Education Act was reauthorized under then President George W. Bush. Through this act states had more flexibility in the use of funds; however, the act contained stringent accountability measures to be met. Three accountability measures from this act are the strongest performance measure of the Perkins indicators and are generated based on formulas that utilize data collected on student performance. These performance measures are credential, certificate or diploma, technical skill attainment and student placement (Dortch, 2012). Today's Perkins V: Strengthening Career and Technical Education for the 21st Century Act, was reauthorized in July 2018 and contains more verbiage than ever before with regard to expectations in collaborating and partnering with its stakeholders to meet their needs and to keep America competitive in the global marketplace. These objectives will need to be met, but in the current economic state, they will be met with greater accountability measures and stricter outcome measures (Advance CTE, 2018b).

Stackable Credential Program Design

The first area that emerged from the literature review, supports the development of programs that ensure student performance outcomes that prepare them for the real world of work. Often time utilization of stacked credentials in a program design is made by institutions to improve completion rates (Burn & Gerhard, 2011). Accountability measures mandated at the federal level and that trickle down to local and state levels also measure retention, completion

and other performance outcomes. Retention is a performance measure of focus and is interchanged with persistence. Throughout the literature discussions included measuring persistence (Burns & Gerhard, 2011), utilization of stackable credential models with students who had various needs (Austin, Mellow, Rosin, & Sletzer, 2012) and utilization of stackable credential models (Dins, 2005). With regard to persistence, a new factor, termed grit, has been studied and shown to have a positive correlation with student grades. In this study, the grit factor was described as a student's perseverance and desire to meet long-term goals. It was also found that student backgrounds, as well as personal traits and external factors are widely varied and can tremendously affect persistence (Duckworth, Peterson, Matthew, & Kelly, 2007)

In their study, *Engaging institutions in workforce development: Career pathways for disadvantaged*, Alssid et al (2005), put forth a strategy for development of a career pathway to help community colleges streamline services and create a model that would improve completion rates, retention and persistence for students. Their research showed six promising practices, two of which support this study, the creation of bridge programs that incorporate developmental and credit programs, creation of internal career pathways for programs which lead from certificate to college degrees, and effective use of college resources. Through their research, it was suggested that students would have a more attainable goal if programs were chunked into smaller units. This would create a system that students could then see as manageable (Alssid et al., 2005). Students would now be more apt to earn a credential rather than leave; however, this is based on the assumption that they have taken the proper course sequence. Community colleges must ensure that the design of the program pathway is correctly sequenced and offered. (Bers & Schuetz, 2014). In her dissertation, *Exploring associate degree outcomes of stacked credential models at two-year colleges*, Kiddoo (2017), developed a study with the purpose to examine the

impact of a stacked credential model on program completion for students in the Wisconsin Technical College System. A multinomial regression model was utilized to study 4,845 students who were enrolled during the 2008 academic year in a degree program that was identified as a stacked credential associated degree program. Kiddoo (2017) employed the multinomial logistic regression model to determine how types of credential enrollment within a stacked model were related to ultimate credential completion for stacked credentials. Upon analysis it was determined that there was no statistical significance. This study used the dependent variable of credential completion, divided into three levels of credential completion: completed technical diploma, completed associate degree, and no credential completed. However, the study did not address programs that were developed into the stackable credential model and then performance of students enrolled prior to the new model and after the new model was implemented. This would be an additional consideration as students enrolled in those programs would have similar characteristics and attitudes.

The stackable credential model utilized to move students through an educational pathway to a short-term credential is best seen in Washington's I-BEST model. This model integrates basic skills training with entry-level skills in career and technical programs (Burn & Gerhard, 2011). The research from the I-BEST model did not address the issues that will be faced by educational institutions when students do not access career pathways to reach higher credentials or degrees.

Community college student success and structure of programs is an area of research interest. In fact, Van Noyl, Trimble, Jenkins, Barnett and Wachen (2016), proposed a hypothesis that community college students would be more successful and persist if they were enrolled in programs that were structured where students had little opportunity to deviate from the program

design. This would keep students on a clear path to completion. Through this study it was stated that while it is considered strength of community colleges to have a wide range of choices in programs, this may actually create a lack of direction in the student, leaving them with a lack of direction for students, which in turn can have negative impacts. By giving students distinct pathways a greater effect can be made on student completion and success. In the article, *Redesigning america's community college: A clearer path to student success*, where researchers Bailey, Jaggars, and Jenkins (2015), promoted a new model that would offer a structure to program design to help with student choice of program and would support positive outcomes. The proposed guided pathway model would provide programs and services that would help students succeed and complete a program of study.

Researchers Bailey et al. (2015), also identified impediments to the effectiveness of the community college. When looking back at the first decade of the 20th Century, they found that community college leaders were being questioned as to the small number of completers in the system. While the low number of completers was occurring, there were questions concerning cost and affordability of community college education. Low completion numbers, cost and affordability combined with pressure to lower tuition and declining state budgets, left community college leaders with no other recourse but to increase tuition. Bailey et al. (2015), stated that while community colleges were developed and designed to foster student enrollment, this design did not lend itself well to completion. Thus, times are changing, and the design of the community college and its programs must change as well (Prince & Jenkins, 2005). The researchers also proposed that the American political system address the need for more workers. This need to create more workers adds pressure to community college leaders to produce more college completers than ever before. To that end, Bailey et al. (2015), recommend that

community colleges take a different approach than the historic “cafeteria-style” approach to course lecture. Instead they propose that community colleges developed structured pathways to increase student completion and other outcomes such as technical skill attainment and job placement. The guided pathway model is the strategy that was ultimately recognized as the best way to meet outcomes (Bailey et al., 2015).

To meet greater accountability measures and stricter outcome measures institutions will now need to utilize new methodologies for addressing accountability measures. One such step that was discussed earlier is through stackable credentials. Through research support was made for stacked credentialing as an academic advancement as well as for career advancement (Austin et al., 2012). It was stated that this type of model would allow for individuals to earn credentials that would have a clear link to higher paying jobs. In his dissertation, *Chunking professional-technical programs to create pathways to degree completion in community colleges*, Dins (2005) used qualitative measures and employed both a within case analysis and a cross-case to analyze questions that focused on stackable credential design. This study found there was a need to ensure that institutions aligned their credentials with business and industry. Findings from his study suggested that consideration should be given to developing a design that would support the student’s employability upon completion of the stackable credential. He also surmised that institutions should be careful not to design credentialing to serve their reporting needs.

In 2011, in a rural southern state, the state Community College Career and Technical Officer’s Association (CCTODA) and Workforce Director groups for all state-sponsored community colleges met and passed a new initiative that was two-fold: creation of curricula developed in semester credit-bearing hours as well as in non-credit modules, and increase student enrollment, retention, and completion of credit-bearing programs. This initiative, called the

Workforce Advantage Initiative, officially began in January 2012, when the state community college board's office of curriculum and instruction was charged with developing career and technical program curricula that would articulate non-credit training into 15 credit hours of a career and technical education program (Mississippi Community College Board, 2012). This unit was also charged with ensuring that students enrolled in programs would be able to obtain a career certificate after successful completion of a prescribed 30 semester credit hour program curriculum, a technical certificate after successful completion of a prescribed 45 semester credit hour program curriculum or an Associate of Applied Science degree after successful completion of a 60 semester credit hour completion. Thus, the program design for this curriculum model became known as the 30-45-60 program design. Community colleges that were quick to adopt this design had programs that were primarily industry-related. Many industry-related programs were incorporating industry credentials and certifications due to advisory council recommendations. This ensured that the 30-45-60 program design complemented the need for the infusion of credentialing and certification (Mississippi Community College Board, 2014).

Most published studies on program design creation and stackable credentials have been in the last decade, which is most likely due to the newness of this type of program design. Searches included dissertations on this topic which found that in his dissertation, Dins (2005), recommended that programs with an existing program design be "chunked". This would mean that courses were placed into chunks that would align with employment. Through this method a capability would be created to serve student, institution and employer needs.

Program design was a key component in a study conducted by Jenkins, Zeidenberg, and Kienzel (2009), for the Community College Research Center (CCRD). The study focused on a program called Integrated Basic Education and Skills Training, I-BEST, which utilized a model

of credentialing and short-term training to encourage adult education students to enroll simultaneously in a career and technical programs at a postsecondary institution while obtaining adult education services. The purpose of the study was to determine if the I-BEST program increased study participants' success in postsecondary occupation education and training. There were over 31,000 adult basic skill students located in Washington state that were part of this study and nearly 900 I-BEST students who participated. A multi-variate analysis was run to compare both groups over a two-year period to determine the effect of the I-BEST model on student educational outcomes (Jenkins et al., 2009).

Through the I-BEST model, career and technical faculty, along with adult basic skills instructors worked closely to develop a program design that would cross-reference each curriculum and teach students basic skills while utilizing career and technical curriculum and vice versa (Jenkins & Spence, 2006). Thus, while students were taught career and technical education skills, adult basic education skills were integrated into the lessons. In the Washington I-BEST model study, it was found that students of the program had stronger educational outcomes than adult basic skills students not enrolled in the I-BEST program. It was also found that the students persisted into credit-bearing college coursework, earned college credit that could be utilized for a certificate or degree, earned career certificates, and had increases in points on adult basic skills tests (Jenkins et al., 2009).

Jenkins et al. (2009), found that program participants earned an average of 52 quarter-term college credits, while non-program students earned 34 quarter term college credits. Also, the study found that I-BEST student were more likely to persist into a second year with program students persisting at a rate of 78% and non-program students persisting at a rate of 61%. Finally, I-BEST students were more likely to earn an occupational certificate. Through the study it was

found that I-BEST students' chance of obtaining an occupation certificate was 55% while non-program students' chance was 15%. Ultimately, the study found results that showed students of the I-BEST program had better performance outcomes than non-program students. Strong program design and structure, helped to improve student performance outcomes such as completion (Jenkins et al., 2009).

One variable previously mentioned in the literature review that could affect program design and student certificate or degree completion is enrollment. Enrollment is a critical piece for understanding patterns that would have an impact as well on program design. Crosta (2014), provided a study that examined the relationship between community college enrollment patterns and student success. The study encompassed 14,129 full-time and part-time students enrolled during in academic years 2006 and 2007 at five (5) community colleges in a single state. Crosta (2014) completed a cluster analysis of enrollment patterns on a large population of students. While it is also supported that a relationship exists between completion, and credentials. This study was significant in that it showed that student enrollment patterns help institutions to understand the benefits to students for earning credentials (Crosta, 2014).

Student success is dependent on the structure of career and technical programs and credentialing that is stacked. Through a study conducted by Carnevale, Rose, and Handson (2012) at Georgetown University, researchers found that the post-secondary certificate is now a key component in obtaining family-sustaining wages. The postsecondary certificate has replaced what the high school diploma has accomplished in the past and is essential in the progression of the American worker who wants to increase their skill level to lead to increased wages. Researchers recommend that successful certificate programs include higher levels of credentials

that would ultimately lead to higher degree levels such as the Associate degree (Carnevale et al., 2012).

A study of community colleges in Washington state studied the structure of community college career and technical programs along four dimensions. Upon review of policies and various practices of institutions, Van Noyl et al. (2016), found that program design was of utmost importance to address student outcomes at the community college. This study examined the structure of community college career and technical programs along four dimensions, to determine if high structure supports student success. The study focused on 8 colleges and 2 programs per college that had 20 more students in each program between 2005 and 2006. Four dimensions for program structure/design were identified and measured through interviews and college websites. Researchers wanted to look at these four dimensions to determine how community colleges support student success and student outcomes in order to inform to the community college community, focus areas for individual college improvement. One of these dimensions which relates to program design is program prescription. Researchers Van Noyl et al. (2016), defined program prescription as the structure of a program that encompasses a curriculum allowing students the freedom to choose classes and the way in which those classes are offered. Through the study it was found that most career and technical programs were highly prescribed. By having program prescription at high levels, students would have a more structured approach to the curriculum with minimal choice of classes in their chosen program. This simplification would ultimately lead to greater student completion. (Scott-Clayton & Rodriguez, 2012).

A second dimension, program alignment, focused specifically on program design and stackable credentialing. Van Noyl et al. (2016) defined program alignment as the intentional

design of a program and program curriculum to support student outcomes and to further education. These researchers also found that programs in their study had a very formal structure whereby credentials were linked to each other in a progression with students held tightly to obtaining those credentials in a sequential pattern. Student could be afforded the opportunity to continue their education with a stackable credentialing model. This type of stacked credential model would support the necessary linkages within programs and to other programs for students to continue their education and move forward in their career (Ganzglass, 2014).

The last two dimensions focused on access to information and active program advising and support. The access to information dimension is defined as the extent to which students have access to information about their program of interest while the advising and support dimension covers how college staff ensure student support through services on programs as well as how well they monitor student progress in their chosen program of study. What researchers found was a high level of structure for six of the eight programs studied (Van Noy et al., 2016).

Stackable Credentials for Improvement of Student Performance Outcomes

The current state of career and technical education in the state has been prompted by reforms set forth by the U.S. Department of Education in the areas of accountability and federal financial aid. With new constraints placed on federal financial aid, more federal accountability measures have been required of career and technical education programs to show program performance. Thus, these programs will now need, more than ever, to provide students with applicable, real world, competency-based, hands-on experiential learning in order to better prepare them for the world of work. It will also require career and technical programs to develop the linkages, partnerships and collaborations necessary to provide the best educational experience possible (Kidwai, 2011).

Within the literature, a second focus area was found around program design and student outcome measures. Many higher educational entities will utilize program design, such as the stacked model of 30-45-60, to increase student performance outcomes such as retention, persistence and completion (Burn & Gerhard, 2011). Measures of accountability such as retention and completion are found in performance outcomes at the federal level, which then trickle down to the state and local levels (Tinto, 1987). This is the case regarding Perkins indicators for federal, state and local reporting for career and technical program performance. Specifically, labor market outcomes, such as credentials, technical skill attainment and job placement are the primary Perkins performance outcomes.

A study specific to credential attainment was conducted for the Lumina Foundation and Connection Credentials (Zanville, Porter & Ganzglass, 2017). The purpose of the study was to determine the multiple credentials that community and technical colleges employ for students to obtain credentials that are recognition by business and industry. The study group was comprised of 149 respondents with 80% from educational entities both two and four year and 20% from business and industry and others. Of the respondents, 81.32% of respondents indicated that industry recognized credentials were embedded in the educational institutions programs for which they were associated. The respondents also indicated that credentials were embedded into programs because business and industry recognized that the credentials made students more marketable and competent.

Key findings from the study showed that embedded industry-recognized credentials ranged across 16 different sectors, credentials were embedded primarily in credit-bearing certificates and associate of applied science degree programs at community and technical colleges, the design for embedding credentials is commonly referred to as “stackable”, and there

is wide variation in offering an embedded credential. For some respondents it may be required in the course of study for the program and for others they can be offered to students without requirement for program completion.

While employers demand can be met through credentials being embedded into a program of study, researchers also state that this can help with funding and policy at the federal and state levels (Lebesch, 2012). The study also found that while postsecondary institutions track student pass rates for certifications and degrees, few track these as related to employment. This study, while not directly tracking this measure can inform to the number of students that obtain credentials by meeting technical skill attainment and of the study group how many obtain employment (Zanville et al., 2017).

Another study conducted by Jenkins and Spence (2006), found that the basis for a program design, such as the stacked credential modeling for career and technical programs, is to increase student performance outcomes. Specifically, knowledge workers in the 21st Century will need to possess credentials and technical skills found through post-secondary education. An implication was made that by increasing education level a student could also increase their earning potential. There have been additional studies conducted that show evidence of increase earnings and increased levels of education and credentials (Jenkins & Spence, 2006).

One such study was conducted by Matheny (2013), for a dissertation on economic returns of technical education. The purpose of this study was to examine the labor market outcomes of sub-baccalaureate education for students enrolled in the Manufacturing Engineering Technologist and Technicians Education program (METT). There were 7,545 students who were part of the study which ran in academic years 2008 through 2011. In his study he found that educational efforts that supported student attainment of credentials while in a program were

positively correlated to academic achievement (48%). It was also found that there was a correlation between employment and credentials earned. In fact, he found that the higher the credential, or level of education the greater the increase in probability of employment. This study helps to add to the body of knowledge that supports that educational efforts through a stacked credential model such as the 30-45-6- model will help students to achieve short-term goals that can support an overall goal of an Associate of Applied Science degree (Matheny, 2013).

At Georgetown University's Center on Education and the Workforce, researchers focused on postsecondary certificates and the United States economy. Their researched recommended that if only certificates were offered by postsecondary institutions that were highly aligned with business and industry needs, the United States would move from a dismal 15th rank to 10th in completion rates among countries part of the Organization for Economic Cooperation and Development (OECD) for ages 25- to 34- year olds. It is also stated that certificates can be a gateway to college for many, while also providing an entry into the level of middle-class jobs. Certificates are also the largest growing credential in the United States in the last decade and even farther back (Carnevale et al., 2012).

The purpose of a study conducted by Schneider (2015), was based on providing access to reliable data to help students and parents make informed decisions on education. To do this students and parents will need to pay closer attention to the labor market and student credential attainment since more and more students are spending time and money to obtain said credentials (Schneider, 2015). This study, *The value of sub-baccalaureate credentials* utilized Colorado and Texas career and technical postsecondary education student data which was obtained from the Department of Education's Integrated Postsecondary Data System in 2008 and then again in 2013, which was approximately 1.7 million students. The researcher reported a 28% increase in

the number of associate degrees earned, a 28% growth in certificates of less than one year and a growth of 64% in certificates of one year but less than two years. At this same time bachelor's degree enrollment growth was a dismal 18%. In a report by researchers at Complete College America (2011) it was reported that student time to completion is an effect that institutions must guard against. Time to completion increases debt and can lead to non-completion of a student's educational goal. This raises a couple of questions for students and their parents to consider. Is the time and money put forth for a four-year bachelor's degree justifiable? Also, is there a certification or other postsecondary credential that would be more beneficial to the student with regard to time and money? The researcher found students who completed a technical sub-baccalaureate credential that was primarily focused on solving equipment or people needs, had the potential to earn more than graduates with bachelor's degrees. Thus, as students earn certificates and move toward the associate's degree they have a greater opportunity to earn more money. This shows that students can begin earning money with lower level certificates and move to a higher paying job with a technical certificate. Ultimately, they can earn even more with an associate's degree, which provides sound cause for the 30-45-60 program design and the stacked credentialing that is built into its structure for this study (Schneider, 2015).

By creating the stacked credential design, it provides a way for students to move from one certificate to the next and ultimately to the associate degree. In doing this, a disadvantaged student has a better chance to move themselves and their families out of poverty and into the middle class (Prince & Jenkins, 2005) Foundations such as the Bill and Melinda Gates Foundation and the Lumina Foundation have helped to fund grants that foster the development of programs serving high school dropouts. Through these programs the career pathways is built where students can obtain a technical skill and postsecondary certificate or credential that will

provide them with a job to make a family-sustaining wage (Austin et al., 2012). This creates a strong tie to why the technical skill attainment and job placement are important to measure.

Chapter Summary

The review of literature included a brief discussion on the history of career and technical education and the Perkins Reauthorization Act. These sections helped to set the tone for background information needed to understand the state of career and technical education as well as what measures of accountability are annually gathered to discern the health of federal, state and local career and technical education.

In the review of literature, there were several studies that helped to inform to the three variables covered in this study. Most of the studies focused on completion of certificates or degrees with results from the studies varied. Not all of the studies showed that program design such as stacked credentials have a positive effect on completion. However, there were some studies on performance measures such as technical skill attainment and job placement that supported program design such as stacked credentialing to increase performance levels.

Overall, existing literature fell into two areas. One was the stackable credential program design and program stackable credentials for improvement of student performance outcomes. While students come to community colleges with different expectations and experiences, there is one common bond between the institution and the student – knowledge that leads to a job. To formalize this bond, the community college system must develop programs of study that have a clear career pathway in which students can take to obtain the needed credentials for employment. Alternatively, students need to work the program of study to ascertain that they have fostered their own success in their chosen career pathway. This research will help to inform scholars on

program design with utilization of stacked credentials and its effect on student performance outcomes.

CHAPTER III

DESIGN AND METHODOLOGY

Overview

This research study sought to determine differences in credential/certificate/degree completion, technical skill attainment, and job placement before and after the implementation of a 30-45-60 program design for career and technical students at a rural southern community college during the academic years of 2012 through 2015. The study focused on two groups: (1) the 2012 and 2013 students who completed and were enrolled in the welding, precision machining and manufacturing or electronic technology program, and (2) the 2014 and 2015 cohort of students who completed and were enrolled in the 30-45-60 program design in welding, precision machining and manufacturing or electronic technology program. This chapter includes the research design for the study, research questions, research site, description of participants, instrumentation, data collection procedures, and data analysis procedures.

Research Design

This research study employed a correlational design with two independent variables (program design before the 30-45-60 program design implementation and program design after the 30-45-60 program design implementation) and three dependent variables (student completion, technical skill attainment and job placement). Data for the study were quantifiable thus the quantitative statistical test, Chi-square, was chosen for this study. With data examined at specific points in time, the study was also cross-sectional (Gravetter & Wallnau, 2009).

This study sought to determine if there was a statistically significant difference between the independent and dependent variables. A non-experimental method was chosen since pre-existing data were used. The researcher did not have control over participant assignment into study groups nor an ability to ensure the study groups were equivalent. The statistical test, Chi-square was employed as the study was correlational. Existing data were employed for this study from a rural southern community college (Gravetter & Wallnau, 2009).

The study purpose was to determine if a the 30-45-60 program design increase student performance in career or technical certificate or Associate of Applied Science degree completion, technical skill attainment and job placement for students enrolled in welding, precision machining and manufacturing and electrical technology.

Research Questions

In this quantitative study, three research questions are addressed.

1. Is there a statistically significant difference in the number of welding, precision machining and manufacturing and electrical technology students receiving career certificates, technical certificates and Associate of Applied Science degrees before and after the implementation of the 30-45-60 program design who were enrolled at a rural southern community college?
2. Is there a statistically significant difference in the number of welding, precision machining and manufacturing and electrical technology students' technical skill attainment before and after the implementation of the 30-45-60 program design who are enrolled at a rural southern community college?

3. Is there a statistically significant difference in the number of welding, precision machining and manufacturing and electrical technology students placed or retained in employment or military service before and after the implementation of the 30-45-60 program design who are enrolled at a rural southern community college?

Research Site

The research site for this study was a rural southern community college that has an average academic year enrollment of 5,500 students. There is one main campus that teaches all three programs included in this study. Also included are four off-site centers within its eight-county district with all four off-site centers teach the welding program. Participants in this study will come from the main campus with welding students only coming from the four off-site centers as well as the main campus. These sites were chosen as the researcher works at the main campus.

Participants

Participants for this study were all students enrolled in the welding, precision machining and manufacturing, and electrical technology programs during the academic years of 2011 - 2012, 2012 - 2013, 2013 - 2014, and 2014 - 2015 at the rural southern community college in this study. These participants were chosen as the programs they were enrolled in were the first to implement the 30-45-60 program design. There was no random sampling of students before or after the 30-45-60 program design implementation. The student population in this study comprised a total of 198 students in two groups: (a) 133 students enrolled in the program design

that was in place in 2012 and 2013 and (b) 65 students enrolled in the 30-45-60 program design that was in place in 2014 and 2015.

The decision to utilize the population instead of random sampling was made due to a violation of the Chi-square test. There were less than 5 students who did not complete a certificate or degree during all years in this study. Due to this violation the concern of within-group variance of performance measures needed to be addressed. There was a need to increase the power of the statistical test, thus the population of students was utilized for this study instead of a random sample (Gay, et al., 2009).

A parameter for the dependent variable of completion was set for May 2019 to allow Program Design I and Program Design II study participants the maximum time possible to obtain completion of the career or technical certificate or Associate of Applied Science degree. The dependent variables were held to the parameter of the Perkins reporting based on their level within their program of study. Participants assigned to a Level 3 were utilized for this study as that level is the only time that technical skill attainment and job placement are reported. There were a total of 198 students in two groups: (a) 133 students enrolled in the program design that was in place in 2012 and 2013 and (b) 65 students enrolled in the 30-45-60 program design that was in place in 2014 and 2015.

Instrumentation

Study data were obtained from two sources. The first source was from the Perkins annual accountability report. The second source was obtained from a query of the PeopleSoft software package utilized by the rural southern community college participating in the study. The Perkins database was created from reports sent to the state for academic years 2011 - 2012, 2012 - 2013, 2013 - 2014, and 2014 - 2015 for the welding, precision machining and manufacturing and

electronic technology programs to obtain technical skill attainment and job placement of study participants. This database was then utilized to query for completion data of students in the study. All study participants who completed their program of study in the academic years of 2012, 2013, 2014 and 2015 for the welding, precision machining and manufacturing and electronic technology programs were included in the study. There was no random sampling of students before or after the 30-45-60 program design implementation since the entire census was utilized.

Student data elements utilized in this study were the program of study (welding, precision machining and manufacturing or electrical technology), student level (all students were level 3), placement, technical skill attainment, completion status, and Perkins snapshot year of record for academic years 2012, 2103, 2014, and 2015. These years were chosen since they represented cohorts before and after the 30-45-60 program design and allowed for time for completion of an Associate of Applied Science degree. Study years 2012 and 2013 were assigned to independent variable , Program Design I and years 2014 and 2015 were assigned to independent variable, Program Design II.

Data Collection Procedures

Data collection occurred upon approval from Mississippi State University's (MSU) Institutional Review Board (IRB) and the president of the rural southern community college in this study. A letter of approval to utilize data from the rural southern community college was obtained from the college president. Upon his approval, a request and application was made to MSU IRB. The IRB number assigned to the request was IRB-19-155. Based on the researchers request and application, the IRB granted an exemption determination.

Upon receipt of the email of exemption determine from the IRB, the email and president's letter of approval were presented to the Dean of Career and Technical Education, who provided the database for Perkins reporting that was sent to the state Community College board. This database contained student data for students enrolled in the welding, precision machining and manufacturing and electrical technology programs for the years identified in this study for Program Design I and Program Design II. The email of exemption determination from the IRB along with the president's letter of approval were presented to the Information Technology (IT) department database administrator at the rural southern community college in this study. The IT department database administrator created a program for the researcher to query the database PeopleSoft for collection of graduate data for certificate and degree completion. The Peoplesoft database houses student data on all credit students enrolled at the rural southern community college. The data from the query were placed into Excel to create a second database. These two databases were merged by the researcher for utilization in this study with all identifying data removed to protect the participants of the study. Unique identifiers were assigned to each study participant and the final database was approved by the Dean of Career and Technical Education at the rural southern community college in this study.

Four full academic years of data were utilized for this study. All three programs had semester credit hour requirements for the career certificate (30 hours), technical certificate (45 hours) and Associate of Applied Science degrees (60 hours). Therefore, the two years prior to the 30-45-60 program design implementation were utilized to determine differences in level of performance as compared to the two years after the 30-45-60 program design implementation.

Data Analysis Procedures

The Chi-square test for independence was employed to determine if there was a statistically significant difference between the Program Design I and Program Design II with regard to career certificate, technical certificate or Associate of Applied Science degree completion, technical skill attainment and job placement at the rural southern community college in this study. The decision to utilize the population instead of random sampling was made due to a violation of the Chi-square test. There were less than 5 students who did not complete a certificate or degree during this study. Due to this violation the concern of within-group variance of performance measures needed to be addressed. There was a need to increase the power of the statistical test, thus the population of students was utilized for this study instead of a random sample (Gay et al., 2009; McDonald, 2015).

Data were studied through utilization of the IBM Statistical Package for the Social Sciences (SPSS). Microsoft Office Excel was utilized to house the study data from the Career and Technical Dean and the queried data from the program provided by the IT database administrator at the rural southern community college. The data reported for certificate/degree completion, technical skill attainment and job placement were entered into the SPSS software program for analysis.

Research question one, is there a statistically significant difference in the number of welding, precision machining and manufacturing and electrical technology students receiving career certificates, technical certificates and Associate of Applied Science degrees before and after the implementation of the 30-45-60 program design who were enrolled at a rural southern community college was analyzed utilizing the statistical test, Chi-square for independence. This test was employed as the independent variable of program design was categorical (Program

Design I and Program Design II) and the dependent variable, completion was categorical (yes/no) . Data for students enrolled in the career and technical programs welding, precision machining and manufacturing and electrical technology were compared for students enrolled in academic years 2012 and 2013 to academic years 2014 and 2015. Data were analyzed to determine if there was a statistically significant difference in the number of students receiving a career certificate, technical certificate or Associate of Science degree between students enrolled in Program Design I and Program Design II. An alpha level of $p > .05$ was utilized to determine statistical significance.

Research question two, is there a statistically significant difference in the number of welding, precision machining and manufacturing and electrical technology students' technical skill attainment before and after the implementation of the 30-45-60 program design who are enrolled at a rural southern community college was analyzed utilizing the statistical test, Chi-square test for independence. This test was employed as the independent variable of program design was categorical (Program Design I and Program Design II) and the dependent variable, technical skill attainment was categorical (yes/no) . Data for students enrolled in the career and technical programs welding, precision machining and manufacturing and electrical technology were compared for students enrolled in academic years 2012 and 2013 to academic years 2014 and 2015. Data were analyzed to determine if there was a significant difference in the number of students' technical skill attainment between students enrolled in Program Design I and Program Design II. An alpha level of $p > .05$ was utilized to determine statistical significance.

With regard to research question three, is there a statistically significant difference in the number of welding, precision machining and manufacturing and electrical technology students placed or retained in employment or military service before and after the implementation of the

30-45-60 program design who are enrolled at a rural southern community college was analyzed utilizing the statistical test, Chi-square test for independence. This test was employed as the independent variable of program design was categorical (Program Design I and Program Design II) and the dependent variable, job placement was categorical (yes/no). Data for students enrolled in the career and technical programs welding, precision machining and manufacturing and electrical technology were compared for students enrolled in academic years 2012 and 2013 to academic years 2014 and 2015. Data were analyzed to determine if there was a significant difference in the number of students placed in jobs between students enrolled in Program Design I and Program Design II. An alpha level of $p > .05$ was utilized to determine statistical significance.

Chapter Summary

In this chapter, discussion included research design, research site, participants, and instrumentation. Identification of the three research questions was also included. The chapter also included a discussion of the procedures for data collection and data analysis procedures. Research design focused on determining if the 30-45-60 program design increased student performance in career or technical certificate or Associate of Applied Science degree completion, technical skill attainment and job placement for students enrolled in welding, precision machining and manufacturing and electrical technology. Study participants were chosen based on the two years prior to or after program design implementation. The Chi-square test for independence was chosen as the statistical test to analyze data since data were categorical for both independent and dependent variables.

CHAPTER IV

RESULTS AND DISCUSSION

Overview

The purpose of this quantitative study was to determine if a new program design influences career certificate, technical certificate and Associate of Applied Science degree completion, technical skill attainment, or job placement rates for career and technical education students at a rural southern community college during the academic years of 2014 and 2015.

This chapter contains descriptive information about the participants of the study and will then be followed by three research questions based on which program design (Program Design I or Program Design II) that the student began welding, precision machining and manufacturing or electrical technology. The first question addresses the statistically significant difference in the number of students receiving career certificates, technical certificates or Associate of Applied Science degrees. The second research question addresses the statistically significant difference in the number of students' technical skill attainment. The third research question addresses the statistically significant difference in the number of students placed or retained in employment, or military service.

Description of Population

The population for this study was comprised of 198 students who were enrolled in the welding, precision machining and manufacturing, and electrical technology programs during the academic years of 2011 - 2012, 2012 - 2013, 2013 - 2014, and 2014 - 2015 at the rural southern

community college in this study. These participants were chosen as the programs they were enrolled in were the first to implement the 30-45-60 program design. The student population utilized in this study comprised a total of 198 students in two groups: (a) 133 students enrolled in the program design that was in place in 2012 and 2013 (Program Design I) and (b) 65 students enrolled in the 30-45-60 program design that was in place in 2014 and 2015 (Program Design II). Table 2 provides a further breakdown of the program of study that students were enrolled in for each program design of this study.

Table 2

Participant Program of Study Information by Program Design

Program of Study	Program Design I	Program Design 2
Electrical Technology	59	30
Precision Mach & Manuf	10	2
Welding	64	33
Total	133	65

Research Question One

The first research question was: Is there a statistically significant difference in the number of welding, precision machining and manufacturing and electrical technology students receiving career certificates, technical certificates and Associate of Applied Science degrees before and after the implementation of the 30-45-60 program design who were enrolled at a rural southern community college? A Chi-square test for independence was conducted with regard to the first research question. To address this question the career certificate, technical certificate and Associate of Applied Science degree were analyzed collectively. In Table 3, the Pearson χ^2 test

results were, ($\chi^2 = 1.498$, $N = 198$, $df = 1$, $p = .222$). The analysis showed that Program Design I and Program Design II had counts for students not completing a certificate or degree that were less than 5. The Fisher's Exact Test was then employed to determine statistical significance (.552) which indicated no statistical significance in the number of certificates and degree earned between participants of Program Design I (students enrolled in the program prior to the implementation of the 30-45-60 program design) and Program Design II (students enrolled in the program after the implementation of the 30-45-60 program design) at the rural southern community college participating in this study. The Cramer's $V = .222$, effect size was small for this study, thus supporting the statistical significance outcome.

Students who participated in Program Design I (97%) obtained a certificate or degree while (100%) of students that participated in Program Design II obtained a certificate or degree at the rural southern community college in the study. As can be seen in Table 3, there were less than 5 students in Program Design I and Program Design II. Chi-square tests were conducted to further study each of the three types of certificates and degree, which are career certificate (30 hours), technical certificate (45 hours), and Associate of Applied Science degree (60 hours).

Table 3

Chi-square Analysis of Certificate and Degree Completion (Program Design I vs Program Design II)

Certificate & Degree Completion		Yes	No	χ^2	<i>p</i>	Fisher's Exact Test	Cramer's V
Program Design I	N = 130	133	3	1.498	0.222	0.552	0.222
Program Design II	N = 65	65	0				
Total	N = 198	195	3				

N = number of students

The results showed that the student counts for Program Design I and Program Design II of students not obtaining a certificate or Associate of Science degree were below 5. The Chi Square goodness of fit assumption was violated, and the test results negated. The Fisher's Exact test was employed (.552) which showed that no statistically significant in the number of certificates and degree earned between participants of Program Design I (students enrolled in the program prior to the implementation of the 30-45-60 program design) and Program Design II (students enrolled in the program after the implementation of the 30-45-60 program design) at the rural southern community college participating in this study.

Associate of Applied Science

The second analysis was conducted to further study if there was a significant difference in the number of welding, precision machining and manufacturing, and electrical technology students receiving an Associate of Applied Science degrees before and after the implementation of the 30-45-60 program design who were enrolled at a rural southern community college. Table

4 shows the Pearson χ^2 test for independence results. There is no significant difference in attainment of an Associate in Applied Science degree between students enrolled in Program Design 1 and Program Design II. The Pearson χ^2 test results were, ($\chi^2 = .312, df = 1, N = 198, p = .576$). Students who participated in Program Design I obtained an Associate of Applied Science degree at a rate of 31.6% while students participating in Program Design II did not obtain the degree at a rate of 27.7% at the rural southern community college in the study. The Cramer's $V = .040$, effect size is small for this study, thus supporting the statistical significance outcome.

Table 4

Chi-square Analysis of Associate of Applied Science Degree Attainment (Program Design I vs Program Design II)

Associate of Applied Science Degree		Yes	No	χ^2	p	Cramer's V
Program Design I	N = 133	42	91	.312	.576	.040
Program Design II	N = 65	18	47			
Total	N = 198	60	138			

N = number of students

Analysis of the Associate of Applied Science degree attainment resulted in no significant difference in attainment of the Associate of Applied Science degree between students enrolled in Program Design I and Program Design II. Students who participated in Program Design I were as likely not to obtain an Associate of Applied Science degree at a rate of 68.4% as students participating in Program Design II at a rate of 72.3%.

Technical Certificate

The third analysis was conducted to study if there is a significant difference in the number of welding, precision machining and manufacturing and electrical technology students receiving a technical certificate before and after the implementation of the 30-45-60 program design who were enrolled at a rural southern community college. Table 5 shows the Pearson χ^2 test for independence results which indicate that there is a significant difference in attainment of a technical certificate between students enrolled in Program Design 1 and Program Design 2. The Pearson χ^2 test results were, ($\chi^2=17.3921$, $df = 1$, $N = 198$, $p = .000$). Students who participated in Program Design II obtained a technical certificate at 150% completion rate at 46.2% while students participating in Program Design I were at a rate of 18.0% at the rural southern community college in the study. The Cramer's $V = .296$ effect size is small for this study but still supports the outcome.

Table 5

Chi-square Analysis of Technical Certificate Attainment (Program Design I vs Program Design II)

Technical Certificate		Yes	No	χ^2	p	Cramer's V
Program Design I	N = 133	24	109	17.392	..000	.296
Program Design II	N = 65	30	35			
Total	N =198	54	144			

N = number of students

Analysis conducted of the technical certificate attainment resulted in a significant difference in attainment of a technical certificate between students enrolled in Program Design 1

and Program Design 2. Students who participated in Program Design II were more likely to obtain a technical certificate at (46.2%) as students participating in Program Design I (18.0%).

Career Certificate

The third analysis was conducted to further study if there was a significant difference in the number of welding, precision machining and manufacturing and electrical technology students receiving a career certificate before and after the implementation of the 30-45-60 program design who were enrolled at a rural southern community college. Table 6 shows the Pearson χ^2 test for independence results which indicate that there is no significant difference. The Pearson χ^2 test results were, ($\chi^2(1, N = 198) = .733, p = .392$). Additionally, it was found that in Program Design I and Program Design II for the group not obtaining a certificate or degree, there were counts of less than 5. The Fisher's Exact Test was employed to determine statistical significance (.666) since there were counts of less than 5 for Program Design I and Program Design II, which indicated no statistical significance in the number of career certificates earned between participants of Program Design I (students enrolled in the program prior to the implementation of the 30-45-60 program design) and Program Design II (students enrolled in the program after the implementation of the 30-45-60 program design) at the rural southern community college participating in this study. Students who participated in Program Design I obtained a career certificate at a rate of 96.2% while students participating in Program Design II were at a rate of 98.5% at the rural southern community college in the study. The Cramer's $V = .061$ effect size is small for this study which supports the outcomes.

Table 6

Chi-square Analysis of Career Certificate Attainment (Program Design I vs Program Design II)

Technical Certificate		Yes	No	χ^2	<i>p</i>	Cramer's V	Fisher's Exact Test
Program Design I	N = 133	128	5	.733	.392	.061	.666
Program Design II	N = 65	64	1				
Total	N = 198	192	6				

N = number of students

Analysis of career certificate attainment resulted in no significant difference in attainment of a career certificate between students enrolled in Program Design 1 and Program Design 2. It was found that in Program Design I and Program Design II for the group not obtaining a certificate or degree, there were counts of less than 5. Thus, the Chi-square goodness of fit assumption was violated, and the test not utilized. The Fisher's Exact test was then employed (.666), which indicated no statistical significance in career certificate attainment between students enrolled in Program Design 1 and Program Design 2. It was found that in Program Design I and Program Design II.

Research Question Two

A Chi-square test for independence was conducted regarding the second research question. The second research question was: Is there a statistically significant difference in the number of welding, precision machining and manufacturing and electrical technology students' technical skill attainment before and after the implementation of the 30-45-60 program design who are enrolled at a rural southern community college? A Chi-square test for independence was conducted with regard to the second research question. To address this question data for

technical skill attainment of students enrolled in the program design that was in place in 2012 and 2013 (Program Design I) and (b) 65 students enrolled in the 30-45-60 program design that was in place in 2014 and 2015 (Program Design II) were analyzed. In Table 7, the Pearson χ^2 test results were, ($\chi^2 = 4.299, df = 1, N=198$), $p = .038$). There is a statistically significant difference between the number of students obtaining technical skill attainment in Program Design I and Program Design II at the rural southern community college participating in this study. Table 7 displays the χ^2 results. Students who participated in Program Design II obtained a higher technical skill attainment (78.5%) than students participating in Program Design I (63.9%) at the rural southern community college in the study. The Cramer's V = .147 effect size is small for this study, which supports the outcomes.

Table 7

Chi-square Analysis of Technical Skill Attainment (Program Design I vs Program Design II)

Technical Skill Attainment		Yes	No	χ^2	<i>p</i>	Cramer's V
Program Design I	N = 133	85	48	4.299	.038	.147
Program Design II	N = 65	51	14			
Total	N = 198	135	62			

N = number of students

Results for research question two showed a statistical significance between student technical skill attainment of Program Design I and Program Design II. Students who participated in Program Design II were more likely to achieve placement at a rate of 89.5% than students participating in Program Design I at a rate of 20.0%.

Research Question Three

A Chi-square test for independence was conducted to study this research question. The second research question was: Is there a statistically significant difference in the number of welding, precision machining and manufacturing and electrical technology students placed or retained in employment or military service before and after the implementation of the 30-45-60 program design who are enrolled at a rural southern community college? In Table 8 the Pearson χ^2 results were, ($\chi^2 = 94.832$, $df = 1$, $N = 198$, $p = .000$). There is a statistically significant difference between the number of students' job placement of Program Design I and Program Design II at the rural southern community college participating in this study. Students who participated in Program Design I achieved job placement at a higher rate (89.57%) than students participating in Program Design II (20.0%) at the rural southern community college in the study. The Cramer's V = .692 effect size is relatively large for this study which supports there is a relationship between program design and job placement.

Table 8

Chi-square Analysis of Job Placement (Program Design I vs Program Design II)

Placement		Yes	No	χ^2	<i>p</i>	Cramer's V
Program Design I	N = 133	119	14	94.833	.000	.692
Program Design II	N = 65	13	52			
Total	N = 198	132	66			

N = number of students

Results for question three showed a statistical significance between student job placement of Program Design I and Program Design II. Students who participated in Program Design II

were more likely to achieve job placement at a rate of 89.5% than students participating in Program Design II at a rate of 20.0%.

Chapter Summary

Upon analysis of the data for research question one, the results showed that the student counts for Program Design I and Program Design II of students not obtaining a certificate or Associate of Science degree were below 5. Thus, the assumption was violated, and the test results negated. Further analysis was made of the specific Associate of Applied Science degree, technical certificate and career certificate. Analysis of the Associate of Applied Science degree attainment resulted in no significant difference in attainment of the Associate of Applied Science degree between students enrolled in Program Design I and Program Design II. Students who participated in Program Design I were as likely not to obtain an Associate of Applied Science degree at a rate of 68.4% as students participating in Program Design II at a rate of 72.3%. Further analysis conducted of the technical certificate attainment resulted in a significant difference in attainment of a technical certificate between students enrolled in Program Design I and Program Design II. Students who participated in Program Design II were more likely to obtain a technical certificate at (46.2%) as students participating in Program Design I (18.0%). Also, further analysis of career certificate attainment resulted in no significant difference in attainment of a career certificate between students enrolled in Program Design I and Program Design II. It was found that in Program Design I and Program Design II for the group not obtaining a certificate or degree, there were counts of less than 5. Thus, the Chi-square goodness of fit assumption was violated, and the test not utilized. Therefore, for research question one, further analysis showed that there was a significant difference of students obtaining a technical certificate between students enrolled in Program Design I and Program Design II. Upon analysis

of the data for research question two, the results showed a statistical significance between student technical skill attainment of Program Design I and Program Design II. Students who participated in Program Design I were more likely to achieve placement at a rate of 89.5% than students participating in Program Design II at a rate of 20.0%. Lastly, analysis of the data for research question three, the results showed a statistical significance between student job placement of Program Design I and Program Design II. Students who participated in Program Design I were more likely to achieve job placement at a rate of 89.5% than students participating in Program Design II at a rate of 20.0%.

CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Overview

In this chapter, a summary will be given of the research study examining the effect of program design on career and technical program completion, technical skill attainment and job placement at a rural southern community college. The two groups of students in the study were (1) students enrolled in the welding, precision machining and manufacturing and electronic technology programs during the academic years of 2012 and 2013 (Program Design I), and (2) students enrolled in the welding, precision machining and manufacturing and electronic technology programs during the academic years of 2014 and 2015 (Program Design II). Findings are presented in this chapter and include conclusions made from these findings. Also included in this chapter are the limitations of the study, recommendations for practitioners and policymakers and recommendations for future research.

Summary of Results

The purpose of this study was to determine if a new program design influenced career certificate, technical certificate or Associate of Applied Science degree completion rates, technical skill attainment, or job placement rates for career and technical education students enrolled in the welding, precision machining and manufacturing and electrical technology programs before and after the implementation of the 30-45-60 program design. Three research questions were addressed: (1) Is there a statistically significant difference in the number of

welding, precision machining and manufacturing and electrical technology students receiving career certificates, technical certificates and Associate of Applied Science degrees before and after the implementation of the 30-45-60 program design who were enrolled at a rural southern community college, (2) Is there a statistically significant difference in the number of welding, precision machining and manufacturing and electrical technology students' technical skill attainment before and after the implementation of the 30-45-60 program design who are enrolled at a rural southern community college, (3) Is there a statistically significant difference in the number of welding, precision machining and manufacturing and electrical technology students placed or retained in employment or military service before and after the implementation of the 30-45-60 program design who are enrolled at a rural southern community college?

This study had two significant findings for two of the research questions. The first significant finding was for research question two: Is there a statistically significant difference in the number of welding, precision machining and manufacturing and electrical technology students' technical skill attainment before and after the implementation of the 30-45-60 program design who are enrolled at a rural southern community college? The Chi-square analysis showed a significant difference ($p = .038$) in the number of students obtaining technical skill attainment in Program Design II. Students who participated in Program Design II were more likely to obtain a technical skill attainment than students participating in Program Design I.

The second significant difference was for research question three: Is there a statistically significant difference in the number of welding, precision machining and manufacturing and electrical technology students placed or retained in employment or military service before and after the implementation of the 30-45-60 program design who are enrolled at a rural southern community college? The Chi-square analysis showed a statistically significant difference

($p = .000$) in the number of students obtaining job placement in Program Design I than in Program Design II. Students who participated in Program Design I were more likely to achieve job placement than students participating in Program Design II.

Research Question One

Findings for research question one (Is there a statistically significant difference in the number of welding, precision machining and manufacturing and electrical technology students receiving career certificates, technical certificates and Associate of Applied Science degrees before and after the implementation of the 30-45-60 program design who were enrolled at a rural southern community college?) indicate there is no significant difference ($p = .222$) in the number of students receiving career certificates, technical certificates and Associate of Applied Science degrees in Program Design I as compared to Program Design II at a rural southern community college. Students enrolled in welding, precision machining and manufacturing and electrical technology programs during Program Design I (97.7%) were as likely as students enrolled in welding, precision machining and manufacturing and electrical technology during Program Design II (100%) to obtain a career certificate, technical certificate or Associate of Applied Science degree. The statistical analysis showed a Chi-square test violation for frequencies less than a count of 5. Therefore, the Fisher's Exact test was employed which showed no statistical significance (.552) for the number of students enrolled in the welding, precision machining and manufacturing and electrical technology in Program Design I as compared to Program Design II. The conclusion from this study is that students enrolled at a rural southern community college in Program Design I are as likely to obtain a certificate or degree as students enrolled in Program Design II.

The results of this study added to the body of knowledge and support as well as contradict other studies. One such study conducted on Washington's I-BEST model (Jenkins et al., 2009), was to determine if a relationship existed between student completion of a certificate/degree due to a stacked model program design. This model was built to support student completion while adult learners were enrolled in a career and technical program. Findings from this study showed that students who participated in the I-BEST model were more likely to persist into a second year of a career and technical program than non-participants of the study. Additionally, the study found that students enrolled in the stacked program structure were more likely to obtain an occupational certificate. An additional study supports this finding as well (Jenkins et al., 2009). While this study did not show the same results, it does add to the body of knowledge by exploring a stacked credential model where students in both program design groups received support services while enrolled. These services include additional instruction in academic subjects from a student service coordinator that is assigned specifically to various programs of study.

Another study which supports student certificate and degree attainment through program design was found to have similar research findings. This study was part of a doctoral dissertation conducted by Kiddoo (2017). The purpose of the study was a significant difference in the number of students completing an Associate of Applied Science program with one exit point and an Associate of Applied Science program with two exit points. Findings from the study showed that there was no significant difference between the two programs. This study also supports this same finding; however, this study also contained a third completion level that could be utilized to quickly obtain and then obtain a job, dependent on the economy.

To better understand the violation of the Chi-square test, three more analysis were run to determine if the career certificate, technical certificate or Associate of Applied Science degree violated the Chi-square assumption of less than 5 expected counts for each Program Design group in the study and the results are as follows.

Associate of Applied Science. Research indicate there is no statistically significant difference ($p = .576$) in the number of students attaining an Associate of Applied Science degree in the welding, precision machining and manufacturing and electrical technology in Program Design I as compared to Program Design II. There was no violation of Chi-square assumptions. Participants of Program Design I obtained an Associate of Applied Science degree at a rate of 31.6% while participants of Program Design II obtained the degree at a rate of 27.7%. It can be concluded that participants of Program Design I are as likely to obtain an Associate of Applied Science degree as participants of Program Design II. This finding supports the findings in the study conducted by Kiddoo (2017) which focused on the Associate of Applied Science degree. In that study, students participating in an Associate of Applied Science degree program were compared to students enrolled in a similar program that contained a technical certificate option as well as the Associate of Applied Science degree option. In that study there were no significant differences in the number of students obtaining the Associate of Applied Science degree between both programs. This study can inform to the body of knowledge for other studies that focus efforts on the granularity of certificates and degrees by incorporating two types of certificates, the career certificate and the technical certificate.

An additional look was taken of the economy during the time of both program designs and it was found that during the years of 2012 and 2013, the unemployment rate for the community college district in the study saw a higher rate than the state of Mississippi, The rate

was down during the years of 2013 and 2014 which could have an effect on students remaining in school and completing their program of study.

Technical Certificate. Research indicate there is a statistically significant difference ($p = .000$) in the number of students attaining a technical certificate in welding, precision machining and manufacturing or electrical technology in Program Design I as compared to Program Design II. There was no violation of Chi-square assumptions. Participants of Program Design I obtained a technical certificate at a rate of 18.0% while participants of Program Design II obtained the technical certificate at a rate of 46.2%. It can be concluded that participants of Program Design II are more likely to obtain a technical certificate as participants of Program Design I. This study contradicts the study conducted by Kiddoo (2017) when looking at technical certificate completion. This study found a significant difference in the number of students obtaining a technical certificate in a stacked credential program design but also contains a lower level career certificate that is an additional level of the stacked program design. Many institutions offer stacked credentials in a program design to improve completion rates (Burn & Gerhard, 2011). However, colleges must ensure that the program design is correctly sequenced and offered (Bers & Schuetz, 2014). Through this study it was found that Program Design II was developed so that students would enroll in all of their academic courses at the conclusion of the technical certificate prior to obtaining the Associate of Applied Science degree. For Program Design I, participants were enrolled in a curriculum design that interspersed academic coursework throughout the program of study. This contradicts these recommendations and could have an effect on the completion of the technical certificate or Associate of Applied Science degree. This fact will help to inform to other researchers to pay particular attention to the structure of the curriculum structure when conducting studies.

Career Certificate. Research indicate there is no significant difference ($p = .392$) in the number of students attaining a career certificate in welding, precision machining and manufacturing and electrical technology in Program Design I as compared to Program Design II. There was a violation of Chi-square assumptions. The expected count for participants in Program Design II was less than 5. The analysis showed a Fisher's Exact test (.666) that supports no statistically significant difference in the number of participants obtaining a career certificate in welding, precision machining and manufacturing and electrical technology in Program Design I as compared to Program Design II. Participants of Program Design I obtained a career certificate degree at a rate of 96.2% and participants of Program Design II obtained the degree at a rate of 98.5%. It can be concluded that participants of Program Design I are as likely to obtain a career certificate as participants of Program Design II. Upon further investigation, it was found that the student service coordinator over the programs informed students enrolled during the 2012 and 2013 academic years of the addition of the career certificate to be implemented in academic year 2014. With his assistance students were able to obtain a career certificate. This created a confounding variable the researcher could not control which affected research results.

The analysis for research question one showed no statistical difference in the number of participants obtaining a career certificate, technical certificate or Associate of Applied Science or degree in welding, precision machining and manufacturing or electrical technology in Program Design I as compared to participants of Program Design II. Upon further analysis of each certificate and degree, it was concluded that the technical certificate showed a significant difference between participants of Program Design I and Program Design II. Analysis of the Associate of Applied Science degree and career certificate showed there was no significant difference between participants of Program Design I and Program Design II.

Research Question Two

Findings for research question two (Is there a significant difference in the number of welding, precision machining and manufacturing and electrical technology student's technical skill attainment before and after the implementation of the 30-45-60 program design who were enrolled at a rural southern community college?) indicate a statistically significant difference ($p = .038$) in the number of technical skill attainment participants in Program Design I and Program Design II at the rural southern community college participating in this study. Students who participated in Program Design II obtained a higher technical skill attainment (78.57%) than students participating in Program Design I (63.9%). It can be concluded that participants of Program Design II are more likely to obtain technical skill attainment as participants of Program Design I.

Knowledge workers of the 21st Century will be required to possess credentials and technical skills found through post-secondary education (Jenkins & Spence, 2006). This can be seen through research conducted for the Lumina Foundation. Findings from this study showed that industry-recognized credentials were found embedded within credit-bearing certificates and associate degrees. However, there was no consensus of the study group as to the requirements to obtain the credential in order to complete the certificate or degree (Zanville, Porter, & Ganglass, 2017). This study can inform to the body of knowledge to institutions that do not require the credential to obtain a certificate or degree through the use of technical skill attainment. However, as was found in the study, due to the variety of credentials there is no one specific credential that can be followed in order to obtain a measurement. As with technical skill attainment, the measurement will need to be dichotomous to encompass a wider variety of credentials across a wide array of programs.

Research Question Three

Finding for research question three (Is there a significant difference in the number of welding, precision machining and manufacturing and electrical technology students placed or retained in employment or military service before and after the implementation of the 30-45-60 program design who are enrolled at a rural southern community college?) indicate there is a significant difference ($p = .000$ in the number of students attaining job placement in Program Design I as compared to Program Design II. Participants of Program Design I placed or retained in employment or military service at a rate of 89.5% while participants of Program Design II at a rate of 20.0%. It can be concluded that participants of Program Design I are more likely to obtain job placement as participants of Program Design II.

In a study on employment and education, the researcher found that there was a direct correlation between credentials and employment. This study showed that the higher the level of degree the greater the probability of employment (Matheny, 2013). Through this study, findings showed that students in Program Design I obtain job placement at a higher level than Program Design II. While this result showed the program design had no significant difference, an exploration of outside external factors was made to determine the state of influences to job placement. It was found that during the years of 2012 and 2013, the unemployment rate for the state of Mississippi was an average of 8.7%. The economy was slightly up during the years of 2013 and 2014 with an average unemployment rate at 7% for the state of Mississippi, which could influence students remaining in school and completing their program of study (Mississippi Department of Employment Security, 2019).

A final study conducted by Schneider (2015) had similar findings which suggested that students who completed a credential that focused on solving equipment or people needs had a

greater opportunity to earn more. While this study is contradictory in its findings on program design and job placement, it does not negate the fact that students who earned a career, certificate, technical certificate or Associate of Applied Science degree were placed in jobs. This study can inform to the overall body of knowledge to show that performance outcomes such as job placement can be affected by external factors such as the overall economy. The economy was in an industrial mini-recession that ran from 2015 through 2016 (Vail, 2018). In his article, evidence was shown where industrial production was down in 2015 and 2016. The programs in this study are part of the industrial employment area. This information along with the unemployment levels for the community college district in this study can help to inform as to external conditions surrounding this study and could be utilized to understand other studies with a variable for job placement.

Limitations of the Study

From the outset of this study, there were several confounding variables. These variables created limitations specific to this study that could not be controlled for and could not be addressed by the researcher. Limitations for this study include:

- The economy and unemployment rate with respect to job placement of students.
- Approval date of Program Design II and implementation occurred during the middle of the 2015 academic year.
- Utilization of population instead of random sample due to lower student count in Program Design II which is a violation of Chi-square assumption of random sampling. The power of the test statistic to reduce within-group variance created the need to utilize the entire population for the study.

- Recognition that this study is for one site and is specific to that one site and cannot be generalized to the population.

Recommendations for Practitioners and Policymakers

Program design for career and technical programs at community colleges is an important component to meeting business and industry demand for a skilled workforce. Funding both at the local, state and federal levels as well as employer need has created the necessity for students to obtain skill sets in a method that supports promotion of student completion of certificate and degrees. (Complete College America, 2011). To that end, community colleges have a vested interest in creating career and technical programs that address this issue. Thus, it is imperative that program design for career and technical programs be utilized to meet employment demand with the necessary certificates and degrees to meet economic needs in their respective communities and states. Through this study the following recommendations are made for practitioners and policymakers.

- Creation of policies at the local community college level to standardize implementation of new certificates and degrees that ensure all administrators, faculty, staff and students are clearly aware of the start date of programs and how students can make application.
- Strong articulation between the local community college and employers based on advisory committee recommendations for appropriate program design that will maximize certificate and degrees that are aligned with workforce needs.

- Strong articulation between the local community college and area employers based on advisory committee recommendations of certificates and degrees to specific jobs in the economic area.
- State and local funding support that fosters strong curriculum alignment and program design.

Recommendations for Future Research

Based on the review of literature and the study findings the researcher makes future research recommendations to foster a stronger understanding of career and technical education and program design.

1. Develop the dataset for each program design with more than two academic years separating the program participants.
2. Incorporate any new certificates that are developed for program curriculum to determine how certificate/degree completion, technical skill attainment and job placement are affected.
3. Survey students to determine if program design increased employment opportunities and job preparedness.
4. Survey employers to determine if program design increased student employment opportunities and job preparedness.

5. Incorporate longitudinal data that shows a trend analysis of student progression through the program design for each individual career and technical program in this study.
6. Incorporate other career and technical programs in the study to determine program design effects on certificate/degree completion, technical skill attainment and job placement.

Interview students concerning their ability and willingness to move to another location to obtain a job as well as what things affected their ability to obtain a job upon completion.

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APPENDIX A

INSTITUTIONAL REVIEW BOARD EXEMPT STATUS EMAIL



Jennifer Weaver <jcp227@msstate.edu>

Protocol Inactivated: IRB-19-155, Examining the effect of program design on career and technical program completion, technical skill attainment and job placement

prm199@msstate.edu <prm199@msstate.edu>

Wed, Apr 24, 2019 at 10:59 AM

To: ltc1@msstate.edu, ccw489@msstate.edu, jcp227@msstate.edu, sbk2@msstate.edu, smj70@msstate.edu

Protocol ID: IRB-19-155
Review Type: EXEMPT
Principal Investigator: Linda Coats

You are receiving this inactivation notification for one of the two following reasons:

Exempt Determinations:

This protocol is has been granted an exemption determination. Based on this exemption, and in accordance with Federal Regulations which can also be found in the MSU HRPP Operations Manual, your research does not require futher oversight by the HRPP.

Therefore, this study has been inactivated in our system. This means that recruitment, enrollment, data collection, and/or data analysis can continue, yet personnel and procedural amendments to this study are no longer required. If at any point, however, the risk to participants increases, you must contact the HRPP immediately.

Non-Exempt Approvals (Expedited or Full Board):

A request to inactivate (with the submission of a final report) your non-Exempt protocol was submitted and approved. If this is the case, there should be no further data collection or data analysis conducted under this protocol.

For additional questions pertaining to this study, please contact the HRPP at irb@research.msstate.edu.