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Student Achievement and the Career and Technical Education Medical Career Academy: A Quantitative Study

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Doctorate of Education Program

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Abstract

The researcher investigated the benefits of enrolling in a career and technical medical career academy at the secondary school level. It was unknown if there is a significant difference in the student achievement of career and technical education medical career academy participants versus the student achievements of their non-academy participant peers. This study was guided by the following research questions: (a) Is there a significant difference in scores on the Smarter Balanced Assessment Consortium (SBAC) test of students in a medical career academy when compared to their non-medical career academy peers? (b) Is there a significant difference in the attendance rates of the students in a medical career academy when compared to their non-medical academy peers? (c) Is there a significant difference in the progress to graduation of eleventh grade students in a medical career academy when compared to their non-medical academy peers? This quantitative, causal-comparative study used archival data from the 2016-2017 school year from one secondary school to compare the medical academy student records to the non-medical academy students' records. The data analysis found that there is a significant difference in the progress toward graduation of the eleventh grade students in a medical career academy. There are no significant differences in the SBAC scores or attendance rates. The findings demonstrate that participating in career and technical education courses, and more specifically, a medical career academy, does not hinder a student's academic achievement: it complements academic achievement.

Keywords: career and technical education, regional occupational program, medical career academy, student achievement, college and career ready, career academy, attendance, graduation, smarter balanced assessment consortium

Dedication

I dedicate this dissertation to my sister, Kelley Schweers, who encouraged me to complete my doctorate because the time was going to pass by anyway, so why not get a doctorate?

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I want to acknowledge my friends, family, and my husband, Nick Ganga, for being so supportive during this entire process. Their encouragement and assistance helped me carry on through this long and arduous course. Dad, you will be happy to know that I am *finally* done with school … for now.

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Chapter 1: Introduction

The healthcare industry is one of the fastest growing job markets in the entire world. The Bureau of Labor Statistics (BLS) (2017) reported that 3.2 million new jobs will be created over the next 8 years. Career and technical education (CTE) career academies have been widely studied in the past, and it is known that they are, in general, meeting their goals of ensuring that students are college and career ready when they graduate high school (Brand, 2009; Bunting & Erlacher, 2006; Delling, 2006; Dougherty, 2016; Kemple, 2008; Loera et al., 2016).

Kemple (2008) reported that career academies have a great effect on the students who participate. The students in the study had a 90% graduation rate and a 11% percent increase in earnings per year after graduation when compared to non-participants. However, what is unknown is how well the medical career academies are meeting these goals (Dayton, Hamilton-Hester, & Stern, 2011; Kemple, 2008).

Loera et al. (2016) examined medical career academies but did not study specific markers of student achievement. Delling (2006) looked at career academies and student achievement but not specifically at medical career academies. Therefore, as medical career academies have not been the focus of many studies, it is logical to take this next step.

Another example of why it is imperative to focus on the benefits of medical career academies is that they train students in the skills needed for "new collar" jobs, which do not require 4-year degrees. Many of the new collar jobs such as that of medical sonographers or respiratory therapists offer high wages without the large debt that students are often burdened with to fund their 4-year degrees. Symonds, Schwartz, and Ferguson (2011) indicated that half of job openings will go to workers with a certificate or an associates' degree. CTE medical

career academies offer students an opportunity to explore many different healthcare career paths so that students can decide on the future that befits them best (Clark, Threeton, & Ewing, 2010).

This chapter includes the background, context, history, and contextual framework for looking at the benefits of medical career academies. It introduces the purpose and the research questions that will guide this study. Next, the rationale, relevance, and significance of this study will be discussed followed by the assumptions, delimitations, and limitations. Moreover, this chapter concludes with an overview of its content

Background, Context, History, and Contextual Framework for the Problem

Career and technical education career academies can be described as small learning communities within the secondary school setting (Kemple, 2008). These programs were developed over 40 years ago as a tool to keep high-risk students engaged in academia through combining academic and occupational curricula (Hanser & Stasz, 1999). Kemple (2008) also found that it was possible to prepare students to be college and career ready without compromising any of the college preparatory academic courses. Brand (2009) indicated that career academies have prospered because they offer career and college preparation, are rich in student diversity, and have a proven record of accomplishment.

Contextual learning theory (Hull, 1993) was the basis for the conceptual framework for this study. Hull's theory is strengthened through evidence of students participating in a systemic process of inquiry and building a framework for logical reasoning through the hands-on, work-based learning done in medical career academy programs. Career and technical education provides a unique experience for students because it allows students to explore careers while making progress toward graduation (Clark et al., 2010). Rivet and Krajcik (2008) found that students who are given instruction that is contextualized improved learning outcomes. The

authors found that this type of instructional strategy serves as a motivator to engage students in solving project-based assignments.

CTE students are deeply immersed in work-based learning experiences that allow them to put the theory learned in the classroom into experiential activities that replicate real world problems that they may encounter once in their chosen career field. The career academy student is then able to make sense of the new knowledge in his or her personal frame of reference (Clark et al., 2010). Hull (1993) indicated that the student's mind seeks meaning by finding relationships that makes sense to them. Carraher, Carraher, and Schliemann (1985), and Lave, Smith, and Butler (1989) determined that when students learn in meaningful context, learning is effective. Traditional curriculum is decontextualized in the classroom and often has no real world meaning, which results in no meaning for the student.

Statement of the Problem

It has been unknown if there is a significant difference in the student achievement of the career and technical education medical career academy student versus the student achievement of non-academy peers. Since learning that is contextualized results in learning that is more effective, researching the possible significant differences between students that are involved in programs that provide contextual, work based, experiential learning and those that are not may provide some importance to the educational community.

Purpose of the Study

Further quantitative research comparing students who are enrolled in a medical career academy to those that are not enrolled in a medical career academy should be further explored due to the increase in the number of students that are enrolling in these types of small learning communities (Dayton et al., 2011; Kemple, 2008). Loera et al. (2016) researched the effect of

the Health Science Capacity Building (HSCB) grant, which funds medical career academies, and concluded that research should be done on medical career academies so that stronger conclusions can be made regarding the effect of these programs on the students that participate. This quantitative study was built upon these suggestions for further research into student achievement and medical career academies.

With the increase in the number of students interested in careers in health as well as projected growth in healthcare occupations from the Bureau of Labor Statistics (2017) as factors, few studies have looked at the relationship between medical career academy programs and student achievement (Loera et al., 2016). The purpose of this causal- comparative quantitative study was to determine if the career and technical education medical career academy program that high school students are enrolled in has significant differences in student achievement when compared to their non-academy peer. This quantitative study examined if there is greater student achievement when partaking in the medical career academy by comparing attendance rates, on track for graduation rates, and Smarter Balanced Assessment Consortium (SBAC) math and English Language Arts scores of students who were enrolled in the medical career academy versus their non-medical career academy peers the 2016-2017 school year.

Loera et al. (2016) stated, "Given the level of investment that California makes in the career academies, it is imperative to make stronger conclusions on the impact of these academies" (p. 28). The results from this study will help to shed light on any significant influence that participating students may gain from enrollment in medical career academy programs. That information can then be used to show a return on investment to school districts and regional occupational programs.

Research Questions

In this study, this researcher attempted to determine if students enrolled in a CTE medical career academy have higher student achievement outcomes than their non-medical academy peers. The research questions align with Hull's (1993) contextual learning theory through evidence of students participating in a systemic process of inquiry and building a framework for logical reasoning through the hands-on, work-based learning done in medical career academy programs. Career and technical education is an important tool in building the health science and medical technology workforce pipeline.

The overall research question for this study was: "Do students who participate in medical career academies have higher student achievement than their non-academy peers?" The following are the research questions and hypotheses that guided this research study:

RQ1: Is there a significant difference in scores on the SBAC test of students in a medical career academy when compared to their non-medical career academy peers?

H_1A: There is a significant difference in SBAC scores of the students in a medical career academy when compared to their non-medical career academy peers.

H_1O: There is not a significant difference in SBAC scores of the students in a medical career academy when compared to their non-medical career academy peers.

RQ2: Is there a significant difference in the attendance rates of the students in a medical career academy when compared to their non-medical academy peers?

H_2A: There is a significant difference in the attendance rates of the students in a medical career academy when compared to their non-medical career academy peers.

H_2O: There is not a significant difference in attendance rates of the students in a medical career academy when compared to their non-medical career academy peers.

RQ3: Is there a significant difference in the progress to graduation as defined by number of credits completed, of the eleventh grade students in a medical career academy when compared to their non-medical academy peers?

H_3A: There is a significant difference in the progress to graduation as defined by number of credits completed of the eleventh grade students in a medical career academy when compared to their non-medical career academy peers.

H_3O: There is not a significant difference in progress to graduation as defined by number of credits completed of the eleventh grade students in a medical career academy when compared to their non-medical career academy peers.

Rationale, Relevance, and Significance of the Study

Rationale. The literature review revealed that medical career academies are one area of career and technical education career academy research that is understudied. Loera et al. (2016) concluded that further research must be conducted to determine the overall educational effectiveness that the medical career academy has on its student participants. Delling (2006) researched career academies in general in the high school setting and found that there are significant differences in the students who participated in the career academy but did not specifically focus on the medical career academy program.

Relevance. Each career academy program uses one of the 15 career and technical education industry sectors that were established by the California Department of Education as their guide for curricula. The career academy type with the most abundant number of programs throughout the State of California is the Health Science and Medical Technology industry sector, followed by Arts, Media, and Entertainment, Finance and Business, Engineering and Design, and Public Services (Dayton et al., 2011). Since the medical career academy is the most populous

career academy theme and the occupation with the largest amount of projected growth, it is logical to study the possible significance that this program has on the student achievement of its participants (Labor Market Division, 2013).

Significance. The significance or social impact of this study is the possibility of determining the influence that CTE medical career academies have on the students enrolled in these career academy programs. Knowing if student achievement is occurring in this type of career academy is valuable on multiple levels for the student, high school, CTE program, and community. The increase in student achievement results in a student that is prepared for the rigors of post-secondary activity once they graduate high school as indicated by the College and Career Readiness Indicator, a high school that is able to prove that they are meeting their mission statement of graduating students that are college and career ready, a career and technical education program that is proving that it does provide a return on the school district's investment, and a community that will be able to employ responsible and able workers that are prepared to join the workforce once they graduate (Lakes & Burns, 2012).

It is logical to study these dependent variables because 50% of the students that enroll in the career academy program must have three of the six qualifying at-risk criteria to participate by California law: attendance issues, low credit completion, decreased scholarly motivation, economically disadvantaged, low state test scores, and low grade point average (GPA) (Dayton et al., 2011). This study may also provide a basis for the target audience (i.e., educators, administrators, school district, and policy makers in education) to implement medical career academies on their campuses to improve educational outcomes for at-risk students as well as prepare all students to be college and career ready.

Definition of Terms

Career academy is defined as a small learning community that has a "dual objective of college and career preparation by combining academic and occupational curriculum" (Brand, 2009 p. 3).

Career and technical education is defined as "high-level academics with technical training to enter jobs or college" (Wagner, 2016, p. 2).

Graduation rate is defined as how many students in a year complete their required measure of study and graduate from an institution (Voight & Hundrieser, 2008).

Medical career academy is defined as a career academy that focuses on the careers in the health science and medical technologies pathway.

Student achievement is defined by how well a student does on report card grades, grade point averages, enrollment in advanced classes, and standardized test scores as well as attendance, staying in school, and being promoted to the next grade (Henderson & Mapp, 2002).

Assumptions, Delimitations, and Limitations

Assumptions are defined by Simon and Goes (2013) as matters that are believed to be true in a study and are typically out of the researcher's control. This study was based on two assumptions. This researcher assumed that the data collected was quality data because it was obtained from a reliable data house that has clean and accurate data records. The researcher also assumed that the SBAC scores collected were accurate and valid.

Delimitations limit the scope of the study and are the direct results from researcher choices (Simon & Goes, 2013). This researcher recognized that there was a delimitation inherent in conducting this study. The sample was delimited to one CTE medical career academy in

Southern California, but there is no reason to believe that it is not representative of students in other CTE medical career academy programs outside of Southern California.

There were certain limitations inherent in conducting this study. The quantitative causal-comparative study design could have been a limitation because it may have been difficult to explain why there are any significant differences in the data had they appeared. This study was non-experimental in design, which meant that it was impossible to determine cause and effect of any relationships between the independent and dependent variables. In an attempt to make this study stronger in light of this limitation, a variety of dependent variables were analyzed to show student success. The fallacy of homogeneity is also a limitation of causal-comparative designs that assumes that all members of a racial or ethnic groups are similar. To strengthen this study, the groups were taken from the same school and similar ethnic background, and socioeconomic status. Additionally, this study was based on secondary archived data from only one school year, which may or may not have been input correctly. The data is quality data despite being archived and came from a reliable data house that has a clean and accurate data record.

Summary

This chapter provided an introduction to this quantitative study. It discussed the importance of career and technical education and how career academies can affect at-risk students through the small learning community format. The background, history, and conceptual framework for the problem were introduced to provide context to this study.

The chief purpose of this study was to explore if there is any benefit to partaking in CTE medical career academies by comparing various variables of student achievement as discussed above to non-medical academy peers. The overall research question for this study was, “Do students who participate in medical career academies have higher student achievement than their

non-academy peers?" Additionally, the significance of this study was discussed in terms of the potential impact for the students, schools, school districts, CTE programs, and communities involved with producing a secondary school graduate that is college and career ready.

Chapter 2 features a review of literature regarding student achievement and career and technical education, the history of CTE and career academies, the conceptual framework used, a review of methodological literature and issues, and a summary of findings. Chapter 3 specifies the methodology that was used to conduct the research on the CTE medical career academy data that will be studied and analyzed. Chapter 4 shares the findings of the study, and Chapter 5 entails the discussion and conclusions on how the study answered the research questions and the problem statement.

Chapter 2: Literature Review

Historical Foundations of Career and Technical Education

Xun Kuang (818 A.D.) stated, "Not having heard something is not as good as having heard it. Having heard it is not as good as having seen it. Having seen it is not as good as knowing it. Knowing it is not as good as putting it into practice." This quote embodies the CTE spirit. Asher (1977) asserted that kinesthetic activities can accelerate the assimilation of information and skills. Students have the ability to put what they have acquired in the classroom into tangible work based learning experiences through kinesthetic activities resulting in increased student achievement.

CTE has been in America since the early twentieth century. It was predominantly used to provide students that were deemed unable to succeed in college with job competences. In the beginning, the courses consisted of predominantly agriculture, wood shop, and home economics. In the 1990s, CTE was used as a dumping ground for students with developmental problems and learning disabilities turning it into something that resembled a Tier 2 special education program (Hanford, 2014). Today's career and technical education looks much different than it did in the past.

CTE Model Curriculum Standards, which were adopted by the California State Board of Education (SBE) in 2005, specify learning goals of 58 career pathways organized around 15 industry sectors. In 2013, the California SBE adopted the newly revised CTE Model Curriculum Standards, which reflect the new twenty-first century skills needed for students to be college and career ready. The CTE Model Curriculum Standards industry sectors are as follows: Agriculture and Natural Resources, Arts, Media, and Entertainment, Building and Construction Trades, Business and Finance, Education, Child Development, and Family Services, Energy,

Environment, and Utilities, Engineering and Architecture, Fashion and Interior Design, Health Science and Medical Technology, Hospitality, Tourism, and Recreation, Information and Communication Technologies, Manufacturing and Product Development, Marketing Sales and Service, Public Services, and Transportation (California Department of Education, 2017).

The goal of CTE currently is no longer about teaching underachieving students' basic skills to obtain entry-level positions. CTE is about teaching students to collaborate, think critically, problem solve, and be innovative so they can engage in postsecondary training or higher education resulting in a successful career pathway and become an individual that is a lifelong learner (Brand, Valent, & Browning, 2013). Many high schools have the mission statement of producing graduates that are college and career ready. Career readiness is the fulfillment and exhibition of requisite competencies that prepare high school and college graduates for an efficacious shift into the workplace. To do this, high schools require their students to take numerous college prep courses, which often do not leave a lot of room in their schedule for valuable career exploration through career and technical education classes (Drage, 2009).

Career and technical education programs are fighting for those valuable class schedule spots; however, to prove their worth they need to show that there are benefits to taking these courses, such as improved student achievement as opposed to focusing on traditional academic courses only (Brand, 2009; Delling, 2006; Farr, Bradby, Hartry, Sipes, Hall, & Tasoff, 2009; Hoachlander, 2008; Kosine & Lewis, 2008; Mekinda, 2012; Mitchell & Adler, 2006; Stringfield, Shumer, Stipanovic, & Murphy, 2013). Proving that career and technical education courses belong in the secondary setting is not only beneficial for the high school student, but also for the CTE program because the end result is more funding to keep programs running and growing.

There are several ways that CTE programs can prove their benefit such as measuring student achievement through ensuring students are on track for graduation, state testing scores, and attendance.

The theory that this researcher attempted to strengthen was Hull's (1993) contextual learning theory. Contextual learning occurs when students are able to connect meaning based on their past experiences. Through this quantitative study, this researcher attempted to examine if there is a benefit to partaking in a CTE medical career academy by comparing attendance rates, on track for graduation rates, and SBAC math and English Language Arts scores of students that were enrolled in a medical career academy versus their non-medical career Academy peers the 2016-2017 school year.

For this study, this researcher developed a more specific and in-depth quantitative study based on previous research that attempted to assess the benefits of partaking in career academies in the secondary school setting. Delling (2006) revealed that students who participate in career academies in the high school setting have higher student achievement than their non-academy peers based on standardized tests (California High School Exit Exam and California Standards Test) and grade point averages. The author looked at multiple career academies in the high school setting. This current study was an extension of Delling's work through an elaboration on these perceptions by looking specifically at medical career academies.

The medical career academy was chosen as a focal point for this study due to the California Employment Development Department's labor market report stating that the healthcare industry is one of California's most significant and growing part of the economy (Labor Market Division, 2013). It is known that career academies, in general, are reaching the goals of preparing high school students for career and college, but what is not known is how well

medical career academies are meeting these goals (Bunting & Erlacher, 2006; Burnett, 1992). Dayton et al. (2011) indicated that further research comparing students who are enrolled in a medical career academy to those that are not enrolled in a medical career academy should be further explored because of the increase in the number of students that are enrolling in these types of small learning communities and on recommendation by Loera et al. (2016), which concluded research be done on medical career academies so that stronger conclusions can be made on the effect of medical career academies on the students participating in these programs.

Pierce and Hernandez (2014) indicated that there is a gap in the literature pertaining to student achievement and career and technical education. With that in mind, this researcher performed an exhaustive review of the literature on career and technical education by reviewing peer-reviewed scholarly journal articles, dissertations, fact-sheets, printed material, and other resources from 1984 to 2017. The following search terms were used to locate these sources: career and technical education, regional occupational program, college and career ready, vocational training, vocational education, graduation rate, labor needs, secondary education, post-secondary education, dropout rate, educational improvement, educational outcomes, high school completion rate, college bound student, non-college bound student, career development, experiential learning theory, work based learning theory, and career development theory.

Conceptual Framework

This topic has been of particular interest to this researcher because of being a career and technical educator in sports medicine for over 12 years and an instructional support specialist for a regional occupational program for over three years. Career and technical education has had a challenging past in that it has often been looked at as a dumping ground for educationally disadvantaged students that are not on a pathway to go to college or are struggling in their

general academic courses. In the past, there have been questions as to whether the curriculum is rigorous enough or if these classes provide any benefit to the student. This has resulted in feelings that lean toward viewing career and technical education in conflict with academic college preparatory courses when in fact it can complement them (Lynch, 2000).

Funding for career and technical education has changed drastically over the years. It is more important than ever to prove to school districts the benefits of having career and technical education courses on their campuses clearly outweigh the negatives. School districts are desperately looking for their return on investment with these programs. Currently, local, state, and federal funds supply career and technical education with much-needed monies to continue to run their programs.

At the federal level, acts such as the Carl D. Perkins Career and Technical Education Act of 2006 have allocated $1.133 billion in 2016 to states, which in turn distribute the funds out to the different programs (California Department of Education, 2016). Workforce Innovation and Opportunity Act (WIOA) supports workforce development throughout the country through activities that develop the workforce and fund job training programs for displaced adults and youth workers. President Obama signed the reauthorized WIOA of 1998 into law in 2014 (United States Department of Labor, 2017).

State grants like the Career and Technical Education Incentive Grant (CTEIG) also provide $32.5 million district-wide (California Department of Education, 2016). Local funding becomes a little more interesting with the Local Control Funding Formula (LCFF) that was put into place in 2013 by the state of California. School districts get to decide how to use the funds along with input from their local communities, which are mandated by Perkins funding.

The Local Control and Accountability Plan (LCAP) is an important part of this process. The LCAP describes the school district's vision and focuses on eight state priorities—implementation of common core standards, fundamental services, school environment, student success, student engagement, student outcomes, parental participation, and course access. The plan shows how the budget will assist the goals of the vision.

Basically, the school district determines how valuable career and technical education is to their vision and how it can help them reach the goals stated in their LCAP. This is a key reason why it is important for studies such as this to conclude how taking a career and technical education course can help increase student achievement data and prepare secondary students to be college and career ready. The researcher attempted to provide motivation for school districts to continue to fund career and technical education programs by showing a relationship between student achievement and career and technical education medical career academies.

There are several theories that are interwoven throughout the literature on the benefits of career and technical education such as Kolb's (1984) experiential learning theory, Raelin's (1997) definition of work-based learning theory, and Hull's (1993) contextual learning theory. Clark et al. (2010) stated that Kolb's experiential learning theory is based on six propositions: learning is a procedure, all learning is relearning, learning requires the end of discords, learning is a general process of modification, learning results from relations between the student and the environment, and learning is the process of constructing knowledge. Career and technical education courses allow students to immerse themselves in the industry environment through classrooms, labs, cooperative education opportunities, and internships, enabling them to learn hard and soft skills of that career pathway.

Clark et al. (2010) quantified that significant benefits are provided to students who are exposed to experiential learning techniques throughout their educational career. Students gain the knowledge in the classroom and then can use that knowledge in occupational like lab settings that can eventually be applied to tangible life settings. This theory is the basis of what career and technical education provides to students. Students get real-life hands on training that can automatically be applied to real world problems, which provide the instant gratification on why the topics on career and technical education courses are important (Dixon, Cotner, Wilson, & Borman, 2011; Fletcher & Cox, 2012).

Hyslop and Imperatore (2013) reported that CTE is so successful at improving student achievement because the methods of instruction include hands-on learning experiences that provide context to traditional academic courses. Work-based learning can be defined as learning that is based on reflecting on work practices, learning through collaborative problem-solving in a working environment, and the joy in learning to learn (Raelin, 1997). Gray (1999) complemented this by stating that work-based learning allows students to interact with individuals inside and outside of the program to encourage learning in context to take place. Wang, Wang, and Prevost (2017) found that students seemed to benefit greatly from contextualization in their research on remedial math contextualization in career and technical education programs.

Experiential learning and work-based learning are similar in that career and technical education students focus on problem solving and experimenting with learning in the work-based environment. They are putting to use what they have just learned to problem solve relevant real world issues. This type of project-based learning allows students to use twenty-first century

skills like creative thinking, problem solving, communication, and collaboration in and out of the classroom (Marcketti & Karpova, 2014; Yoo & MacDonald, 2014).

Drage (2009) posited that what sets career and technical education apart from the traditional college prep courses is its ability to teach students how to use the tools that they have learned in the classroom to understand and solve real world problems. Stone and Alfeld (2004) reported that partaking in work-based learning reduces the high school dropout rate by 30%, and it connects learning to the outside world, increases relevancy in the classroom, and prepares students with the skills they need to be effective in the work environment.

According to Hull's (1993) definition of contextual learning, learning occurs only when students tie information to their own frame of reference:

> According to contextual learning theory, learning occurs only when students (learners) process new information or knowledge in such a way that it makes sense to them in their frame of reference (their own inner world of memory, experience, and response). This approach to learning and teaching assumes that the mind naturally seeks meaning in context—that is, in the environment where the person is located—and that it does so through searching for relationships that make sense and appear useful. (p. 41)

Contextual learning strategies allow for the learning of basic skills with academic and career content by directing the learning in a career context.

Wisley (2009) found that students in courses that utilize contextual learning techniques are three times more likely to pass the class, four times more likely to pass degree applicable coursework in the same semester, four times more likely to transfer level work in same semester, and almost two times more likely to pass degree applicable coursework in subsequent semesters. The author (2009) also found that when courses are tailored to specific occupational interests,

students in the contextual learning technique course progress at a much higher rate (86% versus 59%) than students in traditional courses.

Wachen, Jenkins, and Van Noy (2011) found that students are more likely to gain credits towards a certificate or degree and show an overall improvement in basic skill acquirement when given instruction with contextualized theory. Regarding motivation, Martinson (2000) found that student's motivation is enhanced with contextualized instruction. The author also concluded that contextualized theory can decrease attrition rates in job training programs. Contextualized learning theory allows for academic applications to be taught in a career context. Bernhard (2013) reported that this is an effective way to engage and motivate at risk students in areas of math, communication, critical thinking, and problem solving skills.

Review of the Research Literature

Performing a literature review is a much-needed step in a researcher's work, as it is the process that a researcher goes through to review all known facts, methods, and tools to help them understand a topic of interest (Ravitch & Riggan, 2017). The review of literature revealed findings that support this researcher's experience that secondary school students gain numerous benefits when they enroll in career and technical education programs versus their fellow classmates that do not enroll in career and technical education programs.

Historical background. Career and technical education has been around since the early 1900s, except in its early days it was referred to as *industrial education*. The need for acquiring job skills was first noted in 1854 at the Mechanics Institute in San Francisco, California (O'Lawrence, 2013). Beckwith (1913) lamented in his dissertation *German Industrial Education and its Lessons for the United States* that the German-style industrial education was far more advanced than the United States, and a switch to vocational education would be of benefit for all

those involved in America. The author stated, “Vocational guidance is wisely selected data and sympathetic insight into the child’s tastes and capacities, to choose wisely a vocation for him or her and to take the proper steps to prepare for it” (p. 135). The goal of vocational education was to combine basic academics with technical skills for specific jobs. The typical student was a student that was not going to college, and it was assumed that this individual would remain in the same occupation for their entire life (Wagner, 2016).

In 1905, Massachusetts created the Douglas Commission recommended that technical and industrial training should be expanded. The findings of the Douglas Commission were used to promote reform of vocational education through the creation of the National Society for the Promotion of Industrial Education (NSPIE) to lobby for vocational education efforts in congress (Steffes, 2014). The result of this movement was the declaration by the Commission on National Aid to Vocational Education to declare that national vocational education was an urgent necessity.

After World War I began, it brought on the need for additional skilled workers and better-organized advanced vocational education. The Smith-Hughes Act or the National Vocational Education Act, which it was originally known as, was enacted in 1917. The Smith-Hughes Act called for a new program that would meet the needs of the working class, who were attending school, but not necessarily going into career professions (as cited in Lynch, 2000). The educational programs were based on blue-collar type careers such as agriculture, home economics, and industrial arts.

The Smith-Hughes Act “provided federal aid on a matching basis to states and established requirements regarding how the money was to be used” (Steffes, 2014, para. 6). The Federal Board of Vocational Education was created to manage the distribution of funds and

review state plans. This act started a motion of expansion of federal support for vocational education.

In 1947, the George-Barden Act expanded support for vocational topics outside agriculture, home economics, and industrial arts. The 1958 National Defense Education Act provided support for science, mathematics, and foreign language education. The Smith-Hughes Act was eventually renamed the Carl D. Perkins Vocational and Technical Education Act in 1984 and updated to the current name, Carl D. Perkins Career and Technical Education Act in 2006 (Steffes, 2014).

Vocational education enrollment continued to increase throughout the twentieth century. O'Lawrence (2013) noted that the number of students enrolled in vocational education classes rose from 500,000 in 1963 to 1.7 million in 1975. Those numbers started to drop in the early 1980s. Levesque et al. (2000) reported that 22% of a high school student's credit load was vocational education in 1982. In 1994, that number had dropped to just 16% of the total credit load. The Association for Career and Technical Education (ACTE, 2016) reported that 88% of public high schools offer at least one CTE program and 94% of students that graduate has taken a least one CTE course.

Career and technical-education academies. CTE career academies have been around since 1969 are defined by Brand (2009) as smaller learning community within a larger school setting that is made up of a group of students that take course together for a minimum of 2 years and are taught by instructors from different specialties. The author purported that typically, there is a career theme that provides a college preparatory curriculum that connects academics and their real-life application in the specific career pathway. Partnerships are developed between the school and the related business industry, which increases the hands-on learning opportunities for

students to participate in internships, job shadowing, work-based learning, and adult mentorship programs.

When the Carl D. Perkins Act was renewed in 2006, it specifically implied that there be a focus on linking CTE and academic education. By their nature, career academies are founded on the idea that there is integration of academic rigor and technical instruction, which allows these programs to fulfill the directives of the Perkins Act and is a vital difference between career academies and vocational education of the past. In 2008, Kemple conducted the largest study on the effect of career and technical-education academies. The researcher found that students who participate in career academies are more likely to complete the needed credits to graduate from secondary school and these students increase their rate of on-track for graduation by 32% versus the 16% of the control group.

Challenges for career and technical education. There have been many challenges and criticism that career and technical education has faced over the years from declining numbers, to stereotyping students, to outdated curriculum, and funding and appearance issues, which have affected the reputation of career and technical education in high schools and making it difficult to gain backing for funding (Lynch, 2000). Former United States Education Secretary Arne Duncan referred to career and technical education system as the "neglected stepchild" of education reform (Duncan, 2011). Pundt, Beiter, and Dolak (2007) agreed with this title when they asserted that career and technical education has repeatedly been underestimated in its ability to improve the academic achievements of students.

With the declining enrollment numbers issue in the early 1980s and 1990s, Lynch (2000) suggested six possible reasons: (a) Programs were not meeting the needs of the industry employers; (b) Outlines and job descriptions were outdated, vocational education was competing

against the emerging press for students to take college-preparatory classes and the push to enroll in 4-year colleges right out of high school; (c) An elitist view that vocational education is not meant for students that are seeking to attend a 4-year college; (d) Programs were suffering from an image of a less-rigorous coursework; (e) Programs were geared towards disadvantaged students; and (f) A general view that vocational education would inhibit a student's future choices in education and career.

Career and technical education has always struggled with its image. Brand et al. (2013) reported that CTE is often viewed as a less rigorous education track that leads to low-paying jobs with no post-secondary school attendance. The Association for Career and Technical Education (1997) conducted a small survey of parents' views on career and technical education and found that most parents have a strong support for it, but there are still some myths that endure. The most prevalent being that career and technical education is specifically for the at-risk student who cannot survive academically or for those students that are not college bound. The survey reported that 96% of all parents feel that students not going to college would benefit the most from vocational education, and only 76% felt that it would benefit all students.

Wonacott (2000) reported that all types of students are participating in career and technical education. Approximately 80% of all high school students will take at least one career and technical education class in their high school career, and one in eight academic students take more CTE courses than the typical CTE education student. In support of this, Aliaga, Kotamraju, and Stone (2014) found that it is not just students that are academic underachievers or low-income students that are taking career and technical education courses. Their study conveyed that a significant number of students from higher income families and/or parents with higher levels of education were also participating in CTE.

It is not just parents that feel career and technical education is for the outsourcing of education, other educators and policy makers often share that opinion. Funding for career and technical education has changed over the years because politicians and educational leaders cannot agree on the merits and challenges of CTE (EdSource, 2005). In the early 2000s, CTE programs were paid through average daily attendance or how often a student was in attendance in class. Then in 2012-13, Governor Brown switched funding over to the LCFF/LCAP system as discussed previously, which gives the schools districts all the control over funding. With the exception of one-time monies in the form of the CTE Incentive Grant, there is no direct source of funding for career and technical education currently. It is all local control with no requirements of the school district to spend any of the funding on CTE. If one could show that students enrolled in career and technical education courses greatly benefit those students, then perhaps school districts would be more inclined to increase the budget designated for the career and technical education programs with whom they partner with.

Another challenge for career and technical education is the luster of a college degree. Parents want their children to go to college because they feel that it offers more rigorous course work/training when compared to career and technical education and will guarantee them a job when they graduate (Vo, 1997). There is little room in the college prep secondary student's schedule for valuable career exploration through career and technical education programs. Wonacott (2000) found that students believe this as well. The author reported that 50% of male and 67% of female students surveyed believe that they would have a professional career by the time they were 30 if they graduated from a 4-year college. However, the facts do not support this.

College degrees do not automatically lock a student in for a job once they graduate. Symonds et al. (2011) found that only 56% of 4-year college attendees actually graduate with their bachelor degree. Gray (1997) reported that only two out of three students will find employment in their career pathway once graduated from a 4-year college.

Vo (1997) noted that only 50% of students have the ability to secure an entry level job after graduation, and a quarter of students that obtain their bachelor degree end up having to go back to career and technical education training to gain the professional skills necessary to obtain a worthy career. This is an opportunity for career and technical education to offer students other ways to become successful on their career path without wasting their time and money on career pathways that do not benefit them.

Benefits of career and technical education. The purpose of modern day career and technical education is to combine high-level academics with technical training to enter jobs or college. The California Department of Education's vision states: "To create a dynamic, world-class education system that equips all students with the knowledge and skills to excel in college and career" (California CTE Standards and Framework Advisory Group, 2007, p. 4). The goal is to prepare the student to be college and career ready with the skills necessary to survive in changing workplaces or careers.

There have been numerous studies on the benefits of career and technical education, which include increased earnings, reduced dropout rate, improved employment outcomes, reduced absentee rate, and improvement in college (Brand, 2009; Castellano, Stone, Stringfield, Farley-Ripple, Overman, & Hussain, 2007; Farr et al., 2009; Hoachlander, 2008; Kemple, 2008; Kosine & Lewis, 2008; Mekinda, 2012; Stringfield et al., 2013). Career and technical education courses also provide students with twenty-first century skills that are necessary to be successful in the

real world such as in-depth knowledge and kinesthetic activities to solve real world problems (Drage, 2009). CTE classes can reach out to all types of learners due to the ability to teach students through differentiated teaching techniques. These techniques accommodate students that have different learning styles, which result in increased classroom inclusiveness and diversity. Combing academics and career context becomes a critical step in ensuring that a student is successful when entering into the employment marketplace (Drage, 2009).

Kuo (2010) found that small learning communities, such as medical career academies, can have a positive effect on a student's achievement and graduation from high school. Thessin, Scully-Russ, Hildreth, & Lieberman (2018) concurred with this finding when they examined critical factors that related to the success of a career academy and found that engagement through a real world, hands-on learning context was a key to the program's success. The authors also found that the focused student support provided by the small learning community offers students the opportunity to build trusting relationships with their instructors and classmates. Students in their healthcare education program are able to support one another, and the teachers are able to get to know the students on a more personal level due to the small class sizes.

The benefits of career and technical education courses apply after a student has graduated from secondary school as well. Wonacott (2000) found that students are more like to be employed after graduation if they have taken career and technical education courses when compared to their non-CTE counterparts. The students pick up soft and hard skills in their vocational education that increases "worker productivity, skill transfer, job access, and job stability" (p. 3) when they are employed in jobs that are related to their vocational courses.

Soft skills are the way a student relates and interacts with other people. Examples of soft skills would be communication, flexibility, leadership, motivation, problem solving, teamwork,

time management, and work ethics. Hard skills are typically abilities or skill sets that a student learns in the classroom like computer programming, machine operation, or a degree or certificate. The hard skills will get a student the interview, but the soft skills are what get the student the job (Wonacott, 2000).

Student achievement. Having a high GPA in secondary school allows for students to be more competitive and more successful in their post-secondary activities (Hoffman & Lowitzki, 2005). Mitchell and Adler (2006) performed research on over 4,352 high school data sets and found that students who are enrolled in career and technical education courses improve their high school grade point averages at higher rates than comparison students. The data showed that the difference in gains were especially notable in African American, Hispanic, and female sub-groups. Delling's (2006) research also found that students who enroll in career and technical education career academies have significantly higher grade point averages than their non-academy peers.

Ball, Dyer, and Garton (2001) observed that freshman students who participate in national career and technical student organizations such as 4-H Club and Future Farmers of America at an agriculture college had higher cumulative GPA and retention rates than those freshman students who did not participate in the student organizations. Additionally, Castellano, Sundell, Overman, and Aliaga (2012) studied the student achievement that occurs with participation in CTE courses versus non-participation and found that the GPA data were significantly in the favor of the treatment group of students who had taken the career and technical education courses. DeWitt (2008) agreed by asserting that CTE has a positive effect on the academic performance of students who participate.

Schools that have integrated career and technical education courses into their curricula have reported that their students possess significantly higher student achievement in math, science, and reading versus those that do not. Blosveren's (2014) study, which looked at the student achievement of three large urban school districts, concluded that students who participate in career and technical education have higher grade point averages and more credits earned than those who do not participate. Math students who participate in career and technical education courses have higher math scores and take higher-level math classes versus students who do not take career and technical education (Lewis, 2003). Bozick and Dalton (2013) looked at the relationship between career and technical education and math achievement as well and found that CTE does not limit the overall gains in math or the acquisition of basic math skills. Stone and Alfeld (2004) also found evidence that career and technical education students are taking a greater number of higher-level math and science courses than students who are not involved in career and technical education. Pierce and Hernandez (2014) agreed with these findings when they examined if high school student's state assessment scores were higher when mathematics and reading competencies were integrated into career and technical education courses. The authors concluded that students who complete courses that are integrated with mathematics and reading competencies have higher student achievement in reading. There is no change in the mathematics scores.

In opposition to the aforesaid findings, Wagner, Newman, and Javitz (2016) reported that while 96% of students with a learning disability in the study had taken at least one CTE course, they showed no significant improvement in their grade point averages; however, CTE did have some benefits regarding job acquisition. The study looked at the transcripts of 11,000 students

from 2002 to 2009 and the results confirmed the benefits of the student with a learning disability taking these courses because it sets the student toward a career with higher wages and benefits.

Success on standardized tests. Hoffman and Lowitzki (2005) reported that a significant body of literature shows that strong predictors of a student's success in post-secondary activities are his or her grade point average and his or her scores on standardized tests like SAT, ACT, and state mandated testing. If career and technical education involvement can show a relationship between improving those scores, school districts may be more inclined to increase funding for those programs at their schools. The Ball et al. (2001) study on freshman students at an agriculture college found that students who participate in national career and technical student organizations such as 4-H Club and Future Farmers of America have slightly higher ACT scores than students who do not participate in national career and technical student organizations. In support of this, Haniford (2008) found that there are relationships between students who have taken CTE courses have higher than average scores on the ACT exam. Delling's (2006) research also found that students who are enrolled in career and technical education career academies score statistically significantly higher on standardized tests.

Sweat and Fenster (2006) looked at whether students who were enrolled in career and technical education performed better on the Georgia state ASSET test versus their non-career and technical education counterparts. Their study concluded that students who participate CTE courses score slightly higher on the ASSET test than students who do not participate. In another study on state test performance, Ciccolo (2008) echoed that students who attended a career and technical education high school improved their Massachusetts Comprehensive Assessment System math test proficiency index by 18% and their English Language Arts proficiency index by 12%.

Brown (2000) researched a combination of multiple factors, which included student success on the ACT, the SAT, and the Texas Assessment of Academic Skills. Over a 5-year period, over 3.4 million student records were scrutinized, which included 247,778 career and technical education students. The study concluded that there is a definite positive trend for students who participate in career and technical education courses versus those who do not.

Secondary school completion rate. One of the goals of secondary school is to keep students in school. Researchers have found that students who participate in career and technical education have high attendance and high graduation rates (Barnett & Bragg, 2006; Bloom & Unterman, 2013: Brand, 2009; Castellano et al., 2007: Castellano et al., 2012; Dixon et al. 2011; Farr et al., 2009: Fletcher & Cox, 2012; Hoachlander, 2008; Kemple, 2008; Kosine & Lewis, 2008; Mekinda, 2012; Rivera-McCutchen, 2012; Stringfield et al., 2013). In 2016, the National Center for Education Statistics (NCES) reported the national dropout rate to be at 6.5%, and four out of five students are graduating with a high school diploma (National Center for Education Statistics, 2016). California's dropout rate fell to 10.7% for the class of 2015 (Leal, 2016). Symonds et al. (2011) discovered that in the United States, approximately one million students drop out of high school every year and those students would have stayed in school if they had courses that actually interested them. Dropout rates do not have a straight correlation with graduation rates because some students take longer than the typical 4 years to complete their high school diploma requirements.

Wagner (2016) reported that all 50 states have higher graduation rates for students who have enrolled in career and technical education versus those students that do not. The overall rate is 93% percent compared to a national average of 82%. California's high school graduation rate increased to 82.3% for the class of 2015. State Superintendent Tom Torlakson claimed one

of the reasons for that increase was "bringing back relevant and engaging classes in science, civics, arts, and career and technical education that was slashed during the Great Recession" (Leal, 2016, para. 6).

The attraction of career and technical education courses is its capacity to engage students, which results in dropout rate reduction (Stone & Alfeld, 2004). Bishop and Mane (2004) found that when CTE is introduced to a high school environment, students who take the classes are persuaded to stay in school longer than the students who do not take the classes. Bridgeland, Dilulio, and Burke Morison (2006) reported that 81% of dropouts stated that CTE courses would have kept them in school because they were relevant, and offered the opportunity to learn real-world skills. Gottfried and Plasman (2018) examined how effective career and technical education courses are keeping high school students in school as well as keeping them on-track for graduation. The researchers reviewed over 11,000 data sets. They found that a student who takes career and technical education courses in high school is less likely to drop out and has an increased chance of an on-time graduation, especially when these courses are taken in the eleventh of twelfth grade.

Students are motivated and thrive in the classroom when they are engaged and are meeting the goals of their classes. CTE fosters a connection between school and the real world. Thessin et al. (2018) supported this with their findings. They reported that students' sense that career and technical education instructors who come from industry have real and relevant professional experience as opposed to the background of a traditional or college prep course.

Stone and Alfeld (2004) reported that students in CTE academies are 2.5 times less likely to drop out of school. The more CTE coursework in a student's total course load, the lower the chance of that student dropping out of high school. Alfeld, Charner, Johnson, & Watts (2013)

found that work-based learning helps students extend what they have learned in the classroom into the work environment, motivates students to explore a variety of careers and develop critical thinking. Hyslop and Imperatore (2013) agreed that CTE decreases the high school dropout rate due to engaging instructional methods like work-based learning and hands on lab time.

Castellano et al. (2012) found that students enrolled in career and technical education courses are significantly more likely to be on track for graduation than students who are not enrolled. Brown (2000) found that student's attendance rates averaged 1.5% higher in CTE students. In a study on the National Academy Foundation, which supports 529 career and technical-education academies in 49 states, the researchers found that 90% of students graduate and 80% of those students will continue on to post-secondary school (Hyslop, 2009).

DeWitt (2008) reported that in 1998, the University of Michigan found that high-risk students are eight to ten times less likely to drop out of school, fail the course, or be absent from class if they are in CTE courses. Having a career and technical program at a high school can reduce that school's overall dropout rate by 6%. Plank, DeLuca, and Estacion (2008) strengthened the DeWitt study by reporting that the risk for dropping out of high school decreases as schools add more CTE courses to students' course load. They found that the best ratio between traditional academic courses and CTE courses is one CTE course for every two academic courses. The researchers concluded that this course balance encourages a pathway to success because of broader class experiences that the student encounters.

Post-Secondary school activity. A common creed among schools is that they are preparing students to be college and career ready. The fact is that not all students are going to college. Some have no interest, and some just do not have the aptitude to be successful in college. Wonacott (2000) pointed out that only 30% of high school students have the academic

preparation required to be successful in college. Twenty-seven percent of college freshman dropped out of college in 1996, and only 50% of the students enrolled in 4-year colleges are completers—taking up to six years to graduate. Along with not receiving their degree, non-completers are still required to pay the student loans they acquired while they were in school. These students need another option to be contributing members of society, which is where career and technical education helps. Students who have been stereotyped as not smart enough to attend college and are perceived as only belonging in CTE career pathways are proving that they can obtain college dreams if wanted. Students that have participated in CTE courses have a high rate of enrollment in college after graduation (Farr et al., 2009; Staklis & Klein, 2010) as well as a high rate of retention (Rodriguez, Hughes, & Belfield, 2012).

Wagner et al. (2016) strengthened what Harvey (2001) found when a literature review was performed on the efficacy of career and technical education for students with disabilities, specifically looking at post-school employment outcomes. Harvey concluded that a high rate of participation in career and technical education classes results in an increase in the ability of a student with disabilities to obtain a job after graduation from school. These students are learning occupationally specific training, which meets the needs and demands of their chosen career pathway. In agreement with the aforementioned studies, research performed by Stone (1993) concluded that vocational education students are more likely to be employed once graduated and will earn a higher salary than the non-vocational education colleagues. Bishop and Mane (2004) also found that CTE students earn 12% more immediately after graduation and 8% extra seven years after graduation versus students with no CTE experience.

Review of Methodological Issues

A number of topical articles exist; however, there are limited empirical research studies on the topic of career and technical education. The research methodology that was most commonly used in CTE studies has been primarily quantitative with some qualitative and mixed methods as well. Since the purpose of this study was to determine if there is a benefit to partaking in a medical career academy by comparing attendance rates, on track for graduation rates, and SBAC math and English Language Arts scores of students who were enrolled in a medical career academy versus their non-medical career academy peers the 2016-2017 school year, it was logical to use the quantitative method for easy data analysis.

Brown (2000) completed a 5-year quantitative/comparative analysis on almost 250,000 students that were enrolled in technical preparations courses and non-technical preparations courses. The study took into account the following variables: enrollment in career and technical education, annual attendance rates, annual dropout rates, high school graduation rates, performance on state testing, and post-secondary school employment or education. The data was analyzed by grade level, subgroups of special populations, and race/ethnicity groups using frequency distributions, means, and medians. The author mentioned that a limitation of the study was the possibility of obscuring results due to aggregating participant results across such a diverse application of technical preparation courses.

In another quantitative study, Ball et al. (2001) looked at the influence of students participating in career and technical education youth student organizations on academic performance and freshman student retention. Data was collected from the university database with student achievement determined by measuring the student's grade point average at the end of the freshman year, and freshman student retention was based on enrollment status at the

beginning of the next school year. Analysis of covariance (ANCOVA) was used to analyze student achievement and a chi-square test was used to analyze the student retention. The researchers reported that qualitative and quantitative methods should be used in further studies to determine variables that can improve the retention of students as well as student achievement.

Though not as common as the quantitative method research protocol in the literature review, qualitative methods were used in some studies to determine meaning through surveys, interviews, and discussions with participants. Packard, Leach, Ruiz, Nelson, and DiCocco (2012) used a survey to determine current and anticipated educational, work, and career activities of 69 graduates from three different CTE high schools who had taken career and technical education courses. The students answered six questions on the survey that asked what their plans were for the following year, what courses they were enrolled in, who was supporting their career goals, why they chose a particular program, what their current job was, and what their career plans were.

Six months and then a year later, the Packard et al. (2012) study participants were contacted for semi-structured interviews that had them reflect back on their baseline answers and how their current situation compared to their original answers. Limitations noted on this study included the number of participants that responded. The survey and the interviews targeted only a small number of variables and the number of high schools that participated.

Lynch (2000) used a qualitative approach when determining what direction career and technical education should take in America, as this directly affects the high school student's successful transition to post-secondary employment and education. An extensive literature review was performed looking at thoughts, opinions, research, and reflective thinking from educational stakeholders involved in career and technical education. Over 200 conversations,

discussions, face-to-face, and phone interviews were held with participants at national educational conferences and with a range of individuals from business industries, trade associations, public school administrators, university deans, government officials, and other career and technical education advocates. The data collected was then broken down into themes and components of high school career and technical education for the first decade of the twenty-first century and discussed. Limits of this study included the non-structured surveys and discussions that were had with a variety of participants.

A mixed research method is a combination of both quantitative and qualitative research methods. According to Creswell (2014), mixing the two methods together strengthens the study because there is an analysis of both kinds of data. Wagner et al. (2016) used a mixed research format to look at the benefits of career and technical education on employment and youth with learning disabilities involving 480 students participating from a variety of local educational agencies. The researchers gathered participants' transcripts, looked at graduation and dropout rates, and then performed telephone and mail surveys with the families of the participants by asking for information on employment data and the parental expectations of their child becoming financially independent in the future.

The results showed that student learning behaviors come from interviews with their teachers who reported on the student's ability to complete homework on time, participate in group work, staying engaged in class, and working up to the student's ability. The limitations of the study included the inability to independently verify some of the self-reported data, unobserved confounding, and various functional and behavioral covariates were based on parental reports, which are not equal to evaluations of professionals (Wagner et al., 2016).

In another mixed methods study design, Castellano et al. (2012) looked at the effect of programs of study on high school academic and technical achievement. The study had three treatment high schools consisting of 1,957 students and a control group of 509 students participating in the study. All three of the treatment schools had students who were enrolled in career and technical education while the control group enrolled in no career and technical education courses.

The quantitative data analysis in the Castellano et al. (2012) study included descriptive statistics like the analysis of covariance for GPA, chi-square testing for on- track graduation records, and test score analysis. The qualitative data analysis included on site visits during which the researchers interviewed faculty, students, and administrators on what they thought the differences were between enrolling and not enrolling in career and technical education courses and how well they felt their school prepped the student for post-secondary employment and education. Classroom visits were also conducted where they observed the learning objectives and teaching strategies used. The Castellano et al. (2012) study was currently ongoing at the publication of the article; so, more variables were going to be added as the study continued on throughout the course of high school for these students. A limit of the study was the difference between the study participants in the control and treatment groups.

In conclusion, the review of literature found little to no information on how the enrollment in a medical career academy program is related to student achievement with respect to attendance, on-track for graduation rates, and SBAC math and English Language Arts grades. The next logical step was to conduct a study on these variables to add value to the topic of career and technical education by analyzing the relationship of these variables through a quantitative research study method.

Synthesis and Critique of Research

Throughout the literature review, there were several themes than stood out while studying the topic of career and technical education and the benefits for those students who have enrolled in these courses. Academic achievement measured through GPA, academic achievement measured through standardized test scores and completion rates as measured through graduation and dropout rates were themes that were seen often throughout the review. Although these themes are related to this researcher's variables, there are no studies that directly look at the link between enrollment in a medical career academy program and student achievement with respect to attendance, on-track for graduation rates, and SBAC English Language Arts and math grades.

Standardized testing. A theme that was often discovered was the effect career and technical education courses have on a student's success on standardized tests. These studies (Ball et al., 2001; Brown, 2000; Ciccolo, 2008; Delling, 2006; Haniford, 2008; Pierce & Hernandez, 2014) compared students who were enrolled in career and technical education courses versus those students who were not and looked at how well they performed on various standardized tests such as the ACT, SAT, and state high school exit exams. The studies reported that students who have taken a career and technical education course perform better on the various standardized tests versus those students who have not taken a career and technical education course.

In opposition to the aforementioned findings, Sweat and Fenster (2006) reported that although technical prep students scored slightly higher than their non-technical prep students on the Georgia state ASSET exam, there was no essential difference between their scores. This was the only study that was found to disagree with the reported conclusions from other studies. With that in mind, this researcher asserts that this is an outlier and leans toward concluding that career

and technical education could have a positive effect on a student's ability to perform well on standardized testing.

Completion rates. The last theme that was prevalent in the review of literature was high school completion rates. This was measured by comparing the graduation rates and dropout rates of students that have taken a career and technical education class versus those students who have not taken a career and technical education course. The researchers (Bishop & Mane, 2004; Blosveren, 2014; Brand et al., 2013; Brown, 2000; Castellano et al., 2012; DeWitt, 2008; Flexer et al., 2011; Gottfried & Plasman, 2018; Hyslop, 2009; Kotamraju, 2011; Plank et al., 2008; Stone & Alfeld, 2004) concluded that students who have taken career and technical education courses have higher graduation rates and lower dropout rates versus students who have not taken a career and technical education course. Bozick and Dalton (2013) reported that students who enroll in career and technical education tend to have a higher probability of dropping out. It must be made clear that this connection is propelled by the low level of credits earned by these students in other academic courses not related to career and technical education.

Summary

Based on the review of literature, which develops a unique conceptual framework based on theories of the benefits of career and technical education such Hull's (1993) contextual learning theory to understand the relationship between enrollment in a CTE medical career academy program and student achievement, there is sufficient reason for thinking that an investigation examining the effect of medical career academies would yield socially significant findings. This literature review has provided strong support for this research project to answer the following multi-part research question: How does enrollment in a CTE medical career

academy program impact student achievement with respect to attendance, on-track for graduation rates, and SBAC math and English Language Arts grades.

Chapter 3: The Methodology

CTE medical career academies are examples of small learning communities that help address issues with students that can be characterized as at-risk. Career academies have rapidly expanded since their introduction to California in 1981 (Stern, Dayton, & Raby, 2000). Originally, the purpose of career academies was to cater to students that were economically or scholastically disadvantaged and help these at-risk students obtain gainful employment after high school graduation (Hanser & Stasz, 1999). Currently, educators and policy makers understand the benefit of work-based learning for career awareness, career exploration, and an opportunity to integrate college preparatory academics with career and technical education to prepare students for college and career readiness (Burnett, 1992).

It is known that career academies in general are reaching these goals, but what is not known is how well medical career academies are meeting these goals (Bunting & Erlacher, 2006; Burnett, 1992). Further research comparing students who are enrolled in a medical career academy to those who are not enrolled in a medical career academy should be further explored due to the increase in the number of students that are enrolling in these types of small learning communities (Dayton et al., 2011). Loera et al. (2016) researched the effect of the Health Science Capacity Building grant and also concluded that research needs to be done regarding medical career academies so that stronger conclusions can be made on the impact of medical career academies for the students that participate in these programs.

For this study, this researcher developed a more specific and in-depth quantitative study based on previous research that attempted to assess the benefits of participating in career academies in the high school setting. Delling (2006) revealed that students who participate in career academies in the high school setting have higher student achievement than their non-

academy peers, based on standardized tests (California High School Exit Exam and California Standards Test) and GPAs. The author looked at multiple career academies in a high school setting. This study was an extension of Delling's (2006) work through an elaboration on these perceptions by specifically researching medical career academies. The medical career academy was chosen as a focal point for this study due to the California Employment Development Department's labor market report noting that the healthcare industry is one of California's most significant and growing part of the economy (Bureau of Labor Statistics, 2017).

The first segment of this chapter discusses the purpose of this research study and restates the research questions and the matching hypotheses. The second segment explains the design, target population, instrumentation, data collection, and data analysis. The last segment will cover the limitations, validity, expected findings, ethical issues, and finally, conclude with a chapter summary.

Purpose of the Study

The purpose of this study was to determine if a CTE medical career academy program is meeting the goals of a Southern California high school's mission to prepare students to be college and career ready. This quantitative study attempted to examine if there is a benefit to partaking in this CTE medical career academy by comparing attendance rates, eleventh grade on-track for graduation rates as measured by number of credits completed, and SBAC scores of students enrolled in the medical career academy versus their non-medical career academy peers the 2016-2017 school year. The independent variable in this study was the participation in the medical career academy while the dependent variables were the various measures of student achievement that were compared.

The significance or social impact of this study is the possibility of determining the influence that CTE medical career academies have on the students who are enrolled in these programs. Knowing if student achievement is occurring in a career academy is valuable on multiple levels for the student, high school, and community. The increase in student achievement results in a student that in prepared for the rigors of post-secondary activity once they graduate high school as indicated on the College and Career Readiness Indicator, a high school that is able to prove that they are meeting their mission statement of graduating students that are college and career ready, and a community that will be able to employ responsible and able workers that are prepared to join the workforce once they graduate (Lakes & Burns, 2012). The study may also provide a basis for the target audience (i.e., school district and high schools administrators) to implement medical career academies on their campuses to target at-risk students and prepare all students to be college and career ready.

Research Questions and Hypotheses

In this study, this researcher attempted to determine if students who were enrolled in a CTE medical career academy had higher student achievement outcomes than their non-medical academy peers. The research questions were aligned with the contextual learning theory (Hull, 1993) through evidence of students participating in a systemic process of inquiry and building a framework for logical reasoning through the hands-on/work based learning done in medical career academy programs. Career and technical education is an important tool in building the health science and medical technology workforce pipeline.

The overall research question for this study was: “Do students who participate in medical career academies have higher student achievement than their non-academy peers?” The following are the research questions and hypotheses that guided this research study:

RQ1: Is there a significant difference in scores on the SBAC test of students in a medical career academy when compared to their non-medical career academy peers?

H_1A: There is a significant difference in SBAC scores of the students in a medical career academy when compared to their non-medical career academy peers.

H_1O: There is not a significant difference in SBAC scores of the students in a medical career academy when compared to their non-medical career academy peers.

RQ2: Is there a significant difference in the attendance rates of the students in a medical career academy when compared to their non-medical academy peers?

H_2A: There is a significant difference in the attendance rates of the students in a medical career academy when compared to their non-medical career academy peers.

H_2O: There is not a significant difference in attendance rates of the students in a medical career academy when compared to their non-medical career academy peers.

RQ3: Is there a significant difference in the progress to graduation as defined by number of credits completed, of the eleventh grade students in a medical career academy when compared to their non-medical academy peers?

H_3A: There is a significant difference in the progress to graduation as defined by number of credits completed of the eleventh grade students in a medical career academy when compared to their non-medical career academy peers.

H_3O: There is not a significant difference in progress to graduation as defined by number of credits completed of the eleventh grade students in a medical career academy when compared to their non-medical career academy peers.

Research Method and Design

As a researcher, there are many options when it comes to designing a research project. The research method used for this study was a quantitative, non-experimental, causal-comparative research design. The quantitative method is a way to numerically prove a hypothesis by collecting numerical data and statistically analyzing the data to answer research questions (Christensen, Johnson, & Turner, 2010). Gall, Borg, and Gall (1996) indicated that the causal-comparative method is the most basic way to explore if an independent variable has any effect on dependent variables. Causal-comparative studies must involve two or more groups being compared with the purpose of discovering cause. The quantitative, causal-comparison design was appropriate for this proposed study because the data was analyzed through statistics, the participants were enrolled in a specific medical career academy, and archival data was used (Adams & Lawrence, 2015).

For this study, secondary archived data was collected and analyzed to learn about the relationship between participating in a medical career academy program and student achievement. Secondary archived data is data that has already been collected for record keeping purposes. Ucar and Cabe (2011) found that archived online data can be used to effectively perform inquiry activities and results in conceptual understanding. Mitchell and Adler (2006), and Delling (2006) both successfully used archived data and a quantitative research design to complete similar research.

A descriptive research design would not have been appropriate for this study because this researcher began this study with a hypothesis, and data collection is observational in nature. The study used archived data and was not observational in nature. A correlational design was also not appropriate because it tends to focus on trend analysis and does not require that group

differences are caused by membership in said group in any way. A qualitative research method was not advisable as well as this type of method is defined as a way to explain phenomena through data that is provided as a narrative or picture and collected through interviews and observations (Creswell, 2014).

Target Population, Sampling Method (power) and Related Procedures

The data collection site and geographical location from which secondary archived student data was taken was a high school in an urban city in Southern California. For the 2016-2017 school year, the school had a population of over 1,200 students with a makeup of .70% African American, .40% American Indian, 1.70% Asian, 1.50% Filipino, 73.2% Hispanic or Latino, 20.7% Caucasian, and 1.90% other. For the 2016-2017 school year, 44% of the student population participated in some form of career and technical education.

The general population for this study was all high school students enrolled in CTE courses. The archival data contains records of high school students that have taken career and technical education classes in the secondary school setting, specifically medical career academy courses. The sample for this study was the juniors and seniors who were enrolled in the medical career academy program for the 2016-2017 school year. The makeup of the population was predominantly Hispanic or Latino and socioeconomically disadvantaged with over 77% of students qualifying for free or reduced price lunches. This secondary school qualifies as a Title I school meaning it is eligible for federal financial assistance to ensure that all students are meeting state academic standards regardless of having high number of children from low-income families.

The sample size for the proposed study was determined by using the G*Power 3.1 calculator (Faul, Erdfelder, Buchner, & Lang, 2009). Since Hotelling's T^2 is a one-way

MANOVA where the independent variable has only two groups, this researcher selected the F-test for MANOVA: Global effects with a power analysis of A priori, which computes required sample size given α, power, and effect size for two groups. This setting resulted in the G*Power 3.1 calculator computing an estimated total sample size of 176 for both groups with 88 in each set. The total sample size was met with the target population of students with a 95% confidence level and a 5% margin of error.

The confidential data was delivered through an Excel spreadsheet file from the school district. All indicators of student names or identification numbers were deleted and numerical identifiers were assigned instead. All secondary archived data was stored on a private, personal laptop computer that was password-protected and locked. Although there were 124 participant data sets in the medical career academy student data, six of those participant data sets were incomplete leaving only 118 participant data sets for the final sample size for each group.

Sampling procedures were randomized for the non-medical academy students through the Research Randomizer website (Urbaniak & Plous, 2017). The total number of 118 sets was entered as one. There were a total of 999 student data sets with a number range from 1 to 999 students. The students in the medical career academy were pulled out of the collected data leaving 875 student data sets. The remaining students were then pulled randomly using the Research Randomizer website. The program generated 118 random numbers determined as the sample size for students who were not enrolled in the medical career academy program.

Instrumentation

The secondary archived data was sourced from the information database used in the school district called Aeries Student Information System from Eagle Software. The system incorporates real time data synchronizing and immediate access to district information, student

demographics, attendance, grades, and test scores. The secondary archived data provided two scores for the SBAC standardized test, one for English Language Arts and one for math for each student.

The SBAC is a relatively new test that replaced the California High School Exit Exam. To determine success on the SBAC test, which tests eleventh graders' ability in math and Language Arts, the researcher must look at the scores for each section. Different scale levels can also categorize the level of academic achievement as shown in Appendix A. The scaling was not used in this study as just the number score was analyzed.

In eleventh grade, the minimum score is 2,299 and the maximum score is 2,795 for English Language Arts. There are four area achievement level descriptors for the ELA section of the SBAC. They are as follows:

- Reading: Demonstrating understanding of literary and non-fictional texts
- Writing: Producing clear and purposeful writing
- Listening: Demonstrating effective communication skills
- Research/Inquiry: Investigating, analyzing, and presenting information

In eleventh grade, the minimum score is 2,280 and the maximum score is 2,862 for mathematics. There are three area achievement level descriptors for the math section of the SBAC. They are as follows:

- Concepts and Procedures: Applying mathematical concepts and procedures
- Problem Solving and Modeling/Data Analysis: Using appropriate tools and strategies to solve real-world and mathematical problems
- Communicating Reasoning: Demonstrating ability to support mathematical conclusions.

Validity of the SBAC is based on the technical quality of the summative assessments. The Common Core State Standards are recognized as the standards for college and career readiness in the secondary setting. The SBAC summative assessments essentially cover the breadth and depth of these assessable Common Core State Standards through content specifications and test blueprints (Smart Balanced Assessment Consortium, 2016).

Progress to graduation is measured by the number of credit hours a student has completed compared to the number of credit hours the student should have to be on track to graduate in a 4-year period. To earn a high school diploma in the state of California, a high school student is required to complete 220 local units for graduation. To determine how many credits entering students have earned toward local graduation requirements, the local credit units awarded for 1 year of study is multiplied by the number of qualifying yearlong courses they have completed.

Attendance rates are the number of days that students have attended for a givens school year. Attendance rates are measured by the number of days that a student is in class subtracted from the 180 school days that are in a calendar year. Louis, Bastian, McKimmie, and Lee (2015) found that high attendance rates are closely related to student achievement, and student success can be based on the amount of time a student is in the classroom.

Data Collection

Because this quantitative study was conducted using archival data, this researcher accessed the archived database for the 2016-2017 school year and collected data on the students that were enrolled in the medical career academy and those that were not enrolled in the medical career academy. To begin this process, this researcher contacted the superintendent of the school districts explaining the purpose of the dissertation. The secondary archived data was provided from the data department in the school district in an Excel version 15.32 spreadsheet file and

stored on a private, locked laptop. The school district de-identified the student information. The data was organized alphabetically using Excel and had an indicator regarding enrollment in the medical career academy program.

The students in the medical career academy were pulled out of the collected data. Originally, there were 124 student record sets for the CTE medical career academy participants but 6 were missing data, so those participant data sets were not used, leaving 118 participant data sets. Sampling procedures were randomized for the non-medical academy students through the Research Randomizer website (Urbaniak & Plous, 2017). There were a total of 875 student data sets with a number range from 1 to 875 students. The non-academy students were pulled randomly using the Research Randomizer website. The program generated 118 random numbers determined as the sample size for students who were not enrolled in the medical career academy program.

Operationalization of Variables

Operationalization of variables is the process of strictly defining variables into measurable factors. It defines the exact measuring method used and allows others to follow the same methodology.

Academic achievement. Academic achievement is defined by how well a student does in school. For the purpose of this study, academic achievement was defined by attendance, performance on standardized tests such as the SBAC, and progress to degree as defined by completion of credit hours. York, Gibson, and Rankin (2015) asserted that academic achievement is the result of obtaining mastery of learning objectives, skills, and competencies.

Standardized test scores. The SBAC was introduced in the spring of 2015 to replace the California High School Exit Exam (CAHSEE) and is given to high school students in Grade

11. The Common Core computerized exam focuses on English Language Arts and math. The purpose of the SBAC is to ensure that all students who graduate high school are college and career ready through increased student achievement and improved teaching (SBAC, 2010). Benjamin and Pashler (2015) found that the SBAC can be used as a tool in learning and not just another standardized assessment due to its computer-adaptive testing system.

Progress to graduation. Progress to graduation is defined as the rate at which a student participates in study that is correlated with persistence. Voight and Hundrieser (2008) indicated that students are able to demonstrate their ability to move toward completion of school by demonstrating mastery of competencies and skills learned in a course of study. Allensworth and Easton (2005) found that students who are on track to graduation at the end of their freshman year are 3.5 times more likely to graduate than students who are off track.

Attendance. Attendance rates are based on the amount of time that a student is counted in attendance to class on a daily basis divided by the 180 school days that are in a calendar year. High attendance rates are closely related to student achievement. The most effective teacher's ability to provide learning opportunities is adversely affected by chronic student absenteeism.

Students who attend school on a regularly basis have higher student achievement than their non-regular attendance counterparts (Louis et al., 2015). A student's success is based on the amount of time that a student spends in the classroom. Poor attendance patterns can lead to student dropouts and lower graduation rates as well.

Data Analysis Procedures

Once the data was transferred to IBM SPSS Statistics, it was prepared for analysis through cleaning, which removed errors or anomalies. A student was given a code of 1 for participation in the medical career academy program and a code of 2 for non-participation.

Students were also separated out based on their grade level. If a student was a senior, he or she was given a 1 and if the student was a junior, he or she was given a 2. Senior students were given a code of 1 for graduating that school year and a code of 2 for not graduating although all students in the sample graduated the 2016-2017 school year. The data was then transferred to the IBM SPSS Statistics program and prepared for analysis through cleaning which will remove errors or anomalies. There were six participant data sets that were missing variables so those participant data sets were discarded.

The SBAC data was analyzed using Hotelling's T^2 procedure. Hotelling's T^2 is a special case of the one-way multivariate analysis of variance (one-way MANOVA) where the independent variable has only two groups and an extension of the independent-samples *t*-test to incorporate two or more dependent variables (Laerd Statistics, 2017). This data analysis was appropriate because the study fit the assumptions that must be considered before using Hotelling's T^2 because this study has two dependent variables (SBAC English and math scores) that are measured in a continuous level and one independent variable (participation in the medical career academy program) that consists of two categorical independent groups, and has independence of observations. The secondary archival data for attendance rates and on track for graduation rates were analyzed using an independent-samples *t*-test since there was only one dependent variable. Since the attendance data was skewed, the non-parametric Mann-Whitney U was used to analyze the data.

Limitations and Delimitations of the Research Design

This researcher recognized that there were certain limitations inherent in conducting this study. The limitations were:

1. The quantitative causal-comparative study design is a limitation as it may be difficult to explain why there are any significant differences in the data if they should appear. This is termed the post hoc fallacy and occurs when researchers attribute causation between groups where no cause can be established. In an attempt to make this proposed study stronger in light of this limitation, a variety of dependent variables were analyzed to show student success.
2. The fallacy of homogeneity is also a limitation of causal-comparative designs that assumes that all members of a racial or ethnic groups are similar. To strengthen this study, the groups were taken from the same school and similar ethnic background, and socioeconomic status.
3. The study was based on secondary archived data, which may or may not have been entered correctly. The data is quality data despite being archived and came from a reliable data house that has a clean and accurate data record.

This researcher also recognized that there was a delimitation in conducting this research study. The delimitation was the sample was delimited to one medical career academy in Southern California; however, there is no reason to believe that it is not representative of students in other medical career academy programs outside of California.

Internal and External Validity

Validity means that the study is accurate in its findings or measures. It is difficult to control every irrelevant variable in a study, which is why it is important to look at internal validity. Internal validity is the degree to which one can say that there is a relationship between the variables (Adams & Lawrence, 2015). Threats to internal validity include history, maturation, testing, instrumentation, selection, experimental mortality, design contamination, and

the “John Henry effect,” which occurs when the control group has knowledge of its role in an experiment. This can result in the control group behaving differently in order to have an advantage over the experimental group.

Since the secondary data was archived, there were no new events concerning student achievement, so the threat on internal validity by history was controlled. The secondary archived data came from one school year, so there was no threat of maturation. No students dropped out of the study due to the archived data, so there was no threat of experimental mortality.

Because this study was retrospective in nature, there was no threat of instrumentation, design contamination, or the John Henry effect. Not all student participant data sets in the proposed study were randomly selected, so there may have possibly been a threat to internal validity (Creswell, 2014). All efforts were made to control this factor because the subjects are mostly low-socioeconomically disadvantaged Hispanic or Latino students in the same age groups with equal numbers of male and female participants. Concerning the validity of standardized tests being used as an indicator of secondary school student success, Geiser and Santelices (2007) found that standardized tests are the gold standard predictor of a student’s success in college.

As previously mentioned, external validity is the degree to which we can say that the results of the study are accurate and can be generalized across a population (Adams & Lawrence, 2015). There is no reason to believe that the sample in the study would not be representative of the general population of high school students in Southern California as well as for the general population of career and technical education students outside of California. This study is reliable because it can be replicated in other secondary school districts that are located in an urban setting

with a student population that is predominantly of Hispanic or Latino background and comes from socioeconomically disadvantaged homes with medical career academy programs.

Study Findings

Due to increases in enrollment numbers and the amount of money that California is spending to support career academies through the HSCB Grant Program, it was necessary to determine if there was a relationship between participation in a CTE medical career academy and student achievement (Dayton et al., 2011; Loera et al., 2016). This study examined several measures of student achievement including SBAC English and math scores, attendance, and on-track progress to graduation of students that have participated in the medical career academy program at one school compared to their non-participating student counterparts.

This researcher expected to find that the students that participate in the medical career academy program would have a significantly greater amount of student achievement when compared to those students that did not participate in the medical career academy program as found in other similar studies done by Delling (2006) and Mitchell and Adler (2006). It was also expected that there would be a significant difference in SBAC English and math scores, significant difference in the attendance rates, and a significant difference in the progress to graduation (as measured by credits completed) of the students in the CTE medical career academy when compared to their non-medical career academy peers.

Ethical Issues in the Study

For this study, this researcher was required to review secondary data from an archival source. Permission to access the data from the high school's AERIES data system at the Southern Californian School District was obtained. Collecting data on human subjects still carries the risk of harm that must be minimized as much as possible. Tripathy (2013) indicated

that while gathering secondary data saves time, money, and resources, fundamental ethical issues still remain. New technology makes data sharing, compiling, and storing much easier, yet raises issues about confidentiality and security.

All data for this study was stored on a secure, password-protected, locked laptop so access to the data was restricted as much as possible. None of the data was stored on a cloud. One of the main concerns with secondary data analysis is the potential for identification of the participants. The participants were guaranteed anonymity, so no consent was needed from participants. The geographical locale of the schools was used, but no names or other personal identifiers of the student or specific school names or school districts were used. All data records were assigned numerical identifiers, such as "Case 1" as opposed to student names or student identification numbers to protect the confidentiality and privacy of all student subject data. School demographics and testing results are considered public data and did not violate any privacy laws. The data will be destroyed after 3 years of storage.

Summary

In conclusion, before this study, it was unknown if there is a positive effect on the student achievement of students that participate in a CTE medical career academy when compared to their non-academy peers. The purpose of this quantitative causal-comparative research design study was to determine if there were group differences between student achievement (as measured by the SBAC math and English Language Arts scores, attendance, and on-track for graduation for significant differences) and participation in a career and technical education medical career academy program in the secondary school setting. The overall research question for this study was, "Do students who participate in CTE medical career academies have higher student achievement than their non-academy peers?"

The secondary archival SBAC English and math score data from the 2016-17 school year was analyzed using Hotelling's T^2 procedure. The secondary archival data for attendance rates and on track for graduation rates were analyzed using an independent-samples *t*-test, since there was only one dependent variable. Since the attendance data was skewed, the non-parametric Mann-Whitney U was used to analyze the data.

Although it was factually unknown before commencing this study, this researcher assumed that there would be a significant difference in the student achievement variables of the CTE medical career academy participants when compared to their non-participating counterparts. Students in career and technical education courses are able to use the contextualized instruction they are receiving in the classroom and make meaning of the new information they are obtaining through their past experiences. Knowing if student achievement is occurring in this career academy is significant for the student, high school, and community because it results in a student that is college and career ready.

Chapter 4: Data Analysis and Results

As previously mentioned, career academies in general are beneficial for students. Before commencing this study regarding the extent of influence that medial career academies have on student achievement, the answer was unknown. Dayton et al. (2011) suggested that further research comparing students who are enrolled in a medical career academy to those that are not enrolled in a medical career academy should be further explored due to the increase in the number of students enrolling in these types of small learning communities. Loera et al. (2016) indicated that research be completed for medical career academies so that stronger conclusions can be made regarding the influence of medical career academies on the students that participate in these programs.

The purpose of this causal-comparative quantitative study was to determine if career and technical education medical career academy program high school student participants has a significant influence on student achievement when compared to non-academy peers. This researcher examined if there is a benefit to joining a medical career academy by comparing secondary archival data attendance rates, on track for graduation rates, and SBAC math and English Language Arts scores of junior and senior students who were enrolled in a medical career academy versus their non-medical career academy peers the 2016-2017 school year. The sample for this study was delimited to one medical career academy in Southern California, but was expected to be representative of students in other medical career academy programs outside of California.

The secondary archival data for SBAC math and English Language Arts scores data was analyzed using Hotelling's T^2 procedure. Validity of the SBAC is based on the technical quality of the summative assessments. The Common Core State Standards are recognized as the

standards for college and career readiness in the secondary setting. The SBAC summative assessments cover the breadth and depth of these assessable Common Core State Standards through content specifications and test blueprints (Smart Balanced Assessment Consortium, 2016).

The secondary archival data for attendance rates and on-track for graduation rates were analyzed using an independent-samples *t*-test, since there was only one dependent variable. The Mann-Whitney U test was used for attendance rates as the data was skewed. This chapter provides a summary of the research, a detailed analysis of the data that was collected for this study, and tables and figures to display the findings.

Research Questions and Hypotheses

The overall research question for this study was: "Do students who participate in CTE medical career academies have higher student achievement than their non-academy peers?" The following are the research questions and hypotheses that guided this research study:

RQ1: Is there a significant difference in scores on the SBAC test of students in a medical career academy when compared to their non-medical career academy peers?

H_1A: There is a significant difference in SBAC scores of the students in a medical career academy when compared to their non-medical career academy peers.

H_1O: There is not a significant difference in SBAC scores of the students in a medical career academy when compared to their non-medical career academy peers.

RQ2: Is there a significant difference in the attendance rates of the students in a medical career academy when compared to their non-medical academy peers?

H_2A: There is a significant difference in the attendance rates of the students in a medical career academy when compared to their non-medical career academy peers.

H_2O: There is not a significant difference in attendance rates of the students in a medical career academy when compared to their non-medical career academy peers.

RQ3: Is there a significant difference in the progress to graduation as defined by number of credits completed, of the eleventh grade students in a medical career academy when compared to their non-medical academy peers?

H_3A: There is a significant difference in the progress to graduation as defined by number of credits completed of the eleventh grade students in a medical career academy when compared to their non-medical career academy peers.

H_3O: There is not a significant difference in progress to graduation as defined by number of credits completed of the eleventh grade students in a medical career academy when compared to their non-medical career academy peers.

Description of the Sample

While only archival data was used, the representative sample was from a high school in an urban city in Southern California. The data was obtained from the school district's data department on an Excel spread sheet with a combined total of 999 junior and senior students, which was stored on a private, password-protected laptop accessible only to this researcher.

An initial G*Power 3.1 calculation for MANOVA found an estimated total sample size of 176 participants, 88 per group (Academy/Non-Academy students), for a power of .95. After reviewing the secondary data, it was determined that it was necessary to use different analysis methods (independent-samples *t*-test) for the attendance and progress to graduation as measured by units completed which required new G*Power 3.1 calculations. This researcher used the independent-samples *t*-test G*Power 3.1 setting and found an estimated total sample size of 184, 92 per group (Academy/Non-Academy students), for a power of .95.

The secondary archival data was separated into students who were part of the medical academy and students who were not part of the medical academy who were de-identified and assigned study identification numbers. If any of the participant data sets were missing information, it was not used for analysis. This researcher originally had 124 student record sets for the CTE medical career academy participants but 6 were missing data, so those participant data sets were not used, leaving 118 participant data sets. The total sample size used for this for this study was 236 participants, 118 per group (Academy/Non-Academy students) which was greater than the recommended number of data sample sets from both the MANOVA and independent-samples *t*-test G*Power 3.1 calculation (Faul et al., 2009).

This researcher then used the Research Randomizer website, as suggested by Urbaniak and Plous (2017), to create the randomly selected 118 non-medical academy participant samples to complete a total sample size of 236. None of the randomly selected non-medical academy participant samples were missing data. The medical academy students were 62% (74) female and 38% (44) male. Grade wise, 44% (53) of the population were eleventh grade students and 56% (65) were twelfth grade students. The non-medical academy students were 48% (58) female and 52% (60) male. Grade wise, 52% (62) of the population were eleventh grade students and 48% (56) were twelfth grade students.

Research question number 3 asked if there was a significant difference in the progress to graduation as defined by number of credits completed of the students in the CTE medical career academy when compared to their non-medical academy peers. It was decided that only the student data sets from the junior students would be used for this data analysis. This change was made because it was expected that senior students already had a comparable amount of credits completed if graduating that year, and all of the seniors in the sample graduated.

Summary of the Results

Threats to internal validity often include history, maturation, testing, instrumentation, selection, experimental mortality, design contamination, and the John Henry effect, which occurs when the control group has knowledge of its role in an experiment. Since the secondary data was archived, there were no new events concerning student achievement, so the threat on internal validity by history was controlled. The secondary archived data came from one school year so there was no threat of maturation. No students could drop out of the study due to the archived data so there was no threat of experimental mortality. Because the study was retrospective in nature, there was be no threat of instrumentation, design contamination, or the John Henry effect.

Not all student participants in the study were randomly selected, so there may be a threat to internal validity. All efforts were made to control this factor because the secondary archival participant data sets were from mostly low-socioeconomically disadvantaged Hispanic or Latino students in the same age groups with equal numbers of male and female participants. Concerning the validity of standardized tests being used as an indicator of secondary school student success, Geiser and Santelices (2007) found that standardized tests and the gold standard for predicting a student's success in college.

This researcher recognized that there are certain limitations inherent in conducting this study. The quantitative causal-comparative methodology was a limitation, as it may be difficult to explain why there are any significant differences in the data if they should appear. In an attempt to make this study stronger in light of this limitation, a variety of dependent variables were analyzed to assess student success. Another limitation for this study is based on the use of secondary archived data, which may or may not have been entered correctly. The data is

assumed to be quality data despite being archived and is coming from a reliable data house that has a clean and accurate data record so this has reduced or eliminated this threat.

The SBAC math and English Language Arts scores data was analyzed using Hotelling's T^2 procedure. Hotelling's T^2 is a special case of the one-way multivariate analysis of variance (one-way MANOVA) where the independent variable has only two groups and an extension of the independent-samples *t*-test to incorporate two or more dependent variables (Laerd Statistics, 2017). The independent variable was the participation in the medical career academy, and the dependent variables were the English and math scores from the SBAC standardized test. The completed data analysis showed no significant difference between medical career academy students versus their non-medical career academy peers regarding SBAC math and English Language Arts scores.

Hotelling's T^2 procedure was chosen over Wilk's Lambda because Hotelling's T^2 procedure is useful when examining differences between two groups, and Wilk's Lambda requires a good balance between power and assumption. The attendance rates and on-track for graduation rates were analyzed using an independent-samples *t*-test. Independent-samples *t*-tests are used when a researcher wants to compare the mean score on a continuous variable for two different groups of participants. The independent variable was the participation in the medical career academy and the dependent variable was attendance rates and on track for graduation rates. Once the attendance data was reviewed, this researcher determined that the data for the attendance rates was skewed and leptokurtic so the Mann-Whitney U test was used as a non-parametric alternative to the independent-samples *t*-test.

The data analysis indicated that there was no significant difference between medical career academy students versus their non-medical career academy peers regarding attendance

rates. The data analysis showed a statistically significant difference in the on-track for graduation rates (credits completed) of the eleventh grade medical career academy student versus their non-medical career academy peers.

Detailed Analysis

A quantitative causal-comparative study design was used to analyze secondary archival data to determine if the career and technical education medical career academy program high school students had significant differences in student achievement when compared to non-academy peers.

RQ 1: Is there a significant difference in scores on the SBAC test of students in the medical career academy when compared to their non-medical career academy peers? A multivariate analysis of variance or MANOVA was done to determine if there was a statistically significant difference between the participants and non-participants. Specifically, the data was analyzed using Hotelling's T^2 procedure. As previously mentioned, Hotelling's T^2 is a special case of the one-way multivariate analysis of variance (one-way MANOVA) where the independent variable has only two groups and an extension of the independent-samples *t*-test to incorporate two or more dependent variables (Laerd Statistics, 2017).

This study had one independent variable (participation in the medical career academy program) that consisted of two categorical independent groups and two dependent variables (SBAC math scores and SBAC English scores). One participant data set was an outlier, so it was removed as shown in Figure B1 in Appendix B and Figure C1 in Appendix C because a MANOVA is very sensitive to outliers leaving 235 cases as part of the remaining participant data sets tested. Correlation between the 2 dependent variables (r = .769) indicated that

multicollinearity was present (> .700) a MANOVA violation. The dependent variables were measured on a continuous level and were normally distributed so MANOVA was indicated.

Box's test of equality of covariance matrices indicated that the assumption of equal covariance matrices had been satisfied at .365 with a $p > .05$. Levene's Test of Equality of Error Variances indicated that the assumption of equal variances across both dependent variables had been satisfied. Multivariate tests indicated that there were no significant differences in the SBAC English and math scores based on the participation in the medical academy, $F(2, 232) = .124$, $p = .883$; Hotelling's Trace = .001; partial eta squared = .001 as shown in Table 1. Hotelling's T^2 was used because it is useful when examining differences between two groups (Laerd Statistics, 2017).

Table 1

Multivariate Analysis of Variance Summary for SBAC scores

Source	*Df*	*F*	*Eta*^{2}	*p*
SBAC Scores	*2*	*.124*	*.001*	*.883*

It should be noted that the observed explanatory capability (post hoc power) of this study was < 10%, which could possibly indicate that these were false negatives. For each of the dependent variables, by examining the Kolmogorov-Smirnov tests and the skew and kurtosis statistics, the univariate normality was tested. Additionally, a Q-plot of each was examined as shown in Figure D1 in Appendix D and Figure E1 in Appendix E. These results fell within normal limits indicating the two dependent variables were normally distributed and satisfied the requirements for MANOVA.

The univariate test for each of the dependent variables indicated that there were no significant differences in the scores based on participation in the medical academy ($p > .05$), and similar to the MANOVA, the post hoc power for the ANOVAs were also < 10% (SBAC English: 1-ß = .58 and SBAC math: 1-ß = .051). After an adjustment for the alpha error inflation, the pairwise combinations across the different levels of the dependent and independent variables indicated that there were no significant differences in the SBAC scores based on participation in the academy ($p > .05$).

Lastly, using the marginal means to test for simple main and interaction effects, both the multivariate and univariate tests indicated there were no significant differences in the scores based on participation in the academy ($p > .05$). The combined group means were not

statistically different ($p > .05$). Therefore, this researcher could not reject the null hypothesis for this research question and could not accept the alternative hypothesis.

RQ 2: Is there a significant difference in the attendance rates of the students in the medical career academy when compared to their non-medical academy peers? Research question number two was analyzed using the Mann-Whitney U test. An inspection of the skew and kurtosis indicated that the number of days missed was excessively skewed and leptokurtic, which is illustrated when examining the Figure F1 Q-Q plot in Appendix F and the histogram for days missed in Figure G1 in Appendix G.

With $p > .05$, the Mann-Whitney U test found no significant difference in attendance rates of students who participated in the medical academy ($Md = 126.43$, $n = 118$) and their non-participant counterparts ($Md = 110.57$, $n = 118$), $U = 6026.50$, $z = -1.789$, $p = .074$, $r = .12$ as indicated in Table 2. This researcher cannot reject the null hypothesis for this research question and cannot accept the alternative hypothesis.

Table 2

Mann Whitney-U Test Results for Number of Days Missed

Source	Participation in Academy	*N*	Mean Rank	Rank Sum	*U*	*p*
Number of days missed	Yes	118	126.43	14918.50	6026.50	.074
	No	118	110.57	13047.50		

RQ 3: Is there a significant difference in the progress to graduation of the eleventh grade students in the medical career academy when compared to their non-medical academy peers? As previously mentioned, a comparison of only the eleventh grade students were used because it was expected that senior students already have a comparable amount of

credits completed if graduating that year. It was also taken into consideration that no student in either of the samples failed to graduate.

An independent samples *t*-test was conducted to compare the progress to graduation (number of credits completed) for eleventh grade students in the medical career academy and their non-participant counterparts. With the assumption of equal variances satisfied (Levene's $p > .05$), there was a significant difference in the number of credits completed by eleventh grade students based on participation in the academy $t(113) = 2.389$, $p = .019$ as shown in Table 3. The students that participated in the academy ($M = 199.21$, $SD = 18.351$) had significantly more credits completed than their non-participating counterparts ($M = 189.41$, $SD = 24.552$). The number of CTE medical career academy student credits completed was 9.796, 95% CI [1.67 to 17.9] higher than non-participant student credits completed. There was a statistically significant difference between means ($p < .05$), and therefore, this researcher rejected the null hypothesis and accepted the alternative hypothesis.

Table 3

Independent Samples T-Test for Progress to Graduation

Source	*N*	*Mean*	*SD*	*t*	*Df*	*p*
Academy participant	53	199.21	18.35	14918.50	113	.019*
Non-Academy participant	62	189.41	24.55	13047.50		

Note. *$p < .05$

Summary

The purpose of this causal-comparative quantitative study was to determine if a significant difference existed between career and technical education medical career academy

program high school students compared to non-academy peers in student achievement. This researcher examined student achievement by looking for significant differences in attendance rates, on track for graduation rates, SBAC math and English Language Arts scores of students who were enrolled at one high school's medical career academy versus their non-medical career academy peers the 2016-2017 school year.

The completed data analysis found that there was no significant difference between medical career academy students versus their non-medical career academy peers regarding attendance rates. The completed data analysis also found no significant difference between SBAC math and English Language Arts scores. The completed data analysis found a statistically significant difference in the on-track for graduation rates (credits completed) of the eleventh grade medical career academy student versus their non-medical career academy peers.

Chapter 5: Discussion and Conclusion

Career academies were created over 40 years ago with an original purpose of keeping at-risk students engaged and in high school (Hanser & Stasz, 1999). In their current state, they are an amalgamation of the archaic idea of career and technical education from the 1970s and the recent push for college and career readiness in secondary schools today with an emphasis on skilled occupations with an academic focus. Career academies tend to be described as small learning communities or schools within a school and feature a more personalized and supportive learning environment for the participating students (Kemple, 2008).

The National Career Academy Coalition (2017) reported that there are over 7,000 career academies across the United States servicing approximately one million students. Research has shown that career academies improve student engagement and achievement while enhancing the student's earning ability and future job prospects (Brand, 2009; Delling, 2006; Dougherty, 2016; Kemple, 2008; Loera et al., 2016). What was not known, however, was how CTE medical career academies are improving student outcomes.

The purpose of this causal-comparative quantitative study was to determine if career and technical education medical career academy program high school student participants have significant differences in student achievement when compared to their non-academy peers. This researcher examined if there is a benefit to partaking in a medical career academy by comparing secondary archival data attendance rates, on-track for graduation rates for junior students as measured by number of credits completed, and SBAC math and English Language Arts scores of junior students that were enrolled in the medical career academy versus their non-medical career academy peers the 2016-2017 school year.

This chapter reviews the results of this study, which provides the reader with an understanding of the overall study. The discussion of the results gives the reader this researcher's interpretation of the results and the implications. It discusses the results in relation to the literature and the limitations for this study. This chapter also reviews the implication of the results for practice, policy, and theory, and provides recommendations for future research.

Summary of the Results

The overall research question for this study was: "Do students who participate in medical career academies have higher student achievement than their non-academy peers?" The following are the research questions and hypotheses that guided this research study:

RQ1: Is there a significant difference in scores on the SBAC test of students in a medical career academy when compared to their non-medical career academy peers?

H_1A: There is a significant difference in SBAC scores of the students in a medical career academy when compared to their non-medical career academy peers.

H_1O: There is not a significant difference in SBAC scores of the students in a medical career academy when compared to their non-medical career academy peers.

RQ2: Is there a significant difference in the attendance rates of the students in a medical career academy when compared to their non-medical academy peers?

H_2A: There is a significant difference in the attendance rates of the students in a medical career academy when compared to their non-medical career academy peers.

H_2O: There is not a significant difference in attendance rates of the students in a medical career academy when compared to their non-medical career academy peers.

RQ3: Is there a significant difference in the progress to graduation as defined by number of credits completed, of the eleventh grade students in a medical career academy when compared to their non-medical academy peers?

H_3A: There is a significant difference in the progress to graduation as defined by number of credits completed of the eleventh grade students in a medical career academy when compared to their non-medical career academy peers.

H_3O: There is not a significant difference in progress to graduation as defined by number of credits completed of the eleventh grade students in a medical career academy when compared to their non-medical career academy peers.

The conceptual framework that steered this research was based on the contextual learning theory (Hull, 1993). The theory asserts that learning only occurs when students are able to obtain new information in such a way that it makes sense to them in their own frame of reference. Career and technical education is able to do this through directing the academic learning in a career context. Wisley (2009) found that students who are enrolled in courses that are tailored to their specific career interests have higher student achievement when compared to students in a traditional academic course.

Three different analysis procedures were used in this causal-comparative quantitative study. The secondary archival data for SBAC math and English Language Arts scores data were analyzed using Hotelling's T^2 procedure. The secondary archival data for attendance rates were analyzed using an independent-samples *t*-test, since there was only one dependent variable. The secondary archival data for on track for graduation rates (as measured by number of units completed by eleventh grade students) was originally planned to be analyzed using an independent-samples *t*-test but the data was excessively skewed and leptokurtic, so a Mann-

Whitney U test was used in its place as a non-parametric alternative for the independent-samples *t*-test.

The completed data analysis found that there is no significant difference between CTE medical career academy students versus their non-medical career Academy peers regarding attendance rates and SBAC math and English Language Arts scores. The completed data analysis found a statistically significant difference in the on-track for graduation rates (credits completed) of the eleventh grade medical career academy student versus their non-medical career academy peers.

The results of this study demonstrate that participating in career and technical education courses, more specifically a CTE medical career academy, does not hinder a student's academic achievement. CTE courses in fact complements a student's academic achievement. Students that participate in career and technical education do just as well as those students that do not participate in career and technical education. Students can valuably explore career interests and prepare to be college and career ready at the same time.

Discussion of the Results

Standardized test scores. Multivariate tests indicated that there were no significant differences in the SBAC English and math scores based on the participation in the medical academy, $F(2, 232) = .124$, $p = .883$; Hotelling's $T^2 = .001$; partial eta squared = .001. It should be noted that the observed explanatory capability (post hoc power) of the study was < 10%, which could possibly indicate that these are false negative results. This result is in line with research that was described in Chapter 2 and in turn means that students who participate in medical career academies are doing no harm to their ability to be college and career ready when they graduate high school.

Dougherty (2016) posited that one of the main issues with career and technical education is that specialization in career pathway might cause a student to trade that knowledge for the knowledge he or she may have received in a traditional academics or college prep courses. The author added that one might worry that standardized test scores may well be lower when compared to students who do not participate in career and technical education courses. The practical implications of this finding are that schools should not be afraid to implement and promote career academy types of programs because they feel such courses might affect the outcome of state standardized testing, which is so publicly viewed as the only data that matters for a school's success. Connecting students with opportunities such as a medical career academy will only ensure that they obtain the skills that the labor market is demanding and make them college and career ready.

Attendance. Grades and student achievement are strongly tied to course attendance (Allensworth & Easton, 2007). Concerning research question 2, the Mann-Whitney U test found no significant difference in attendance rates of students who participated in the medical academy (Md = 126.43, n = 118) and their non-participant counterparts (Md = 110.57, n = 118), U = 6026.50, z = -1.789, p = .074, r = .12. This was likely due to the low post hoc power of the study and a product of the small effect size. This analysis has a potential to be a false negative due to the low effect size.

Personally, this researcher has had students on many occasions say that they would not be in school that day if it were not for the fact that they had their career and technical education class that day. Students are excited about these classes because they are giving them an opportunity to explore career pathways in which they are really interested. This researcher

would guess that if a larger sample was used, it may have had a positive effect on the effect size and power of the study and the differences would have been significant.

These results are not in line with the research that was described in Chapter 2. Career and technical education courses have the capacity to engage students (Stone & Alfeld, 2004). Bishop and Mane (2004) found that when CTE is introduced to a high school environment, students who take the classes are persuaded to stay in school longer than the students who do not take the classes. Career and technical education has the ability to motivate and engage students, so they attend school more regularly and consequentially improve their core academic skills (Jacob, 2017). These results of this study show that there is no hindrance to the attendance of high school students.

On-Track for graduation. The independent samples *t*-test found that the students who participate in the academy (M = 199.21, SD = 18.351) have significantly more credits completed than their non-participating counterparts (M = 189.41, SD = 24.552). The number of medical career academy student credits completed are 9.796, 95% CI [1.67 to 17.9] higher than non-participant student credits completed.

Hull's (1993) contextual learning theory is strengthened through the results of this study because it demonstrates evidence of students participating in a systemic process of inquiry and building a framework for logical reasoning through the hands-on, work-based learning done in medical career academy programs. This study shows that medical career academy students are motivated and there is enthusiasm in enrolling in these courses and completing more course credits when compared to their non-medical academy participating peers.

The practical implications for this finding is that students in the medical career academy are gathering course completion credits faster than their non-participating peers, which in turn

means that these students are on track to graduation at a faster rate. Schools can use these types of programs to ensure that students have the appropriate amount of credits to graduate and at the same time produce students that are completing a career pathway, which is a requirement of the College and Career Indicator.

Discussion of the Results in Relation to the Literature

The key finding from this study, which is in line with what Bozick and Dalton (2013) and Kemple (2008) found, is that it is possible to prepare students to be college and career ready without compromising any of the traditional college preparatory academics in a medical career academy program. This finding also parallels what Dougherty (2016) found as well. The school-to-work transition can be smoother and successfully completed with a combination of career and technical education and traditional academic courses.

Standardized test scores. Standardized test scores have long been a strong predictor of student success (Hoffman & Lowitzki, 2005). The results of this study are consistent with Dougherty' (2016) study and Bozick and Dalton's (2013) findings that career and technical education does not hinder a student's academic progress. However, the results of this study do not support what Ball et al. (2001), Delling (2006), Pierce and Hernandez (2014), and Haniford (2008) reported on there being a relationship between student participation in career and technical education and improved performance on state test performance. Despite this, the results of this study show that career and technical education is not a hindrance to the SBAC and would not affect the College and Career Indicator requirement for the SBAC. Students are able to gain the technical skills required for employment in their chosen career path and still do just as well as their non-CTE peers on state tests.

Attendance. While the results of this study do not show a significant difference in the attendance rates, there could be an association between attendance and number of credits completed while in the medical career academy. Students must attend class to do well and complete the course to obtain units. It is very difficult to be successful academically if the student is not in school.

Brown (2000) found that student's attendance rates average 1.5% higher in CTE students, and Bishop and Mane (2004) supported this by indicating that students in CTE courses are persuaded to stay in school longer than students who had not taken the class. DeWitt (2008) reported that in 1998, the University of Michigan found that high-risk students are eight to ten times less likely to drop out of school, fail the course, or be absent from class if they are in CTE courses. Having a career and technical program at a high school can reduce that school's overall dropout rate by 6%.

This researcher asserts that although there is not a significant difference in attendance between the students that participate in the medical career academy and those who do not, the implications for this finding are still valid. More often than not, previous research has shown that there is a relationship between career and technical education and staying in school. Administrators should use this finding to promote access to high quality career and technical education programs so students have the choice between going to a 4-year college and starting a career in one of the new-collar jobs. Schools need to break away from the "bachelor degree or bust" mentality.

On-Track for graduation. In a study by Castellano et al. (2012), the results indicated that students who are enrolled in career and technical education courses are significantly more likely to be on-track for graduation than those students who were not enrolled. Blosveren (2014)

reported on a study examining student achievement of three large urban school districts and concluded that students who participate in career and technical education have higher GPAs and more credits earned than those who do not. Kemple (2008) compared students that participated in career academies to their non-participating peers and found that career academies decrease dropout rates, improve attendance, and increase the likelihood of graduating on time. In agreeing with previous studies, Gottfried and Plasman (2018) found that students who are enrolled in career and technical education have a lower chance of dropping out of school as well as an increase in their on-time graduation.

The results of this study agree with Kemple's (2008) findings. There is a statistically significant difference in the number of credits completed by eleventh grade students who were in the medical career academy. The number of medical career academy student credits completed was 9.796, 95% CI [1.67 to 17.9] higher than non-participant student credits completed. This equals out to a student being almost two whole classes closer to graduating when participating in a medical career academy.

Students who participate in a CTE medical career academy have found a CTE pathway that interests them and is one that they want to complete. Thessin et al. (2018) found that students were successful in their health care education program because they had an interest in the career and that they attended school that day so they could take these class. These students are excited about the high quality CTE classes they are taking, which in turn means that they are going to take more of these classes and do well in them. They will see value in taking traditional academic classes, such as anatomy and chemistry because they know it will benefit their career path. These students are learning skills that are relevant to their career as well as skills that will

make them more competitive in a global economy. Moreover, CTE classes quite possibly could give them a good paying job as soon as they graduate high school.

Limitations

Like much of the research that has been conducted regarding education, conducted in education, this study includes several research limitations. First, the quantitative causal-comparative study design is a limitation because it may be difficult to explain why there are any significant differences in the data should they appear. In light of this, a variety of dependent variables were analyzed to show student success in an attempt to make this study stronger. In the future, a study could use a mixed-methods methodology and questionnaire or survey for the participants involved to obtain perception data on the benefits of the medical career academy. A qualitative interview would have given the floor to the students to talk about their experiences in their particular grouping, which in turn could have given more meaning to the data collected (Hox & Boeije, 2005).

A second limitation was that this study is based on the use secondary archival data for analysis. Hox and Boeije (2005) indicated that secondary data can create some issues for researchers. First, it can be difficult for a researcher to locate the specific type of data needed for their study. Second, the researcher must be able to gain access to the data they require. Third, the researcher must be able to determine if the data is of quality and fits the needs of the particular study. The secondary archival data for this study was produced from a reliable data house that has a clean and accurate data record, so there is no reason to believe that it is not quality data. This limitation could have been strengthened if primary data had been used such as a first-hand account from the student participants as well as the secondary archival data.

A third limitation for this study was the sample is delimited to only one medical career academy in Southern California. There is no reason to believe that it is not representative of students in other medical career academy programs outside of California with the same population or makeup. Dyer and Wilkins (1991) said, "Studying a single case in detail doesn't guarantee that rich theoretical insights will be the harvest" (p. 618), and multiple case studies do not guarantee those grand insights either. In the future, the use of multiple school sites or school districts with medical career academies would strengthen this limitation because it would increase the number of participant data sets, which would in turn increase the power of the data analysis.

Implication of the Results for Practice, Policy, and Theory

Practice. Career and technical education career academies can be described as small learning communities within the secondary school setting (Kemple, 2008). These programs were developed over 40 years ago as a tool to keep high-risk students engaged in academia through combining academic and occupational curricula (Hanser & Stasz, 1999). This study supports what Kemple (2008) also found, which is that it is possible to prepare students to be college and career ready without compromising any of the college preparatory academic courses. This study found that medical career academies do not adversely affect a student's attendance or how well they do on state standardized testing. CTE medical career academies positively affect the number of credits that an eleventh grade student completes in their critical junior year.

Knowing that student achievement is occurring in this medical career academy is valuable on multiple levels for the student, high school, CTE program, and community. The increase in student achievement results in (a) a student that is prepared for the rigors of post-secondary activity once they graduate high school as indicated on the College and Career

Readiness Indicator (b) a high school that is able to prove it is meeting their mission statement of graduating students that are college and career ready (c) a career and technical education program that is proving that it does provides a return on the school districts investment and (d) a community that will be able to employ responsible and able workers that are prepared to join the workforce once they graduate (Lakes & Burns, 2012).

Schools should look to implement these types of CTE medical academies because it is one of the fastest growing career pathways in California (Bureau of Labor Statistics, 2017). Students will get immediate returns when participating in medical career academies. Participation in career and technical education is associated with higher wages as well as an increase in technical skills learned in these pathways. Every year a student spends in upper level career and technical education courses equals out to an additional 2% wage increase (Jacob, 2017). The author suggested that this benefit stems from the in-depth study of a specific pathway of study within a career academy.

The career and technical education regional occupation program (ROP) that provides the classes and instructors for the CTE medical career academy in this study is part of a Joint Powers Authority with its partner school districts. This agreement allows two or more public agencies to exercise common powers. The ROP receives annual operating funds from each district as pass through money. This means that the classes the ROP provides are on a fee-for-service basis.

This study serves as a reminder of the return on investment that the partner school districts are acquiring from their participation with the ROP through the Joint Powers Authority. These school districts have the opportunity to see that the money they are designating to career and technical education is providing students with the opportunity to become college and career

ready through the results from this study on medical career academies. This agreement is beneficial for all parties involved.

Policy. California is rolling out a new College and Career Indicator (CCI) for the 2017-18 school year. This new measuring system will do away with the previous Academic Performance Index (API) system that measured the academic performance and progress of a school. The CCI is designed to emphasize that a high school diploma represents a student has completed rigorous course work and is prepared for success in the post. Currently, the CCI measures SBAC scores (score of Level 3 "Standard Met" or higher), advanced placement exam results, dual enrollment, University of California A-G requirement completion, and Career and Technical Education Pathway completion. A web-based system called the California School Dashboard will be available to the public to review how secondary schools are scoring on the CCI.

The fact that completing a career and technical education pathway is included on the CCI indicates that exploring career pathways is an important part of ensuring that a student is college and career ready when he or she graduates high school. Schools that incorporate CTE medical career academies are giving students a way to specialize and complete that career pathway. CTE medical career academies provide work based learning experiences that assist a student in determining their interests, talents, and skills related to potential careers in the Health Science and Medical Technologies industry sector without burdening their ability to complete their traditional academics and doing just as well on standardized state exams like the SBAC.

Theory. This study strengthens the contextual learning theory (Hull, 1993) because it connects the work-based contextual learning that occurs in medical career academies with making meaning and engagement in a career context. Students who participate in CTE medical

career academies are clearly enthusiastic about their career related courses as observed by the significant differences in the number of credits completed by eleventh grade students that participated in the CTE medical career academy when compared to their non-participant peers. These students are enrolling in additional courses that could possibly lead them to their career goals faster and in turn resulting in these students obtaining credits to graduate high school and move on to the next step in their career path.

Recommendations for Further Research

There are multiple avenues that a researcher can travel to extend research on this study. This study only looked at 1 year of data, which limited the overall student achievement. A future study could possibly follow a class of students throughout their four years of high school participation in the medical career academy to get a broader view of the overall high school experience. Research could even extend this further and follow the students after graduation to post-secondary activity to determine if they continued their education and how their salaries compare to their non-participant peers.

Another aspect of the CTE medical career academy that should be researched is the intimate nature that is a characteristic of the small learning community or school within a school. Teachers and mentors are able to provide students with a more personal level of support, since they spend more time together in the classes for the CTE medical career academy (Castellano et al., 2012; Dixon et al., 2011; Fletcher & Cox, 2012; REL Southeast, 2012). Students that have a high level of trust for their teachers tend to have improved student performance (Allensworth & Easton, 2007). A future researcher could use a mixed-method to examine the relationships that are created in the medical academy and use that information to possibly explain any significant differences in student achievement that are found.

This study only had one sample medical career academy to study, which may have possibly affected some of the data analysis. It would be interesting to have a larger scale sample and look at multiple medical career academies throughout California to see if that would affect the power of the data analysis. This researcher predicts that it might possibly have an effect on the attendance data but not so much on the state standardized testing, as the SBAC tests are not normed to include medical career academy courses.

Conclusion

The purpose of this study was to determine if there are significant differences in student achievement of career and technical education medical career academy program high school student participants when compared to their non-academy peers. The benefit to partaking in a CTE medical career academy was examined by comparing secondary archival data attendance rates, on track for graduation rates for junior students as measured by number of credits completed, and SBAC math and English Language Arts scores of eleventh grade students who were enrolled in a medical career academy versus their non-medical career academy peers the 2016-2017 school year.

The completed data analysis indicates that there is no significant difference between medical career academy students versus their non-medical career academy peers regarding attendance rates and SBAC math and English Language scores. The analysis also shows a statistically significant difference in the on track for graduation rates (credits completed) of the eleventh grade medical career academy student versus their non-medical career academy peers. Despite these mixed results, this study is still notable because it shows that students who participate in a medical career academy can explore career pathways without hindering

traditional college preparatory academics, and ensures that they are on the path to an on-time graduation.

Career academy programs have prospered because they offer career and college preparation, are rich in student diversity, and have a proven record of accomplishment (Brand, 2009). These small learning communities come together in such a way that they take responsibility for the achievement of the school within the school. These programs provide a way for instructors to provide relevant, career contextual academia while developing the strong trusting relationships that foster academic achievement.

With the rollout of the new CCI, school districts, policy makers, and administrators should look to medical career academies as a way to ensure that all students are meeting the "prepared" indicator on their CCI dashboard. These programs provide an outlet for students to complete a career and technical education pathway. Providing high quality career and technical education courses, pathways, and career academies should be a priority of all school districts.

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Appendix A: Standards Based Assessment Consortium Scale for English and Math

The scales are as follows:

- Level 1-standard not met
- Level 2- standard nearly met
- Level 3-standard met
- Level 4-standard exceeded

Appendix B: Histogram of SBAC Math Scores

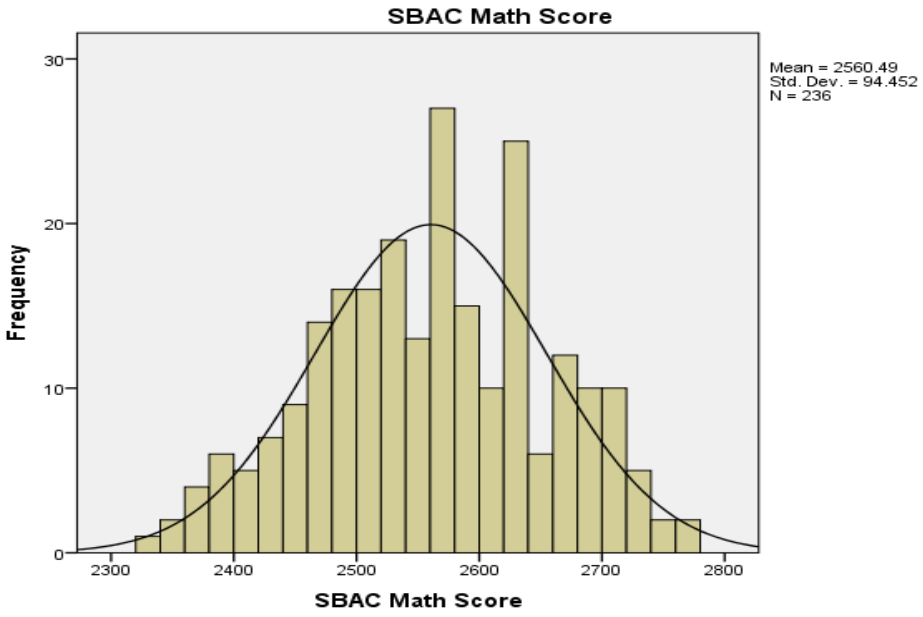


Figure B1. Histogram of SBAC math scores.

Appendix C: Histogram of SBAC English Scores

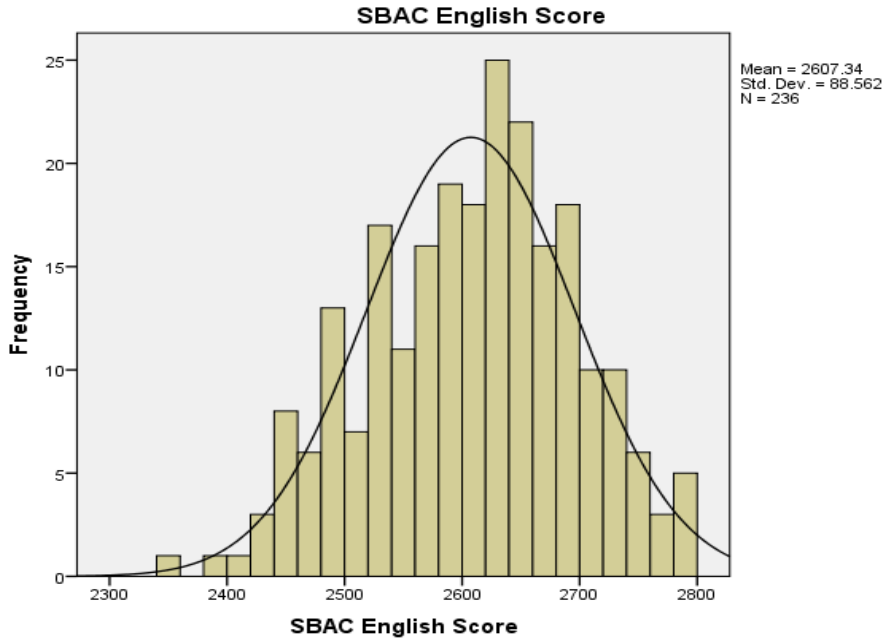


Figure C1. Histogram of SBAC English scores.

Appendix D: Q-Q Plot of SBAC English Scores

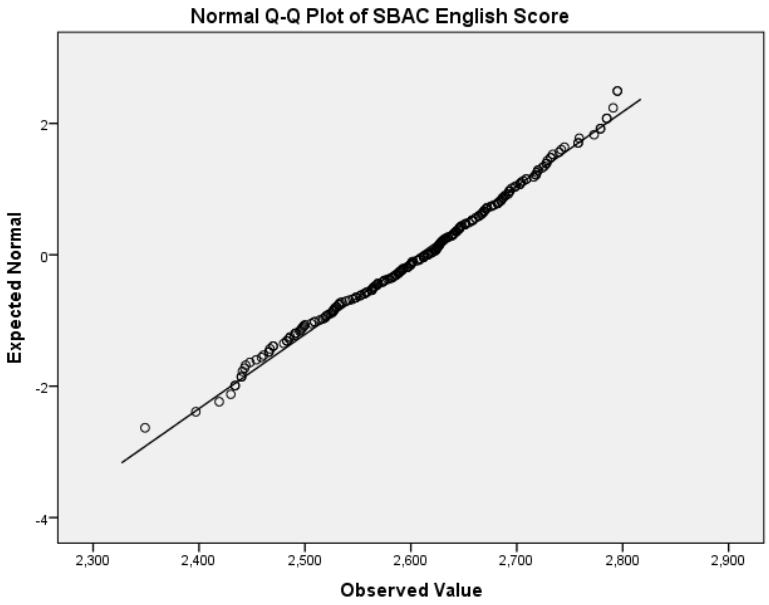


Figure D1. Q-Q Plot of SBAC English scores.

Appendix E: Q-Q Plot of SBAC English Scores

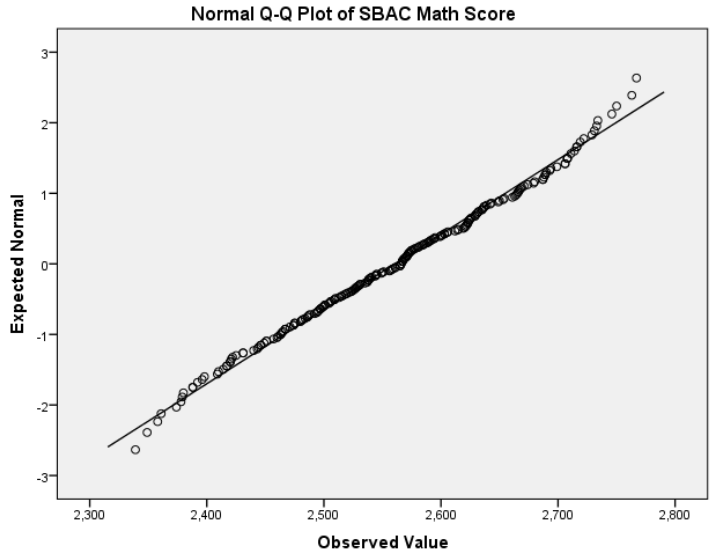


Figure E1. Q-Q Plot of SBAC English scores.

Appendix F: Normal Q-Q Plot of Days Missed

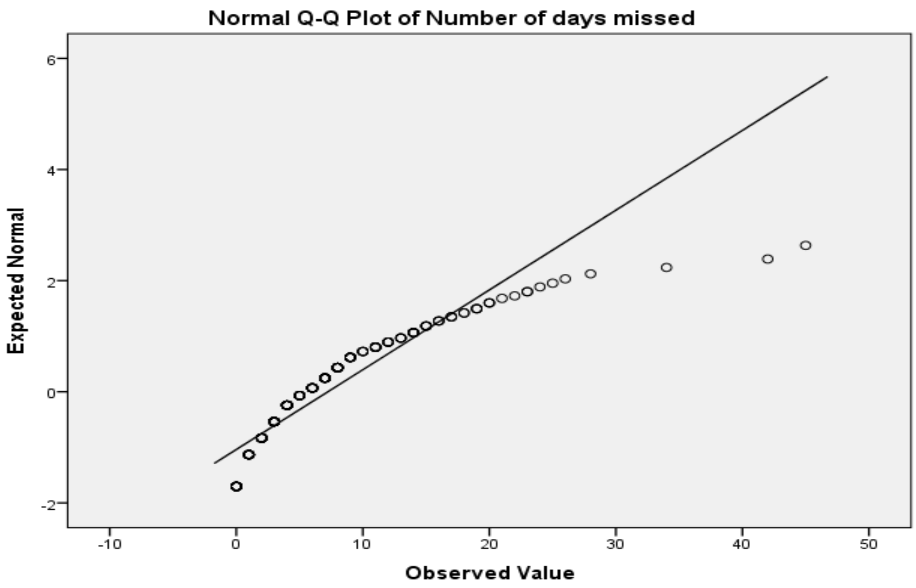


Figure F1. Normal Q-Q plot of days missed.

Appendix G: Histogram of Days Missed

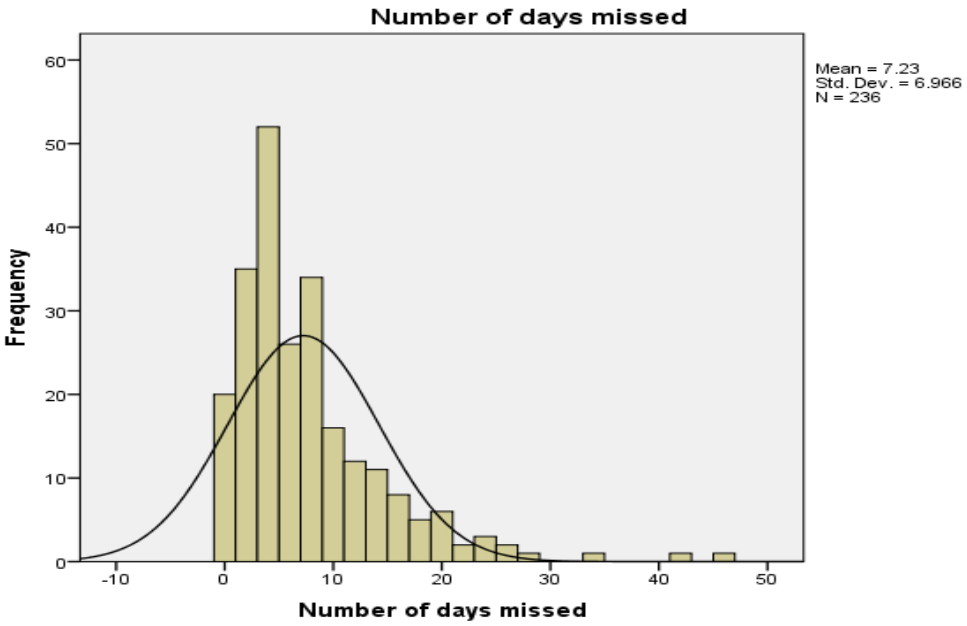


Figure G1. Histogram of days missed.

Appendix H: Statement of Original Work

The Concordia University Doctorate of Education Program is a collaborative community of scholar-practitioners, who seek to transform society by pursuing ethically-informed, rigorously- researched, inquiry-based projects that benefit professional, institutional, and local educational contexts. Each member of the community affirms throughout their program of study, adherence to the principles and standards outlined in the Concordia University Academic Integrity Policy. This policy states the following:

Statement of academic integrity.

As a member of the Concordia University community, I will neither engage in fraudulent or unauthorized behaviors in the presentation and completion of my work, nor will I provide unauthorized assistance to others.

Explanations:

What does "fraudulent" mean?

"Fraudulent" work is any material submitted for evaluation that is falsely or improperly presented as one's own. This includes, but is not limited to texts, graphics and other multi-media files appropriated from any source, including another individual, that are intentionally presented as all or part of a candidate's final work without full and complete documentation.

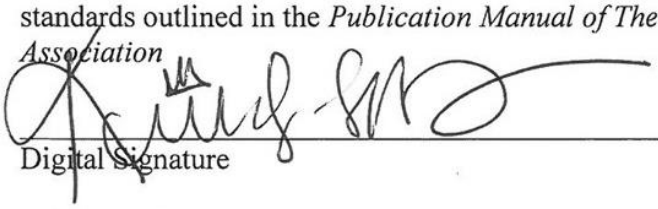
What is "unauthorized" assistance?

"Unauthorized assistance" refers to any support candidates solicit in the completion of their work, that has not been either explicitly specified as appropriate by the instructor, or any assistance that is understood in the class context as inappropriate. This can include, but is not limited to:

- Use of unauthorized notes or another's work during an online test
- Use of unauthorized notes or personal assistance in an online exam setting
- Inappropriate collaboration in preparation and/or completion of a project
- Unauthorized solicitation of professional resources for the completion of the work.

Statement of Original Work (Continued)

1. I have read, understood, and complied with all aspects of the Concordia University- Portland Academic Integrity Policy during the development and writing of this dissertation.
2. Where information and/or materials from outside sources has been used in the production of this dissertation, all information and/or materials from outside sources has been properly referenced and all permissions required for use of the information and/or materials have been obtained, in accordance with research standards outlined in the *Publication Manual of The American Psychological Association*



Digital Signature

Krista J. Schweers

Name (Typed)

July 16, 2018

Date