

Quantitatively Comparing Academic Achievement in Secondary Charter and Public
Schools Implementing Career Academies

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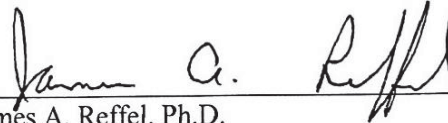
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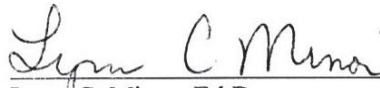
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ABSTRACT

Since the 1980s publication “*A Nation at Risk*”, policy makers have continually sought to improve America’s education system by crafting education policies with strict guidelines. Recent policies like No Child Left Behind (NCLB), and now the Every Student Succeeds Act (ESSA), are calling for increased accountability of school districts measured by standardized test scores. With the threat of losing funding and facing sanctions for failing to meet minimum College and Career Readiness Performance Index (CCRPI) requirements, school districts are continually looking for research-based strategies and reform models that promise to enhance student achievement.

Researchers have examined various reform models and methods including schools-within-a-school, small learning communities, career academies, school choice, career pathways, and charter schools. Some studies have displayed successful increases in student achievement as a result of implementing these reforms individually. However, the results have not proven to be entirely reproducible as other researchers exhibit insignificant findings.

This casual-comparative design compared career academy charter schools to traditional public schools that had implemented career academies. The independent variable was school type-charter school and public school. The dependent variables were Georgia End-of-Course Test scores in the areas of English Language Arts, math, and science. Using ANOVA analysis, significant findings on one out of three measures indicated that implementing career academies at charter schools increased student achievement in science more than the implementation at public schools. The implementation did not positively or negatively impact ELA scores or math.

However, when grade level was incorporated as a covariate, ANCOVA analysis revealed that implementing career academies at public schools significantly impacted student achievement in math compared to the charter site. The analysis also revealed that as grade level increased, so did test scores. ANCOVA analysis of the science data indicated that career academy charter school students significantly outperformed the public school career academy students. However, no interaction effects were observed between grade level and test scores. ANCOVA did not impact the results in ELA.

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DEDICATION

I am the first person in my family to ever attend graduate school and attain graduate degrees; especially a doctorate. However, I am not so conceited that I do not realize the others who have helped make this possible. It is my honor and privilege to dedicate this body of work to my parents Myrtice and Robert Meeks. Thank you for your unwavering faith, unending sacrifice, and unfading love that you have given me throughout my college career. The accomplishments that I have made would not have been possible without you! This accomplishment is as much yours as it is mine. Thank you for making this journey with me. I love you both!

Chapter I

INTRODUCTION

Overview of the Study

As policy makers continue to attempt to force improvement in academic achievement in America's schools through educational policy, researchers continue to evaluate potential reform solutions. Their attempts provide evidence that some reforms can work in some schools (Duncan, 2008; Thornton, 2009), but no single reform model has demonstrated itself capable of increasing student achievement due in part to the lack of "rigorous research" (Fleischman & Heppen, 2009). Because schools vary in terms of demographics and other regional factors, one reform model in itself is not sufficient to produce sustainable results. In this study, the impact of career academies on student achievement was tested.

The test compared charter schools with traditional public schools that have implemented career academies characterized by a mixture of reform methods. The reform methods incorporated into the charter school and public school test sites included: reducing student body size by breaking them into small learning communities or schools-within-a-school, by creating small learning communities with career-focused academies, and by offering students a choice of their preferred career academy based on career pathways. The independent variable was school type, which included two types of schools - charter and public. The public schools are simply traditional public schools, and charter schools are considered a more progressive school model where stricter

guidelines are enforced in exchange for more autonomy. The dependent variable for this study had three levels, which included student achievement scores on Georgia standardized End-of-Course Tests (EOCTs) in the areas of English Language Arts, math, and science.

Problem Statement

Perhaps the most critical publication calling for education reform was the “*A Nation at Risk*” publication of the 1980s that portrayed America’s students as “ill-prepared to compete in a global economy” (Cleary & English, 2005). For example, it was reported that American students scored last on seven academic tests compared to other industrialized nations, science and math scores were lower, and the level of college graduate achievement was declining (The National Commission of Excellence in Education, 1983). The report essentially found a downward trend in student achievement at both secondary and post-secondary schools, competency tests fell short in terms of rigor requirements, too few academic classes were required for graduation, and the curricula of public schools had been “diluted and diffused to the point they no longer have a central purpose” (The National Commission of Excellence in Education, 1983, para. 49).

Today, the state of public education continues to be under the microscope of lawmakers and education reformers across America. Recognizing the inability of educators to enhance the achievement of public education students, federal policy has taken control of how and what America’s schools are teaching. For decades, research-based policies like the Perkins Act, No Child Left Behind, and the Every Student Succeeds Act have been crafted in an effort to turn around failing schools by

implementing a system of checks and balances as a means of raising the level of accountability. These policies have not accomplished the ultimate goal. While there is an on-going effort to improve America's struggling education system, school reformists have proposed an array of reform approaches such as small learning communities, charter schools, career academies, and student choice. However, the foci of much of the available research are on elementary education. To date, there exists little research-based evidence upon which high school administrators can build their school improvement plans. In fact, Rouse and Kemple (2009) found research pertaining to high schools was severely lacking when they conducted their study.

Of the reform models previously mentioned, charter schools are growing in popularity because they offer a new approach to education. Although they remain a potential alternative to traditional public schools, charter schools remain a highly contentious topic due to the free-market competition they create with traditional public schools (Chow & Whitlock, 2010; Barrett, 2003). Other reform models researchers tend to favor include smaller schools, schools-within-schools, free-choice schools, career academies, freshman academies, and career pathways (Lauen, 2009; Cleary & English, 2005; Kuo, 2010). Smaller learning communities and schools-within-schools refer to creating smaller learning communities from larger populations of students. These differ from free-choice schools in that free-choice schools refer to students' rights to choose to attend a higher performing school over lower performing schools in their districts (Lauen, 2009). Career academies are small learning communities created in schools where teachers deliver academic and Career, Technical and Agriculture curricula together, so students are learning in the context of a specific career field (Kemple & Rock, 1996).

Typically, schools creating career academies often implement freshman academies to segregate ninth graders from upper classmen because ninth graders are considered to be more at-risk of dropping out of school (Styron & Peasant, 2010). In freshman academies, students are exposed to the different career academies offered at the school, which are contingent on the career pathways being offered. Pathways are a series of classes designed around a specific Career, Technical and Agriculture area where content becomes more career skill specific as students advance through the pathway courses.

These reform methods offer school districts research-based approaches to school reform. However, the problem with existing research is the limited availability of studies pertaining to secondary schools using these reforms together as a mixed model approach. For Georgia school systems to adopt research-based reforms, more studies on reform models in Georgia secondary schools are needed. The purpose of this study is to bridge the research gap evaluating multiple reform models in Georgia high schools by comparing the impact of career academies on student achievement at charter schools and traditional public school test sites.

Significance

In this study, a lens was utilized that combined multiple reform models characterized as career academies to compare charter schools to traditional public schools. The mixed reform model incorporated Career, Technical, and Agricultural Education (CTAE) career academies as small learning communities structured as schools-within-a school enrolling students based on their chosen career pathways. Each component is supported by research that has been noted to enhance student achievement individually. This study was conducted using archival data from Georgia high schools

addressing the need for research in school systems educating a large number of socioeconomically disadvantaged students.

In 2011, Seyedbagheri conducted a similar study comparing academic achievement at elementary charter and public schools in Georgia. The study revealed that the observed difference in reading and math test scores at both the third grade and fifth grade level was insignificant (Seyedbagheri, 2011). That study offered some insight as to how charter schools compare to public schools, but it did not compare the implementation of career academies. Additionally, it did not focus on secondary grade levels, an under-studied grade group when it comes to education research and Georgia's education system.

This research offers Georgia's school systems a foundation upon which to develop a research-based school design model. In Georgia, CTAE courses are very common. As a requirement of Perkins IV, federal legislation that funds CTAE programs, these courses not only provide students with technical skills, they must also incorporate academic content into the curriculum with evidence of increased academic achievement. Schools failing to comply with this legislation risk losing Perkins funds provided by the federal government (Friedel, 2011). Additionally, Georgia CTAE departments are required to offer secondary school students career pathways to attain technical skills aimed at improving their workplace potential. This research study is an important piece because it is unique in its comparison and will offer other secondary schools in Georgia the ability to replicate this mixed reform model to enhance their schools' student achievement rates. Understanding that demographics and other regional factors vary,

variations of the career academy model proposed in this research might assist other school districts in reforming their schools.

Research Questions

It is expected that implementing career academies with student chosen career pathways at traditional high schools will have the same impact on educational improvement as implementing career academies at charter schools. For the purposes of this study, student achievement was measured using Georgia End-of-Course Tests (EOCTs) in the areas of English Language Arts, math, and science. This research study was guided by three research questions:

1. Is there a significant difference in student achievement in English Language Arts (as measured by English Language Arts EOCTs) for students enrolled in career academy charter schools versus traditional public schools implementing career academies in the academic year following the implementation?
2. Is there a significant difference in student achievement in math (as measured by Math EOCTs) for students enrolled in career academy charter schools versus traditional public schools implementing career academies in the academic year following the implementation?
3. Is there a significant difference in student achievement in science (as measured by Science EOCTs) for students enrolled in career academy charter schools versus traditional public schools implementing career academies in the academic year following the implementation?

Conceptual Framework

In this modern era of educational accountability, school and district leaders are continually seeking reform methods that promise to enhance student achievement on state mandated tests that directly impact their schools' College and Career Ready Performance Index (CCRPI). Some of the most renowned research-based strategies include: converting public schools to charter schools, chartering new schools, instituting small learning communities, implementing career academies, or invoking the right of school choice or career pathways. Certainly each of these strategies will have advantages and disadvantages that may lead one to appear to be better than the other, but Fleischman and Heppen (2009) concluded "that no one model or approach, no matter how powerful, can turn around low-performing schools" (p. 105). If that is the case, what if the models were mixed together? In this study, reform models were combined under the umbrella of career academies to transform a traditional public high school into a nonconventional high school capable of competing with career academy charter schools that have adopted similar mixed-reform models.

The use of career academies is not a new educational concept for enhancing student achievement. In 2000, Kemple and Snipes reported "the career academy approach is one of the oldest and most widely established reforms in the United States" (p.13). Career academies are essentially small learning communities with centralized foci aimed at not only helping students learn, but also helping them develop skills needed to transition into the workplace. Although there are varying models of career academies, the foundational elements are the same.

According to the Stern, Dayton, and Raby (2000), “a career academy is a type of school-within-a-school, or small learning community that utilizes a college-preparatory curriculum with a career-related theme” (p. 8). The most current estimates show that throughout the United States, approximately 7,000 career or themed academies are currently in operation (Stern, Dayton, & Raby, 2010). Although they vary in construct or themes, these schools have developed models that best suit their local needs. As career academy charter school models grow in popularity, traditional public schools are increasingly experimenting with the use of career or themed academies. This research is one of very few attempts to compare these career academy charter school models with traditional public schools that have adopted career academies.

Aside from local systems developing career academy models, other common career academy models include: Career Academy, First things First, Project Grad, and Talent Development (Herlihy & Quint, 2006). Herlihy and Quint acknowledge that “implementing small learning communities will not, in and of itself, increase student achievement,” but may help (p. 6). Regardless of the model being used, Career, Technical, and Agricultural Education is once again becoming a major contributing component in education, especially in career academy model schools.

Career academies are not geared specifically for students planning to enter post-secondary technical schools. Rather, they provide an avenue for integrating academic and CTAE courses, so students are more engaged in their learning (Association for Career and Technical Education, 2009). This reflects the most current Perkins legislation that called for the integration of Career and Technical Education and academics (Friedel, 2011). The combination of academics and Career and Technical Education create

learning environments that are more engaging and where students tend to be more successful on academic measures (Association for Career and Technical Education, 2009). Further, the integration of the two add more rigor to academic courses while giving students hands-on experiences applying academic content to real world scenarios. Career academies offer academic and Career and Technical Education teachers the opportunity to collaborate about the curriculum, so students learn the skills needed to be successful in the work place while learning academic content in the context of career fields (Fleischman & Heppen, 2009). Pedagogically, career academies allow two major learning theories to be utilized: behaviorism and constructivism.

Behaviorism is a teaching and learning theory that was introduced in the early 20th century by E. L. Thorndike that utilizes performance objectives measured using criterion-referenced assessments (Berns & Erickson, 2001). Other researchers, including B. F. Skinner, support behaviorism theorizing that students learn best by breaking tasks down into step-by-step processes (Melton, Zience, Leonard, Pick, Thomasson, Camp, Broyles, Governor's School for Agriculture, & Virginia Tech, 2003). Though the behaviorist theory has dominated America's education system for decades (Center for Occupational Research & Development, 2012), Dobbins (as cited in Doolittle & Camp, 1999) believes it continues to be "the learning theory undergirding current career and technical education thinking" as well (para. 8).

Behaviorism is one of the six fundamental theories of the social efficiency doctrine David Snedden and Charles Prosser used in the early 1900s when they were developing Career and Technical Education (Doolittle & Camp, 1999). In their explanation of behaviorism, they explained that behavioral science provided the

mechanism for schools to teach right work and moral habits while pedagogical science provided the process. The end result then was the development of skills and understanding according to society's norms and expectations. After all, students were learning skills necessary to enter the workforce as contributing members of society. However, as the face of education has begun to change as a result of increased accountability, Career and Technical Education courses are increasingly incorporating more academic content into the curriculum, fostering a pedagogical mix of behaviorist theory infused with contextual learning often seen in the constructivist theory.

After decades of behaviorism underpinning American's education system, contextualized learning is now being viewed as the reaction to a failed system (Silvey & Anderson, 2011). The Center for Occupational Research and Development (2012) characterized contextual learning as a cognitive science that "recognizes that learning is a complex and multifaceted process that goes far beyond drill-oriented, stimulus-and-response methodologies" (para. 4). This concept of learning relies on teachers providing experiences through classroom activities, labs, and other learning environments where the concepts being learned are connected to how the information will be utilized (Spindler & Ogwo, 2014). Essentially, students are constructing knowledge around what they already know, a teaching and learning theory known as constructivism.

Constructivism is an educational theory that has philosophical and psychological roots and is diverse based on varying viewpoints and assumptions (Doolittle & Camp, 1999). In their work, Doolittle and Camp acknowledged that under constructivism learners have an active role in constructing their knowledge, that individual and social experience in the creation process is important, and the understanding that the validity of

the knowledge created will vary based on learner's representation of reality. Although they did not definitely define constructivism, Chopra and Gupta (2011) believed the main principal of the constructivist theory is that students learn best by applying skills, not watching teachers. However, just as students learn differently, experience things differently, and interpret things differently, constructivists are so diverse in their opinions of constructivism that there is not a unified theory. Instead, they rely upon a constructivist continuum (Doolittle & Camp, 1999, p. 4).

The constructivist continuum is comprised of three main categories of constructivism: cognitive, social, and radical (Doolittle & Camp, 1999). Each of these will be discussed in more detail in the literature review, but for now Doolittle and Camp (1999) reported that the constructivist pedagogy requires these essential factors:

learning should take place in authentic and real-world environments; learning should involve social negotiation and mediation; content and skills should be made relevant to the learner; content and skills should be understood within the framework of the learner's prior knowledge; students should be assessed formatively, serving to inform future leaning experiences; students should be encouraged to become self-regulatory, self-mediated, and self-aware; teachers serve primarily as guides and facilitators of learning, not instructors; and teachers should provide for and encourage multiple perspectives and representations of content (pp. 7-9).

They exhausted their discussion of constructivism to the point they conceded that Career and Technical Education contradicts both radical and social constructivist tenets leaving cognitive constructivism the only option for the integration of constructivism into

Career and Technical Education. Cognitive constructivists concede that learners can have similar experiences and can recreate similar models from those experiences. This is accomplished by students learning internalizing processes and then constructing or reconstructing what they have learned externally (Doolittle & Camp, 1999). Learning around a centralized theme or career and then using the skills that have been attained in real-world situations is what career academies are all about.

Birthered in 1969, career academies have been found to be effective approaches to improving student outcomes with nearly 7,000 career academies in operation in 2010 (Stern et al., 2010). Although no concrete definition of career academies has been agreed upon, the Association for Career and Technical Education (2009) identified career academies as providing college preparatory curriculums that infuse academic courses with Career and Technical Education curriculums that keep students engaged by creating learning environments that allow cohorts of students and staff members to engage in applied learning. In order for an institution to be considered an academy, researchers agree upon the following three characteristics: uses a school-within-a-school structure, integrates academic and vocational curriculums around a career theme, and institutes partnerships with local employers (Kemple & Snipes, 2000). Districts opting to implement career academies may adopt individualized models that reflect the characteristics of career academies, or they may opt to adopt comprehensive initiatives such as Career Academies, First Things First, Project GRAD, or Talent Development (Herlihy & Quint, 2006). Regardless of the theme or structure implemented, career academies utilize a research-based reform strategy or a combination of reform strategies to increase student learning and outcomes.

Conceptually, career academies were utilized in this study as the primary framework at charter schools and public schools to determine if significant impacts were experienced in the areas of English Language Arts, math, and science. Understanding career academies use behavioral and constructivist approaches to learning, multiple research based-strategies were utilized including: small learning communities, career pathways, and school choice. In theory, both academic and Career and Technical Education instructors use behaviorist tactics while Career and Technical Education instructors also utilize constructivist tactics where students apply skills to construct a better understanding of the content. At the career academy test sites, students enroll in the career academy of their choice based on their chosen career pathway. Career academy students have the same teachers for multiple years who collaborate together to integrate academic and Career and Technical Education curriculums to engage students in active learning.

Definition of Relevant Terms

The operational terms are defined as:

Behaviorism. Behaviorism is a learning theory that suggests learning is the result of “links formed between stimuli and responses through the application of rewards”

(Berns & Erickson, 2001, p. 2).

Career Academies. Career academies are small learning communities that present a “college-preparatory curriculum with a career related theme” (Stern et al., 2010, p. 4).

Career Pathways. Career pathways are sequences of courses with rigorous academic and technical courses taught in a coherent articulated manner (Hull, 2005).

Charter School(s). Charter schools are schools that create market-like competition for public schools. They are publicly funded schools that students can choose to attend in lieu of an underperforming traditional public school (Bohte, 2004).

Constructivism. Constructivism is an active learning theory rooted in philosophy and psychology where learners learn by doing (Doolittle & Camp, 1999).

Contextual Learning. Contextual learning theory is a learning theory that integrates academic content into contexts and experiences that are more meaningful to students than drill practices (Imel, 2000).

Course Sequencing. Course sequencing is the organizing of content-specific courses into a series that students take throughout their school career (Schneider, Swanson, & Riegle-Crumb, 1998).

End-of-Course Tests. End-Of-Course tests are Georgia state mandated tests that align with the curriculum and “include assessment of content knowledge and skills” (Georgia Department of Education, 2014, para.3).

Small Learning Communities. Small learning communities, achieved as schools-within-schools or academies, allow teachers to work with the same students throughout their high school career (Kuo, 2010; Supovitz & Christman, 2005).

Limitations

For this research, several limitations were identified. The most restricting limitation was the ability to gain access to school data. Initially, access to one public test site was denied, but personal contacts were used to get approval. Accessing the second public school site was not a problem because of personal contacts, but multiple charter school test sites denied access to their data. The data from those schools was very

important because those charter schools were conversion charter schools. This is important because the research study design could have compared the year prior to and following the implementation. The results of that comparison were needed to identify if the implementation of career academies impacted each type of school individually. The lack of access to the conversion charter school's data produced another major limitation.

The major limitation created was the lack of ninth grade test scores and the use of ninth grade academies at the participating charter test site. Had the conversion charter schools participated in this study, that data would have been available. The limitation was not discovered until the data had been collected and analysis was in progress. It was not discovered earlier because during the study design phase, the researcher was led to believe that the site met all of the criteria by the charter's current chief executive officer. After discovering the lack of ninth grade data, the charter site was contacted again about the discrepancy. After talking to multiple school personnel, original support personnel present at the initiation of the charter school reported ninth graders were not incorporated until the charter school's second year of operation.

In searching for more charter test sites, the next limitation was identified. Other charter schools that incorporate career themes into their structure did not house students on campus for all of their courses. Instead, students were transported to the public schools in their district to take CTAE courses while their academic courses were taught on campus. These limitations limited the number of charter school test sites, which translated into a smaller sample size. Similarly, there were only two traditional, rural, public schools available that were implementing career academies. Again, the sample was limited in scope to only two schools.

Other limitations that were discovered during the course of the study were related to the type of data provided by each site and the method in which it was provided. The charter school provided data electronically and included grade converted EOCT scores for each subject along with grade level data. The data did not include gender, race, or students with disabilities which would have been valuable for further analysis and inferences.

Public School One was a rural school in South Georgia that provided its data electronically as well. However, the raw data had to be broken down using a coding form provided by the state. By using character counts on the form, the grade converted score was identified. The data for Public School One included grade converted scores, scale scores, grade level, gender, and ethnicity.

Public School Two was a rural school in South Georgia that provided a hard copy of the data that included grade converted scores and grade level but did not include gender or ethnicity. These data were entered by hand for each subject into an Excel document before being loaded into a computer program known as Statistical Package for the Social Sciences, or SPSS.

The final limitation identified in this study was course sequencing. It was discovered that EOCTs are not grade specific, but instead are course specific. Students take the test once they complete an EOCT course. That being said, students from grades ten through twelve may take the same EOCT depending on the grade they enroll in an EOCT course. Ninth grade EOCTs are grade specific. However, remember the only available charter site did not have ninth grade scores the first year of operation. This prevented the comparison of ninth graders at the charter and public school test sites.

Delimitations

To account for the limitations of this study, steps were taken in the research design phase to eliminate limitation concerns. The research questions that guided this study were not grade specific, but were designed to make a general comparison between charter and public schools implementing career academies. Initially, the research questions were crafted to compare the year prior to and following the implementation. Because access was denied to the converted charter schools, the research questions were modified to compare the year following the implementation. Following this modification, the research questions kept the study on track. Additionally, exhaustive efforts were taken to identify charter and public schools that utilized career academies, small learning communities, and career pathways. Multiple efforts were made to reason with the charter test site administrators denying access to data, but still access was not granted. Despite being denied access to multiple charter school samples, and the limited number of career academy public schools, the samples used in this study were comparable for generalized comparisons. The data were entered into SPSS and a fellow researcher efficient in SPSS checked labels and data entry.

Although ninth grade academies were researched and considered to be a part of the mixed model reform under career academies, a comparison of ninth grade scores was not possible because the charter site did not have a ninth grade academy the first year of operation. Although a ninth grade comparison would have provided valuable data, recall the research questions were not grade specific, but rather compared charter and public by subject in more general terms. Throughout the process, every effort was made to ensure this study's generalizability.

Chapter II

LITERATURE REVIEW

Introduction

The foundation for this research rests upon previously conducted research studies and reports concerning the effectiveness of various reform models. From small learning communities to career academies to student choice and charter schools, some researchers suggested student achievement does increase as a result of implementing the reforms (Lauen, 2009; McDonald, Ross, Bol, McSparrin-Gallagher, 2007; Cleary & English, 2005). However, some researchers reported when it comes to school reforms, definitive evidence that the reforms provide a “concomitant improvement in academic achievement” is unclear (Rouse & Kemple, 2009, p. 7). Previous research was used in this study to establish a foundation for comparing two different types of schools that have implemented multiple reform methods reviewed herein. Classifying this combination of reforms as career academies, the purpose of this study was to determine if there is a significant difference in student achievement in ELA, math, and science for students enrolled in career academy charter schools versus traditional public school students utilizing career academies in an understudied region of the United States.

This review of literature explores historical perspectives of the education system, examines federal policies and discusses the role of career and technical education. The theoretical foundations for career and technical education are examined. Following an explanation of course sequencing, various reform initiatives are explained including:

small learning communities, career academies, career pathways, school choice, ninth grade academies, and charter schools.

Historical Perspectives

Federal Policy.

America's failing schools is a phrase that is commonly used among educators, news media, policy makers, and increasingly among parents and American citizens. As America's economy continues to struggle to recover from the recent recession, there is growing concern over whether its education system can adequately prepare students to compete in a global market. Rouse and Kemple (2009) reported that the graduation rate for high school students remained unchanged over the past four decades. By the 2011-2012 school year, the graduation rate of America's high school students had reached an all-time high of 81% (National Center for Education Statistics, 2015). This an alarming revelation when one considers the advancements America has made in the private sector. This is not the first time that America's education system has been scrutinized for its failure to produce students possessing the skills necessary to compete in an advancing global market.

Friedel (2011) reported in the mid1980s, that public outcry to improve America's education system was initiated after "*A Nation at Risk*" was published, which sparked discussion concerning educational reform. This publication addressed the insufficiency of America's education system to effectively prepare students to enter the workforce competing in a global economy. According to the National Commission on Excellence in Education (1983), "*A Nation at Risk*" demanded the need for more accountability, a method for measuring student achievement, and that America's student achievement be

compared to international students. As a result, congress attempted to initiate school reform through education mandates embedded in other educational legislation such as the Perkins Act of 1984 (Friedel, 2011).

The Perkins Act of 1984 is a continuation of funding for vocational education that began with the Smith-Hughes Act of 1917 and the George Acts from the 1920s until the Vocational Education Act of 1963 was passed (Friedel, 2011). In that era, most schools were focused on teaching vocational skills to enhance male students' workforce training and to teach females the domestic skills needed to manage households. For years, vocational education sought to train students with the skills necessary to enter the workforce of an industrialized nation. After "*A Nation at Risk*" it became evident that technical skill training alone was not sufficient to prepare students to enter the workforce of a globally competitive market.

Career and Technical Education Policy.

The Perkins Act was the most comprehensive effort to enhance students' performance and skills training. This law provided equal access to vocational education for special populations including: disabled, disadvantaged, and those with limited English proficiency (Friedel, 2011). Perkins IV, the most current reauthorization of the Perkins legislation, regulates how funds are administered to Career and Technical Education. The name change from Vocational Education to Career and Technical Education reflected the themes of the Perkins Act in that Career and Technical Education courses would place more emphasis on academic content by providing a more rigorous curriculum characterized by minimum standards, student assessments, increased accountability, and alignment with technical and post-secondary schools (Friedel, 2011). On the federal

level, Career and Technical Education includes Agricultural Education. However, in Georgia, it is typically referred to as CTAE.

The Perkins Act impacted Career and Technical Education students because it contained many of the same mandates of the current No Child Left Behind legislation (NCLB) including parameters, accountability, and increased student achievement requirements (Friedel, 2011). Kymes (2004) reported four primary areas that NCLB addressed: (a) requiring that teachers be highly qualified, (b) that states adopt an accountability system, (c) that implemented school programs be research-based, and (d) the ability of parents to choose which school their child would attend. Embedded in the law are mandates requiring schools' effectiveness be measured using an annual yearly progress formula. Maleyko (2011) suggested NCLB would initiate the evolution of low-performing schools into high-performing schools, and that the achievement of all students, would be equalized regardless of socioeconomic status or ethnicity. Although this legislation was an admirable attempt to improve America's schools, he admits the flaw in annual yearly progress measures lies in the ability of states to statistically manipulate their AYP rankings giving false impressions of their schools' success.

Further concerns for schools are the ramifications that NCLB has on Career and Technical Education (Kymes, 2004). Recalling that Career and Technical Education receives Perkins funds under the condition that academic standards are integrated into Career and Technical Education courses, the perceived impact is an increased level of accountability for Career and Technical Education students, typically considered to be at-risk. However, Castellano, Stringfield, and Stone (2003) argued that the problem with

NCLB is that it mandated research-based initiatives be adopted, and that the research concerning the integration of Career and Technical Education and academics is lacking.

In Georgia, Career and Technical Education courses are common in most rural schools. Career and Technical Education pathways include:

agriculture, food, and natural resources; health sciences; advanced academics, fine arts, and world languages; architecture and construction; arts, AV technology and communications; business management and administration; education and training; energy; finance; government and public administration; hospitality and tourism; human services; information technology; law, public safety, corrections, and security; manufacturing; marketing; science, technology, engineering, and mathematics; and transportation, distribution, and logistics (Georgia Department of Education, 2013, para. 1).

Each of these courses provides technical skills and real-world applications of the academic curriculum. The concern over the integration of Career and Technical Education and academic content stems from research reporting that students more apt to drop out of high school tend to be vocational students; now referred to as Career and Technical Education (Castellano, Stringfield, & Stone, 2003). Understanding that at-risk students are more likely to drop out of school as compared to their peers, it becomes evident that school reform must address those students' needs. Fleischman and Heppen (2009) concluded in their work that the implementation of only one reform model was not sufficient to improve a school's report card (p. 105). They do, however, go on to say it is not that school reforms do not improve schools, instead they imply that the effects

are limited when it comes to student achievement and social differences (Fleischman & Heppen, 2009).

NCLB established mandates and expectations for schools that helped America's education system make some progress. Recently, a report from the Executive Office of the President (2015) summarized America's schools progress under NCLB as:

adopting higher academic standards in nearly every state, putting our schools on par with their international competitors and our children on track to graduate from high school ready for college and career; reaching the highest high school graduation rate on record at 81 percent, with the highest gains among students of color; investing billions of dollars in high-quality early education to help our youngest leaders succeed; reaching more than halfway to the President's goal of training 100,000 excellent STEM teachers, ahead of schedule; and expanding access to high speed Internet to 20 million more students (para. 2).

Although progress has been made under NCLB, flexibility in the legislation was necessary because "one-size-fits all mandates" were too strenuous and unrealistic for all schools (Executive Office of the President, 2015). In December 2015, the President of the United States signed into law the Every Student Succeeds Legislation (ESSA). The infancy of this legislation has not allowed time for researchers to study the impact of this legislation, but it is important to note the legislation reflects some of the same characteristics as NCLB.

The report from the Executive Office of the President (2015) summarized the components of the legislation. They report ESSA will:

ensure states set high standards so that children graduate high school ready for college and career; maintain accountability by guaranteeing that when students fall behind, states target resources toward what works to help them and their schools improve, with a particular focus on the lowest-performing five percent of schools, high schools with high dropout rates, and schools where subgroups of students are struggling; empower state and local decision-makers to develop their own strong systems for school improvement based upon evidence, rather than imposing cookie-cutter federal solutions like No Child Left Behind (NCLB) did; preserve annual assessments and reduce the often onerous burden of unnecessary and ineffective testing on students and teachers, making sure that standardized tests don't crowd out teaching and learning, without sacrificing clear, annual information parents and educators need to make sure our children are learning; provide more children access to high-quality preschool, giving them a chance to get a strong start to their education; and establish new resources to test promising practices and replicate proven strategies that will drive opportunity and better outcomes for America's students (Executive Office of the President, 2015, para. 3).

Theoretical Foundations of Career and Technical Education

Behaviorism.

In educational research, learning theories have long provided theoretical frameworks upon which research studies have been conducted. Since the late 1800s, the three primary learning theories that have dominated educational research were: behaviorism, information processing, and constructivism (Mayer, 1996). Of these,

behaviorism and constructivism remain the core theories upon which educational research continues. In the area of Career and Technical Education, behaviorism is considered the primary framework, which was conceived by Snedden and Prosser in the early 1900s (Berns & Erickson, 2001; Doolittle & Camp, 1999).

Proposed by E. L. Thorndike, behaviorism is a framework where learning is the result of stimuli and responses with rewards given for correct behaviors (Berns & Erickson, 2001). In their discussion on behaviorism, Weegar and Pacis (2012) reported that it was works utilizing Pavlov's findings on animals' responses that helped redirect theories on learning away from functionalism and toward behaviorism. They wrote that Pavlov found that animals could be trained to have psychological reactions or behaviors to stimuli, and that in 1917 Watson recreated a similar experiment using children. These behaviorist theories were found to be transferable into educational technology with the creation of the Skinner's teaching machine in 1958 and can be found in today's educational software that reinforces student behavior (Weegar & Pacis, 2012).

According to Dobbins (as cited in Doolittle & Camp 1999) this theoretical framework for learning was often characterized by performance objectives, tasks lists, and skills demonstrations to industry standards. Using this linear, step-by-step process for completing skills or tasks, early behaviorists like B. F. Skinner believed students more effectively learned required skills (Melton, Zience, Leonard, Pick, Thomasson, Camp, Broyles, Governor's School for Agriculture, & Virginia Tech, 2003). Conversely, other scholars believed that behavioral responses to environmental factors were not the best learning method. Instead, they believed that students should construct their knowledge

through experiences. This belief led to the development of contextual learning and the constructivist learning theory.

Contextual Learning.

Contextual learning is a learning theory often seen in adult learning strategies and institutions. Crawley, Malmqvist, Jianzhong, and Broudeur (2008) defined context in education as relating meaning and understanding to the surrounding environment. They described contexts as being experiences, motivational factors, and applications of learned concepts. Contextual learning offers problem or project-based instruction that provides a more meaningful real-world approach to learning (Kelley & Kellam, 2009). Students engaged in contextual learning learn in multiple contexts at a self-regulated pace (Curry, Wilson, Flowers, & Farin, 2012; Glynn & Winter, 2004). These same researchers indicated that contextual learning typically utilizes authentic assessments to gauge levels of learning.

Long before the term conceptual learning began being utilized in educational research, contextual learning was evident in vocational classrooms (Curry et al., 2012). At its inception, vocational education (now referred to as Career and Technical Education) taught students hands-on skills that were transferable to the work place. The employability skills students were learning were taught in the context of the environments in which they would be working. Contextual learning is anchored in the diverse contexts of students' lives and prepares them to learn in complex environments similar to what they will encounter as they enter the workforce (Glynn & Winter, 2004). Allowing students to learn in a mock workplace environment promotes not only the learning of concepts, but also how they are applied (Curry et al., 2012).

In an era where schools are held accountable via student achievement scores on state mandated tests, employers are demanding that graduates have work-ready skills required in an evolving global economy. To meet these demands, policy makers are looking to Career and Technical Education instructors to integrate academics into their curriculum. Career and Technical Education instructors utilize direct instruction and skills practice which is behavioristic in nature, but couple those techniques with contextual learning which is constructivist in nature (Berns & Erickson, 2001).

Constructivism.

Developed around the same time as behaviorism, constructivism looked beyond how the environment impacted learning and instead observed that students “construct their own knowledge by testing ideas based on prior knowledge and experience” (Berns & Erickson, 2001, p. 2). Birthed from John Dewey’s theories, constructivists believed students should construct knowledge based on experiences and then apply that knowledge to new problems using critical thinking (Berns & Erickson, 2001). Dating back to 1938, constructivists have long held that experiential learning produces realities that are unique to each individual learner (Doolittle & Camp, 1999). These realities stem from the psychological and philosophical interpretations of what they are learning. Thus, constructivists insist constructivism is best understood as a continuum rather than a singular theoretical philosophy.

The constructivist continuum is comprised of three fundamental theories including: radical constructivism, social constructivism, and cognitive constructivism and are all centered around three primary epistemological tenets (Doolittle & Camp, 1999). They described the three tenets as: knowledge acquisition is adaptive, requires active

cognition, and learning is individually experienced and not a reflection of a specific external reality. Representing one end of the continuum, radical constructivism embraces the three tenets and recognizes some social interactions considered to be, in part, a fourth tenet. Radical constructivism describes learning as being represented by models created by learners in context, but do not reflect a true reality because reality is unknown to the learner (Doolittle & Camp, 1999). In essence, learners are learning new content based on what they already know, and their experiential result will not reflect reality because that is unknown to them.

At the opposite end of the constructivist continuum from radical constructivism is cognitive constructivism, with social constructivism in the middle. Like radical constructivism, social constructivism emphasizes all three epistemological tenets and also fully embraces social interactions. Essentially, social constructivists believe knowledge is constructed through social interaction and activities (Doolittle & Camp, 1999). Unlike radical and social constructivism, cognitive constructivists only embrace the first two epistemological tenets.

Doolittle and Camp (1999) described cognitive constructivism as being infused with information processing and is centered on the individual learner actively acquiring information and then reconstructing that information to represent one external reality that mimics real world models. This form of constructivism is considered to be the “weakest form of constructivism” because it applies only two of the four tenets differentiating itself by “the claim the reality is knowable to the individual” learner (Doolittle & Camp, 1999, p. 5).

Course Sequencing

America's education system historically utilized curricular tracks to classify students as either college preparatory, general education, or vocational education where the curriculum varied in complexity and rigor (Gamoran & Mare, 1989). In 1994, Stevenson, Schiller, and Schneider found tracking students did not reflect the leveled courses students were actually taking. For instance, they reported that some students classified as college prep were not taking the more rigorous courses. As a result of multiple research studies, tracks were phased out and course sequencing replaced the method in which students were enrolled in courses.

Course sequencing is a series of content courses students take in a sequence where other courses serve as prerequisites for the next course (Schneider, Swanson, & Riegle-Crumb, 1998). Similar to career pathways, Schneider et al. went on to explain how academic classes like math and science are sequenced, usually "hierarchically by topic and ability grouping" (1994, p. 25). For instance, math courses are sequenced linearly requiring specific concepts to be mastered before moving on to the next course (Schneider et al., 1998). Although they conceded extensive controversy exists over the social benefits of curricula tracking, Stevenson et al. reported course sequencing appeared to more accurately predict how students would perform on assessments when compared to curricula tracking (1994). The nature of course sequencing makes student enrollment course specific and not grade level specific. Students may enroll in a course provided they have passed the prerequisite course. Students failing a course must retake it before progressing to the next course. Therefore, students across different grade levels may be enrolled in the same courses. This is seen many times when students transfer

schools, a concept Schneider et al. (1998) referred to as positional advantages and disadvantages.

Primarily commenting on positional advantages, the researchers considered the positional advantages students encounter as a result of being exposed to content for longer periods of time (Schneider et al., 1998). They reported students who transfer from one school district to another experience positional disadvantages which they have found negatively impacted student performance on assessments. The negative impact is the product of schools having the autonomy to decide the grade level students take specific courses at their schools, which reinforces the understanding course sequencing is not grade specific. All across Georgia, one school may give an ELA EOCT in the eleventh grade whereas a different school in the next county may elect to offer the same course in the tenth grade.

A review of the literature on course sequencing found a lack of current studies, but research from the 1990s reported valuable results. Specifically, Schneider et al. (1998) conducted a study surrounding math and science courses. In this longitudinal study, researchers examined eighth grade students and then reexamined them in the tenth and twelfth grades. The results of the study indicated course sequencing was a powerful predictor of student outcomes. Specific to course sequencing, the results indicated the “pattern of courses students take in mathematics and science” has strong, positive impacts (p. 44).

Reform Initiatives

Small Learning Communities.

Various models of school reform have surfaced over the years. One strategy evaluated, in response to NCLB, was the small schools' movement for creating a school culture characterized by better learning experiences. Reported in Cleary and English (2005), the 2001 NCLB Act granted large high schools with a population of one thousand students or more federal grants to develop small learning communities. Fleischman and Heppen (2009) characterized small learning community models as being schools-within-schools, academies within buildings, and free-standing small schools. Although they concede that small learning communities are primarily structural changes, instructional changes may also occur including collaboration between Career Technical Education teachers and core academic teachers fostering instruction around a career theme.

Schools creating small learning communities have experienced positive benefits. Kuo (2010) reported that small learning communities increase student achievement, especially among students identified as being socioeconomically disadvantaged, and that small learning communities positively impact academic achievement. Cleary and English (2005) supported those claims reporting improved academic performance and decreased disciplinary problems as a result of better educational experiences. The problem is that restructuring a school into small learning communities alone is not sufficient to enhance and maintain these benefits.

In the late 1990s, Supovitz and Christman (2005) conducted a study at a school in Philadelphia and a school in Cincinnati. Though the small learning community structures at each school were not identical, they found that small learning communities promoting

cross-collaboration discussions among teachers increased student performance. Their research helped build the case for teaching academic content with a career focus. Essentially, the personalization of small learning communities improved the overall culture of the school by maintaining smaller class sizes where students felt cared about and were actively engaged in the lessons (Fleischman & Heppen, 2009). In 2008, Duncan reported small learning community high school students had higher pass rates on Biology and English Language Arts tests when compared to traditional high school students. It is important to note, however, that Fleischman and Heppen claimed the reported benefits of small learning communities have “not been definitively established with rigorous research” (p. 119).

Career Academies.

Career academies have been in existence for nearly four decades with the earliest career academies being established in the late 1960s (Stern, Dayton, & Raby, 2000). Getting its start in Philadelphia, the first career academy was focused on electrical careers (Stern et al., 2000). The idea behind this first academy spread to other vocational areas including agricultural education. Initially, the focus of career academies was not to increase student achievement for the purposes of meeting CCRPI requirements. Instead, the use of career academies as part of a school’s structure was viewed as a tool for “dropout prevention and vocational preparation” (Stern et al., 2000, p. 5). Essentially, career academies were meant to keep students viewed as at-risk in school long enough to learn skills that would aid them in getting employment following secondary school.

Today, the focus of career academies as a school improvement model is not limited to teaching vocational skills. Modern career academies are focused on combining

academic content with career technical skills to enhance the rigor of the high school curriculum (Stern et al., 2010). The anticipated result of this increased rigor would be increased student achievement and schools' CCRPI rankings. Because of the positive benefits, career academies remain one of the most "durable and best-tested" high school reform strategies still being used today (Stern et al., 2010, p. 2).

What exactly are career academies? In a separate publication by Stern et al. (2000), it was suggested that an authoritative definition of career academies did not exist. However, in 1996, Kemple and Rock identified three main characteristics necessary to be classified as a career academy: (1) the model must utilize small learning communities, (2) the model must utilize a career theme to teach college-preparatory courses, (3) and the model requires the career academy school to partner with employers as advisory groups (p. 6). Researchers Gajda and Dorfman (2006) described a career academy as "an alternative academic pathway that integrates academic and technical skill instruction, creates healthy learning communities, and supports independent and project-based learning" (p. 13). This instructional approach creates more engaging lessons that provide students with real-world applications of academic content. Kuo (2010) reported that these types of small learning communities exhibited increased attendance, increased the amount of earned credits, and decreased the number of at-risk students dropping out.

These results were echoed by Stern, Raby, and Dayton (as cited in Kuo, 2010) who found students enrolled in career academies had higher achievement scores and graduation rates when compared to their non-academy school peers. Kemple and Snipes (2000) reported an 11% decrease in the dropout rate of career academy students when compared to non-career academy students. However, this was refuted by Kemple (2004)

who reported career academies did not positively or negatively impact overall student achievement, but did report increased graduation rates for those students.

Specific to this research, Stone, Alfred, and Pearson (2008) conducted a study on the impact career and technical education courses had on math scores. Even though they reported students did not possess the math skills needed in all settings after graduating, they discovered that students taking Career and Technical Education courses improved their math skills on “traditional and college-placement tests” on two out of three measures (p. 787). This increase in achievement is the result of adding real world relevance and rigor to how students are taught. This supports Stich’s (as cited in Hoachlander, 2008) findings that reading skills also improve as a result of teaching students “to read in the context of their daily activities” (p. 26). This supports the theory of constructivism where students learn by internalizing and then demonstrating what they learn (Doolittle & Camp, 1999).

In a brief published by the National Center for Education Statistics (May 2010), graduates who concentrated on Career and Technical Education courses had science test scores that were higher or not significantly different from those who did not concentrate in a career and technical education area. Career academies do not seek to teach only specific trade skills, but also to teach academic content in themed contexts that students learn in applied settings. To enroll students into career academies of these types, Georgia schools are utilizing career pathways to place students in academies surrounding their career focus.

Career Pathways.

Schools implementing career academies, which include ninth grade academies, allow students to choose a career pathway based on their interests. After choosing a career pathway, students are enrolled into the proper academy. A career pathway is the combination of rigorous academic courses coupled with technical courses beginning in the ninth grade, and is the result of collaboration between secondary schools, post-secondary schools, and business leaders. In his work, Hull (2005) indicated that the characteristics of an approved pathway included: meets state standard requirements, provides exit assessments, aligns with postsecondary entry expectations, provides technical skills training for specific careers, and establishes articulation agreements with technical colleges. By fulfilling these requirements, schools implementing career pathways were expected to see gains in student achievement, as well as enhanced - technical and career skills. Typically, schools offering pathways diversify them so multiple pathways are available from which students can choose. Kuo (2010) supported the multiple pathways approach citing they effectively assimilate career and academic courses into a learning environment that enhances the quality of secondary education. In 2003, Castellano et al. reported that effectual studies of career pathways had not been conducted, but in 2008 one study reported some findings.

In 2005, the National Center for Education Statistics (as cited in Hoachlander, 2008) reported a 6% increase in the number of graduates that took at least four units of Career and Technical Education courses, and that eight percent tended to enroll in both college-prep courses and Career and Technical Education courses. In 2011, Nord et al. reported 94.2% of secondary students enrolled in America's schools earned credits in a

CTE area in 2009. The success of pathways in schools stem from the cognitive theory that teaching a subject in contexts enables students to learn more efficiently (Hoachlander, 2008). This reiterates the use of contextual learning and constructivism.

Ninth Grade Academies.

Frequently, ninth grade academies are incorporated as part of the school-within-a school model, which Fleischman and Heppen (2009) indicated ease their transition to the high school environment. Ninth graders typically struggle with transitioning to high school because they are not prepared, and because the organization of high schools is not typical of their middle school environments (Rouse & Kemple, 2009). Wheelock found (as cited in Styron & Peasant, 2010) that ninth grade students who struggle with high school transitions often “become disengaged, discouraged, and who were unable to develop strong bonds with teachers were the most vulnerable to fail”(p. 2). Because of this, there is growing concern over ninth grade students and their achievement.

In 2009, Rouse and Kemple wrote that “Nationally one-third of recent high school dropouts were never promoted beyond the ninth grade” (p. 8). They attributed this to the fact that many of these students make failing grades their first year in high school causing them to fall behind preventing them from graduating on time. Styron & Peasant (2010) believed that easing the acclimation of ninth graders into a high school’s culture provides them with the support they need while alleviating the pressure of their older school peers. They reported that compared to ninth graders attending traditional high schools, ninth grade academy students scored higher on high-stakes tests in the areas of math and science.

School Choice.

Providing students with choices about their education, such as which school they want to attend has been scarcely researched. Having a choice about their education gives them ownership in their education, which researchers believe increases their level of engagement. However, the primary study about school choice did not relate to pathway choice. In the 1980s, school choice programs were introduced into the Chicago school district to address concerns that socioeconomically disadvantaged students did not have access to a quality education (Lauen, 2009). School choice programs offered parents the opportunity to choose which school their children would attend, regardless of location. Of the few studies attempting to correlate school choice to student achievement, one suggested that students who chose schools out of their neighborhoods in order to attend career academies were more likely to graduate as compared to those who attended schools near their homes (Lauen, 2009). However, Lauen (2009) concluded that the result of that test may not apply to other school districts. Of the school choices available to students in the district, charter schools were one of the options for attaining a better education.

Charter Schools.

Gaining popularity as an ideal school reform model are charter schools. Charter schools are essentially public schools that provide parents and students an alternative to traditional education (Bulkley, Fisler, & Consortium for Policy Research in Education, 2002). Boyd (2007) viewed charter schools as a compromise between public and private education that changes the monopolistic nature of public education. Opponents of charter schools and school choice have argued that these alternatives to traditional public schools

are unconstitutional. To that end, they have pursued legal action contending that schools using the voucher system violate the First Amendment, especially schools formed around a particular sect (Boyd, 2007). Traditional public school enthusiasts contend that because traditional public schools do not discriminate, they benefit society by decreasing crime and poverty rates (Seyedbagheri, 2011).

On the other hand, proponents of charter schools argue that the rationale for the creation of charter schools lies in the autonomy and flexibility they are afforded, and that creating market competition in education will enhance the performance level of competitor schools (Fleischman & Heppen, 2009). The flexibility and autonomy that charter schools are afforded excuse them from NCLB mandates that public schools are forced to comply with (Stillings, 2005). As such, they are not bound by education mandates that constrain public schools (Seyedbagheri, 2011). Over the years, those strongly opposing charter schools disagreed with this education deregulation and feared that the increase in competition for funds only served to further deteriorate America's education system.

Advocates for charter schools argue that the flexibility and autonomy do not diminish the education system because under NCLB charter school students are required to take the same assessments as traditional public school students (Stillings, 2005). Under the most current NCLB reauthorization, charter school students are required to demonstrate the same minimal achievement requirements as their traditional public school peers (Seyedbagheri, 2011). In most of the research findings, the length of time that charter schools had before losing their charter was not disclosed, but Stillings (2005) reported that public schools that do not attain minimal performance levels face sanctions

for two years of underachievement. She further reported those schools have 7 years to correct their underachievement status. Additionally, she reported that charter schools are not granted that privilege, but instead may be closed immediately; the exchange they make for autonomy and flexibility. Seyedbagheri (2011) reported that lack of time to correct shortcomings is what compels charter schools to do well. This raises the question – do charter schools exhibit greater student achievement than traditional public schools?

Fleischman and Heppen (2009) admitted that research comparing charter and public schools is lacking, but forthcoming. One recent study by McDonald, Ross, Bol, and McSparrin-Gallagher (2007) reported finding that charter school students' achievement was lower than the mean score of students attending public schools on the National Assessment of Educational Progress (NAEP). Zimmer and Buddin (2005) conducted a study on two charter schools where one school showed student performance on reading and mathematics tests to be equivalent to traditional public school students on the same content tests. The other school reported that students surpassed traditional public school students on both content tests. In a California study, Edwards (as cited in Fleishman & Heppen, 2009) reported charter students' scores on math and English exit exams were higher than traditional school students' scores. Still, research on the performance of charter schools against traditional public schools is scarce at this point leaving much debate over the effectiveness of one school model over the other.

Today it is just as evident as it was in 1983 that traditional public schools are in dire need of reforms that will enhance student performance and lower the dropout rate, but with less money (Graham, 2013). Lawmakers are not callused to the understanding that education reform policies are needed to map out potential solutions to America's

failing schools' epidemic. NCLB has been one of the most forward thinking and controversial pieces of legislation due to the mandates and expectations. However, when one compares the state of education today with that of the "*A Nation at Risk*" era, there are mounting concerns surrounding the ability of today's graduates to skillfully enter the workforce. With multiple school reform models available, researchers must continue to strive to find a replicable model or mix of models that will enable school districts to reformulate effective approaches to education reform.

Chapter III

METHODOLOGY

Introduction

The purpose of this study was to compare student achievement in charter schools with traditional public schools where each have implemented career academies. Developed around behaviorist and constructivist learning theories, these schools combine a mix of school reforms identified as career academies as a vehicle to enhance student achievement. This chapter provides an in-depth rationale for the research design that was utilized for this study. The methodology includes a description of the study, a description of how test sites and participants were selected, the research questions that guided the study, an explanation of how data were collected and the procedures used for data analysis, and a conclusion with a short explanation of ethical considerations.

Description of the Study

For many years, educational leaders have sought out research-based school reform models that promise to enhance student achievement. The most studied reforms include limiting the size of the student body to smaller populations, implementing schools-within-schools, offering free-choice schools, utilizing career academies with freshman academies, and implementing career pathways (Lauen, 2009; Cleary & English, 2005; Kuo, 2010). Each of these reform models have been studied individually to validate their contributions to increasing student achievement. However, no studies were

identified where researchers examined whether or not mixing the approaches together improve overall student performance. It was noted by Fleischman and Heppen (2009) that the implementation of only one reform model in a school was not robust enough to improve a low-performing school. In this research study, the impact of mixing multiple reform models in the form of career academies on student achievement in English Language Arts, math, and science was tested.

In this study, a casual-comparative design using quantitative analysis was utilized to determine if implementing career academies significantly impacted student achievement at charter schools versus traditional public schools. The implementation of these academies accounts for multiple reform models including small learning communities, the creation of schools-within-schools, career academies with ninth grade academies, and student choice through career pathways. It is expected that each student enrolling in a career academy at both the charter school and the traditional public schools selected a career pathway of their choice. Archival data were collected from each site to statistically determine if significant differences exist for each dependent variable including: English Language Arts EOCT scores, Math EOCT scores, and Science EOCT scores. The use of archival data exempted this research from Institutional Review Board (IRB) oversight (see the Appendix). The evidence from these tests addressed the problem statement by providing empirical evidence as to whether career academies at charter schools are a better approach to educational reform in Georgia high schools compared to the same reform model at traditional public high schools.

Sampling Technique

In Georgia, career academies are slowly becoming recognized as ideal vehicles for improving student achievement given Georgia's adoption of Common Core Standards. These academies are viewed as a way of bridging the gap between academic content and real-world applications. Career, Technical, and Agriculture Education career academies appear to be Georgia's desirable choice for enhancing academic rigor in classrooms around the state. Because the focus of this study is on career academies, a purposeful sample of charter and public schools that have implemented schools-within-schools by the creation of themed career academies was selected. Additionally, these schools were expected to have implemented career pathways for students to choose from satisfying the element of free choice. Further, the creation of these academies satisfied the element of small learning communities for the purposes of this study.

This study was limited to one charter school test site, and it was identified as Charter School One in Georgia. This school met the criteria of the study as it was a chartered career academy school where students are housed on campus for all of their classes. At Charter School One, 1,057 students took the Math EOCT, 833 students took the Science EOCT, and 541 students took the English Language Arts EOCT following its inception as a college and career academy school.

The public school test sites proposed for this study were Public School One in Georgia and Public School Two in Georgia. Both of these schools implemented career academy models where Public School One built new facilities to house their academies and Public School Two reorganized in-house. The year following the implementation of career academies, Public School One had 311 students take the Math EOCT, 774 take the

Science EOCT, and 785 take the English Language Arts EOCT. The year following the implementation, Public School Two had 442 take the Math EOCT, 461 students take the Science EOCT, and 381 take the English Language Arts EOCT.

Each of the test sites were contacted to ascertain the appropriate applications necessary to gain access to the archival data needed to carry out the proposed research. Letters of cooperation were obtained from each research site prior to collecting data. The data needed for this study included archival student test scores for Math, Science, and English Language Arts EOCTs given the year following the implementation of career academies. Information pertaining to students was not requested as only individual scores were needed to address the three research questions. However, all three test sites did indicate grade level with their data.

Description of the Sample

A purposeful sample of Georgia career academy charter schools and traditional public schools implementing career academies was selected. This research study was conducted by comparing archival data from one Georgia career academy charter high school and two traditional Georgia public high schools that have implemented career academies. The school district where the career academy charter school is located has multiple traditional public high schools. Students in the district had the opportunity to apply to the career academy charter school when enrolling in secondary school. Students enrolling at the career academy had career pathway options that were used to determine their course of study at the school. Data from the charter school's first year of operation were utilized in this comparison study with the two traditional public schools. Archival

EOCT scores from the charter school test site included a total of 1,057 math scores, 833 science scores, and 541 English Language Arts scores.

Two public schools were used in this comparison study. Public School One implemented career academies using the Talent Development Career Academy Model. Public School Two implemented career academies 2 years after Public School One. To design the career academy school model that would be used, district administrators from Public School Two visited Public School One and modified the Talent Development Model to fit the school's current building structure. The adopted models at both public schools utilized a combination of ninth grade academies, small learning communities, schools-within-schools, career academies, and student chosen pathways. The total public school sample for this study consisted of 753 students taking the Math EOCT, 1,235 students taking the Science EOCT, and 1,166 students taking the English Language Arts EOCT.

Though the research questions do not specifically attend to grade level data, the sample was broken down by grade level across all test sites for a better sample description. Table 1 summarizes the sample description by grade. As discussed in the limitations section, the charter school did not have a ninth grade academy, so the ninth grade sample was public school specific. Other demographic information including gender and ethnicity was not included; therefore that information was not included herein.

Research Design

A casual-comparative quantitative design was utilized to determine the differences of test scores for the Georgia English Language Arts EOCT, Math EOCT,

Table 1

Sample Population by Grade

Grade	Sample Population
9 th	1,329
10 th	1,167
11 th	1,659
12 th	1,430
Total	5,585

and Science EOCT in the year following the implementation of career academies at the charter and public school test sites. The data was analyzed to determine whether or not a significant difference existed for each dependent variable as a result of implementing the intervention at each school site. Initially, a simple comparison for each research question was carried out using ANOVA.

The independent variable was school type, which had two levels and included charter schools and traditional public schools. The charter school and public school test sites had implemented career academies where academic and CTAE teachers collaborated so that academic courses had a career themed focus. Comparative analysis was conducted to determine if implementing career academies impacted student achievement on the EOCTs.

The dependent variables for this study included the Georgia EOCTs for English Language Arts, math, and science. The use of EOCTs began in response to the A+ Education Reform Act of 2000 (Georgia Department of Education, 2013). The law demanded that each state adopt end-of-course tests for academic subject areas including math, social studies, science, and English Language Arts. The EOCTs are course specific,

and all students are required to pass these tests in order to receive a credit for the course, regardless of grade level. These tests also serve as the final exams for the courses.

Following the simple comparison, ANCOVA analysis was conducted to determine if using grade as a covariate influenced the test results. Although this analysis was not necessary to answer the research questions, the analysis did allow for some grade level correlation inferences to be made. A valid comparison could only be made for grades ten through twelve due to the lack of ninth grade data availability at the charter test sight.

Research Questions

Comparisons of the independent variables were reported using both descriptive and inferential statistics for the following research questions:

1. Is there a significant difference in student achievement in English Language Arts (as measured by English Language Arts EOCTs) for students enrolled in career academy charter schools versus traditional public schools implementing career academies in the academic year following the implementation?
2. Is there a significant difference in student achievement in math (as measured by Math EOCTs) for students enrolled in career academy charter schools versus traditional public schools implementing career academies in the academic year following the implementation?
3. Is there a significant difference in student achievement in science (as measured by Science EOCTs) for students enrolled in career academy charter schools versus traditional public schools implementing career academies in the academic year following the implementation?

Data Collection Instrument

The effectiveness of school districts has been gauged using annual yearly progress measures. For Georgia high schools, annual yearly progress was reported using the Georgia High School Graduation Test as the standard measure. In 2011, the Georgia High School Graduation Test began being phased out giving more weight to Georgia End-of-Course Tests (Georgia Department of Education, 2013). Additionally, with the shift from using annual yearly progress measures to the new College and Career Readiness Performance Index (CCRPI), Georgia End-of-Course Tests now play a more vital role in establishing school districts' yearly report cards.

According to the Georgia Department of Education (2013), End-of-Course Tests measure not only “the effectiveness of classroom instruction at the high school, system, and state levels,” they also serve to identify whether or not students have gained the knowledge needed to earn a course credit (para. 3). Historically, other studies have utilized standardized tests when testing the impact of an intervention on student achievement implying their reliability as an effective test measure (Duncan, 2008 & Seyedbagheri, 2011). Likewise, Georgia End-of-Course Test Scores in the areas of English Language Arts, math, and science were analyzed to determine if the intervention impacted student achievement.

Reliability of End-of-Course Tests.

Reliability refers to the ability of a test to consistently produce results obtained from a measurement (Georgia Department of Education, 2013). To test the reliability of Georgia End-Of-Course Tests, Cronbach's alpha coefficients were established, as well as the Standard Error of Measurement (SEM). Cronbach's alpha coefficients control for the

consistency of the internal responses and reports “test scores as the ratio of true score variance to observed total score variance” (Georgia Department of Education, 2013, p. 7). SEM, however, quantifies the number of errors that occur on a test. When the SEM is applied to a student’s test score, a range of scores is established that theoretically encompasses the student’s true test score. This procedure produces a confidence interval that helps determine the student’s true test score at a 95% confidence interval (Georgia Department of Education, 2013).

The last Georgia end-of-course accountability brief disclosed the last testing administration was in the Spring of 2013 using Form I and Form II. Using industry expectations for criterion-referenced tests, the reliability of the EOCTs administered was expected to fall in the range of 0.74 to 0.94. According to the report, all of the EOCTs, including English Language Arts, science, and math fell within the range established by Crobach’s alpha coefficients, establishing the reliability of the tests (Georgia Department of Education, 2013). The scores were individually reported by subject using Form I and Form II, respectively. The scores for each subject are reported in Table 2. Statistically, all of the coefficients fell within the range indicating an acceptable level of reliability. During the same testing administration, the error bands were considered to be reasonably small with a SEM value range of 3.26 to 3.63 (Georgia Department of Education, 2013). The SEM values for the three previously mentioned content areas in the Spring 2013 testing administration for Form I and Form II appear in Table 3. Because the SEM values fell within the established range, the tests were again deemed to be reliable assessments.

Table 2

Coefficient Alpha Summary for EOCT Reliability Testing

	Summer 2012 Administration Form 1/Form 2	Spring 2013 Administration Form 1/Form 2
Ninth Grade Literature & Composition	0.92/0.92	.092/0.92
American Literature & Composition	0.89/0.90	0.90/0.90
Biology	0.92/0.92	0.94/0.93
Physical Science	0.90/0.91	0.91/0.89
Mathematics I	0.76/0.79	0.83/0.83
Mathematics II	0.89/0.89	0.85/0.87
Algebra	0.77/0.76	0.74/0.78
Geometry	0.86/0.84	0.88/0.90
Coordinate Algebra	0.89/NA	0.87/0.86

Note. Adapted from “An Assessment & Accountability Brief: 2012-13 Validity and Reliability,” by Georgia Department of Education, 2013, p. 8. Copyright 2013 by the Georgia Department of Education.

Validity of End-of-Course Tests.

Giving end-of-course tests is not a requirement mandated by federal legislation; rather the Georgia Department of Education has constructed them to meet the requirement that some instrument be used to measure student achievement in an effort to place more accountability on school systems (Georgia Department of Education, 2014). To that end, the Georgia Department of Education has taken careful steps to ensure that the end-of-course tests given in Georgia high schools accurately measure student performance, and that they are robust enough to be considered reliable in the research community. To ensure the tests are rigid enough to withstand validity testing, careful consideration of the Georgia Performance Standards (GPS) was given in the construction phase of the tests.

Validity is “a matter of degree and is not an all or nothing condition,” and it exists in context (Georgia Department of Education, 2013, p. 1). Contextually, the validity of end-of-course tests was established in the multi-step construction phase of the tests. This

Table 3

Summary of EOCT SEM Values

	Summer 2012 Administration Form 1/Form 2	Spring 2013 Administration Form 1/Form 2
Ninth Grade Literature & Composition	3.35/3.35	3.30/3.31
American Literature & Composition	3.52/3.46	3.43/3.30
Biology	3.65/3.64	3.52/3.52
Physical Science	3.71/3.63	3.61/3.63
Mathematics I	3.42/3.38	3.36/3.35
Mathematics II	3.30/3.28	3.35/3.34
Algebra	3.38/3.38	3.37/3.37
Geometry	3.30/3.30	3.28/3.26
Coordinate Algebra	3.28/NA	3.29/3.29

Note. Adapted from “An Assessment & Accountability Brief: 2012-13 Validity and Reliability,” by Georgia Department of Education, 2013, p. 9. Copyright 2013 by the Georgia Department of Education.

process began by establishing the purpose of the tests, which in this case was to diagnostically measure the minimum knowledge level students should achieve when taking core curriculum courses based on the Georgia Performance Standards (Georgia Department of Education, 2013). Once the test items were established, they were field tested and then reexamined giving consideration to multiple factors. After the test items were accepted, the actual end-of-course tests were established through a process known as statistical equating to ensure “that the tests are of equal difficulty” (Georgia Department of Education, 2013, p. 3). It was only after the first administration of the tests that minimum performance levels were established as a means of developing scale scores to determine if students pass or fail.

In Georgia, end-of-course test scores are scaled from between 200-600 depending on the test subject (Georgia Department of Education, 2012). In order for a student to pass the EOCT, he or she must score a minimum number of points to get credit for the course. The scale score is then converted to a grade converted score. For instance, a score of 400 might translate into a grade of 70, which is the minimum pass score on the 0-100 scale. For the purpose of this study, the grade converted score data were used to analyze student achievement on each EOCT given.

The validity of the scoring system is a construct element that allows inferences to be made as to whether a student has mastered the minimum skills needed to pass a course. On the Georgia End-Of-Course Tests, construct validity was established using point-biserial correlation and Rasch fit statistics (Georgia Department of Education, 2013). Point-biserial correlations correlate test items with final test scores, and Rasch fit statistics use the unidimensional Item Response Theory to statistically fit test items to the scoring rubric.

Data Analysis Procedures

To conduct this analysis, empirical data from each test site were gathered. Specifically, the data were composed of English Language Arts EOCT scores, Math EOCT scores, and Science EOCT scores for students enrolled in career academies. These data were attained from each test site where career academies were implemented. At the public school test sites, EOCT scores were collected for the year following the implementation of career academies. The data for the career academy charter school were for the first year the school was in operation.

For simple comparative analysis, data from the career academy charter school were compared to the data retrieved from the traditional public schools implementing career academies for each research question. To compare and analyze these data, ANOVA analysis was conducted for each research question rather than multiple independent t tests. According to Field (2009) using several t tests to conduct analysis where multiple means are being analyzed increases the Type I error rate as compared to using ANOVA analysis (p. 348). The independent variable was school type which included charter schools versus traditional public schools where each school model had implemented career academies. The participants in the study differed based on test site.

Field (2009) indicated the model sum of squares needed to be addressed to report main effects and interaction effects. He went on to describe how to work out the residual sum of squares and how to calculate the F-ratios. To reduce the risk of a Type II error, the test results were reported using a probability of $p < .05$. Although a $p < .01$ is a more conservative measure, it also increases the risk of a Type II error where genuine effects may be missed.

The purpose of conducting ANCOVA analysis was to determine if significant effects were observed by introducing a covariate into the analysis. The covariate used in this study for ANCOVA analysis was grade level. Recalling the charter school did not have ninth graders attending the school the first year of operation, no comparison was made for that grade level. Too, because EOCTs are course specific and not grade specific, and because schools may sequence their classes differently, the sample sizes for each EOCT by grade level may or may not have been approximately equal. Still, comparing the means using ANCOVA produced interesting results.

In summary, the purpose of this research study was to fill gaps that currently exist in the research community concerning Georgia high schools and analyze the effect of using career academies at charter schools versus traditional public high schools. The empirical results are expected to provide evidence that using multiple reform models under the umbrella of career academies together enhance school leaders' abilities to increase student achievement while maintaining or enhancing their school's culture. The expectation is that this research will provide Georgia school districts with evidentiary support for choosing a combination of reform options for their schools where student achievement is enhanced, and where students graduating are more prepared to enter an ever expanding global market.

Ethical Considerations

The information for this study was acquired from accredited academic databases. The information was accurately conveyed without prejudice to the best of the researcher's ability. Permission was obtained from each test site where archival data were obtained from personnel having access to the data. The school sites were given pseudo-names to protect their identities. Additionally, student names were not included as only the test scores were needed to perform analysis. The ethical use of data was insured by the researcher by reporting accurate statistical results. The results were reported without bias and were not intended to promote charter schools over traditional public schools, or vice versa.

Chapter IV

DATA ANALYSIS AND RESULTS

Introduction

The purpose of this research study was to determine if career academy charter school students scored significantly higher on standardized tests than students who attended traditional public schools where career academies have been implemented. At each test site, whether charter or public, the school models utilized similar school reform techniques including the formation of career academies, small learning communities, and student choice through career pathways. One charter school and two public schools agreed to participate in this study. The charter school was located in the northern part of Georgia, and the two public schools were located in the southern part. This chapter briefly describes the sample, discusses the data collection procedures used, explains the data analysis procedures conducted, and reports the results using both the descriptive and inferential statistics.

Description of the Sample

The purposeful sample utilized in this study was comprised of ninth through twelfth grade charter and public school students in Georgia. The sample contained a total of 5,585 test scores from Georgia ELA, Math, and Science EOCTs. By grade, there were 1,329 ninth grade test scores, 1,167 tenth grade test scores, 1,659 eleventh grade test scores, and 1,430 twelfth grade test scores. From the sample, 2,431 of the total scores came from the career academy charter school test site, and 3,154 of the total scores

came from the public school test sites. By content area, the charter school had 541 ELA scores, 833 science scores, and 1,057 math scores. The public school test sites had 1,166 ELA scores, 1,235 science scores, and 753 math scores.

The archival data collected from the charter school site were from the first test administration given at the site following the first year of operation. The public school data were from the test administrations following the first year implementation of career academies. The data from the charter site and Public School One were electronic, and the data from Public School Two were provided as a hard copy. The electronic data were decoded to identify the grade converted scores and the grade level of the student before being entered into Excel so the data could be easily loaded into the SPSS software.

As mentioned earlier, EOCTs are not grade specific, but are instead course specific. For ANCOVA, the sample was broken down by school type using grade level as a covariate. The charter school had zero ninth graders, five tenth graders, 280 eleventh graders, and 256 twelfth graders take the ELA EOCT. The public school sites had a total of 582 ninth graders, 95 tenth graders, 471 eleventh graders, and 18 twelfth graders take the ELA EOCT.

On the Math EOCT, the charter school sample consisted of zero ninth graders, eight tenth graders, 454 eleventh graders, and 595 twelfth graders. The public school sample consisted of 227 ninth graders, 426 tenth graders, 85 eleventh graders, and 15 twelfth graders.

On the Science EOCT, the charter school had zero ninth graders, five tenth graders, 309 eleventh graders, and 519 twelfth graders take the test. At the public school

sites, a total of 520 ninth graders, 628 tenth graders, 60 eleventh graders, and 27 twelfth graders took the test.

Data Analysis

Archival data were utilized in this study to compare the impact of career academies on student achievement at career academy charter schools versus traditional public schools. A casual comparison was made using Georgia standardized test scores referred to as End-of-Course Tests (EOCTs). The EOCT scores for English Language Arts, math, and science were collected from each test site for the academic year following the implementation of career academies.

SPSS software were used to conduct both one-way analysis of variance (ANOVA) and analysis of covariance (ANCOVA). For SPSS purposes, all of the data from Charter School 1 were labeled 0 to represent charter schools. All of the data from Public School One and Public School Two were labeled 1 to represent public schools. Labeling helped identify which scores were from charter schools and which ones were from public schools. Labels were also created for English Language Arts, math, and science, so the scores could be identified properly. The labels used for these academic areas were ELA_score, Math_score, and Science_score. The label grade was created in SPSS to represent grade level, which included ninth, tenth, eleventh, and twelfth grades. With all of the archival data entered and properly labeled, ANOVA and ANCOVA were performed for each research question. Differential and inferential statistics from each one-way ANOVA and ANCOVA were reported for each research question.

Results

Research Question 1.

Is there a significant difference in student achievement in English Language Arts (as measured by English Language Arts EOCTs) for students enrolled in career academy charter schools versus traditional public schools implementing career academies in the academic year following the implementation?

Inferential statistics from one-way ANOVA were used to determine if there was a significant difference in student achievement in English Language Arts (as measured by English Language Arts EOCTs) for students enrolled in career academy charter schools versus traditional public schools implementing career academies in the academic year following the implementation. Table 4 shows the descriptive statistics for Research Question 1. In Research Question 1, student achievement in English Language Arts was compared for each school type. For the ANCOVA, the covariate was grade level.

Table 4

Descriptive Statistics of ELA EOCT Scores by School Type

School Type	N	M	SD
Charter	541	81.4695	8.67572
Public	1166	80.4708	21.99111
Total	1707	80.7873	18.82258

From the sample of students taking the ELA EOCT (N = 1707), 541 career academy charter school students were tested and 1,166 public school students were tested. The mean ELA EOCT score for the school test sites by type were charter (M = 81.47, SD = 8.68, N = 541) and public (M = 80.47, SD = 22.00, N = 1,166).

ANOVA assumed the groups were independent, attention was given to missing or outlying data, the data were normal, and there was homogeneity of variances. Levene's Homogeneity of Variance Test demonstrated the variances of the two schools were not significantly different satisfying the assumption, $F(1, 1705) = 3.18, p = .08$. Because the sample size was so large, the assumption of normality was assumed. According to Field (2009), normality tests such as skewness and kurtosis should not be conducted on large samples because the tests will likely yield significant values from "small deviations from normality" (p. 139). ANOVA revealed career academy charter schools were not significantly different from traditional public schools implementing career academies on the ELA EOCT, $F(1, 1705) = 1.04, p = .31$.

ANCOVA was conducted to further test the impact of the independent variable on the dependent variable to determine whether a significant difference existed between career academy charter schools and traditional public schools implementing career academies with respect to the covariate (grade level). Assumptions for the ANCOVA are the same as ANOVA with the exception of independence of the covariate and homogeneity of regression slopes. The groups were independent and the covariate was independent from the treatment. Using Levene's Homogeneity of Variance Test, the assumption of homogeneity of variance was assumed, $F(1, 1705) = 3.24, p = .07$. Of the 541 charter school scores, no ninth grade scores were reported, five were tenth graders, 280 were eleventh graders, and 256 were twelfth graders. Of the 1,166 public school scores, 582 were ninth graders, 95 were tenth graders, 471 were eleventh graders, and 18 were twelfth graders. Table 5 shows the main effects from the ANCOVA for Research Question 1.

Using a significance value of $p < .05$, ANCOVA effects in Table 5 again indicated there was not a significant difference in student achievement in ELA for students taking the ELA EOCT at the career academy charter school when compared to students taking the ELA EOCT at traditional public schools implementing career academies, $F(1, 1705) = .03, p = .87, \eta^2 = .000$. More importantly, ANCOVA did not reveal a significant impact of the covariate on the English EOCT, $F(1, 1705) = .96, p = .33, \eta^2 = .001$.

Table 5

Main Effects Table for ANCOVA for ELA Scores

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	707.225	2	353.613	.998	.369	.001
Intercept	983234.552	1	983234.552	2775.223	.000	.620
Grade	338.674	1	338.674	.956	.328	.001
School	9.485	1	9.485	.027	.870	.000
Error	603710.581	1704	354.290			
Total	11745316.00	1707				
Corrected Total	604471.807	1706				

Note. R Squared = .001 (Adjusted R Squared = .000)

Research Question 2.

Is there a significant difference in student achievement in math (as measured by Math EOCTs) for students enrolled in career academy charter schools versus traditional public schools implementing career academies in the academic year following the implementation?

Analysis of the data for this research question mimicked that of research question one, with the exception of the dependent variable. This research question guided the

comparison test to determine if there was a significant difference in student achievement in math for students enrolled in career academy charter schools versus traditional public schools implementing career academies. School type was the independent variable and student achievement in math was the dependent variable. Following ANOVA, grade level was then introduced as the covariate for ANCOVA.

Initially, ANOVA produced a simple comparison of career academy charter schools with traditional public schools that have implemented career academies. Table 6 displays the descriptive statistics for this research question. The sample population of students taking the Math EOCT was $N = 1810$. Of those taking the Math EOCT, 1,057 were career academy charter school students, and 753 were public school students. The mean Math EOCT score for each school type was charter school ($M = 68.56$, $SD = 8.89$, $N = 1057$) and public schools ($M = 68.71$, $SD = 9.36$, $N = 753$).

Table 6

Descriptive Statistics of Math EOCT Scores by School Type

School Type	N	M	SD
Charter	1057	68.5648	8.88680
Public	753	68.7052	9.35631
Total	1810	68.6232	9.08278

All of the assumptions for ANOVA were met, including the homogeneity of variances, $F(1, 1808) = .73$, $p = .39$. ANOVA revealed that compared to public schools, the charter school's Math EOCT scores were not significantly different, $F(1, 1808) = .11$, $p = .75$.

ANCOVA was conducted to determine if career academy charter schools impacted student achievement more significantly than traditional public schools

implementing career academies with respect to grade level. Again, ANCOVA assumptions were addressed and found that the samples were independent. The assumption that the covariate was independent of the treatment was tenable. By grade level the charter school and public school sites reported the following respective sample sizes: zero charter and 227 public ninth graders, eight charter and 426 public tenth graders, 454 charter and 85 public eleventh graders, and 595 charter and 15 public twelfth graders. Levene's test was used to determine whether or not the assumption of homogeneity of variances was tenable. The test revealed the variances were approximately equal at $F(1, 1808) = 24.67, p = .000$ violating the homogeneity of variances assumption. This violation was corrected using Welch's $F(1, 1568) = .10, p = .75$. However, Field (2009) warned that Levene's test can produce a significant value violating the assumption when used on large samples when in all actuality there is not a concerning difference (p. 152).

When grade level was added as a covariate, there was a significant difference in math scores between charter schools and public schools implementing career academies $F(1,1808) = 122.75, p = .000, \eta^2 = .06$. Table 7 shows the main effects table for the ANCOVA analysis which indicates the covariate interaction was significant $F(1,1808) = 177.13, p = .000, \eta^2 = .09$. Estimated marginal means from the ANCOVA revealed that public schools outperformed charter schools, and as the grade level increases so do math scores on the EOCT (see Figure 1). This was true for grades ten and eleven, but not for twelfth graders.

Table 7

Main Effects Table for ANCOVA for Math Scores

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	η^2
Corrected Model	13330.565	2	6665.283	88.621	.000	.089
Intercept	260738.22	1	260738.22	3466.760	.000	.657
Grade	13321.900	1	13321.900	177.127	.000	.089
School	9232.411	1	9232.411	122.753	.000	.064
Error	135906.460	1807	75.211			
Total	8672788.000	1810				
Corrected Total	149237.025	1809				

Note. R Squared = .089 (Adjusted R Squared = .088)

A close examination of the samples size reported only 15 public school twelfth graders took the Math EOCT whereas 595 charter students tested. The sample population description implies the majority of public school students take their Math EOCTs in ninth, tenth, and eleventh grades. The courses are sequenced so students have completed those courses earlier in their secondary school careers compared to their charter peers. The small sample of seniors taking the Math EOCT in the twelfth grade is likely students who are retaking the EOCT because they previously failed the assessment. If that is the case, students testing as seniors would likely have lower scores because they had previously failed the Math EOCT. Therefore, they would have to retake the assessment, or even the course to receive credit toward graduation. This might explain why the trend in the twelfth grade data was not similar to the tenth and eleventh grade data.

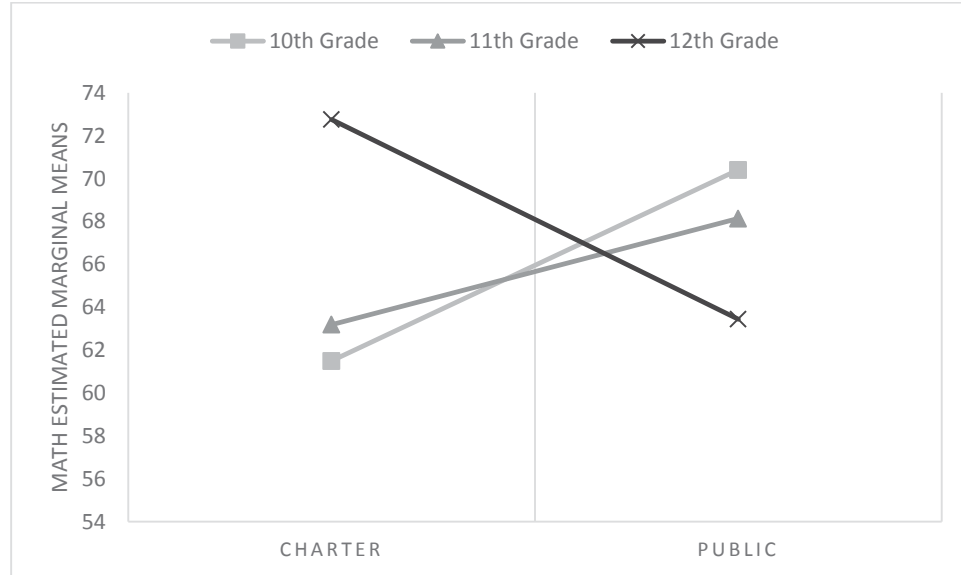


Figure 1. Math EOCT Estimated Marginal Means by Grade Level.

Research Question 3.

Is there a significant difference in student achievement in science (as measured by Science EOCTs) for students enrolled in career academy charter schools versus traditional public schools implementing career academies in the academic year following the implementation?

Simple comparison using ANOVA was used to determine if a significant difference exists between scores on the Science EOCT at career academy charter schools versus traditional public schools implementing career academies. The total sample size of Science EOCT scores was $N = 2068$ with $N = 833$ from the career academy charter school sample and $N = 1235$ from the public school sample. The mean Science EOCT score for the charter school sample was ($M = 80.15$, $SD = 10.39$, $N = 833$) and the public school sample mean was ($M = 77.07$, $SD = 22.99$, $N = 1,235$). Descriptive statistics in

Table 8 show that mean scores at charter schools were higher than those at public schools. Assumptions for ANOVA were met with the exception of homogeneity of variances $F(1, 2066) = 13.49, p = .000$. Therefore, Welch's F was used to correct the violation $F(1, 1844) = 17, p = .000$.

Table 8

Descriptive Statistics of Science EOCT Scores by School Type

School Type	N	M	SD
Charter	833	80.1465	10.39023
Public	1235	77.0680	22.98774
Total	2068	78.3080	19.00557

ANOVA revealed that there was a significant difference in Science EOCT scores at career academy charter schools when compared to traditional public schools that have implemented career academies $F(1, 2066) = 13.13, p = .000$. The results indicated that charter schools outperformed public schools on the Science EOCT.

ANCOVA was once again used to further analyze the data related to this research question. For this research question, the independent variable was school type and the dependent variable was student achievement in science. The covariate was grade level. This research question guided the comparison of career academy charter schools to traditional public schools implementing career academies. The same ANCOVA assumptions from the two previous tests were evaluated, and it was determined that all of the assumptions were tenable with the exception of homogeneity of variances. This assumption was tested using Levene's Test which produced a significant value indicating that this assumption was violated, $F(1, 2066) = 13.36, p = .000$. Again, Welch's F, $F(1, 1844) = 17.00, p = .000$ was used to reconcile this assumption.

The number of scores by grade level for the charter and public sites was: zero charter and 520 public ninth graders, five charter and 628 public tenth graders, 309 charter and 60 public eleventh graders, 519 charter and 27 public twelfth graders. Inferential statistics in Table 9 indicated that there was a significant difference in Science EOCT scores between career academy charter schools and traditional public schools implementing career academies $F(1, 2066) = 4.46, p = .04, \eta^2 = .002$. The covariate was not statistically significant $F(1, 2066) = .04, p = .84, \eta^2 = .000$. The estimated marginal means from ANCOVA revealed charter schools outperformed public schools on the Science EOCT.

Table 9

Main Effects Table for ANCOVA for Science Scores

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	4728.756	2	2364.378	6.581	.001	.006
Intercept	643893.635	1	643893.635	1792.219	.000	.465
Grade	14.388	1	14.388	.040	.841	.000
School	1603.222	1	1603.222	4.462	.035	.002
Error	741896.030	2065	359.272			
Total	13427905.00	2068				
Corrected Total	746624.787	2067				

Note. R Squared = .006 (Adjusted R Squared = .005)

Chapter V

SUMMARY AND DISCUSSION

Introduction

Since the early 1980s, the state of America's education system has been under continual scrutiny. Following the "*A Nation at Risk*" publication, researchers and politicians began searching for methods to reform America's schools into educational powerhouses that produce students attaining higher levels of achievement than their global peers. Researchers began seeking out and evaluating many reform initiatives and models believed to benefit students and boost achievement on standardized tests. Following the passing of the No Child Left Behind legislation, and most recently the Every Student Succeeds Act, school districts continue to search for reform methods that promise to deliver increased results in student achievement in an educational era characterized by stringent accountability standards.

From small learning communities and career academies to charter schools and school choice, researchers have investigated many alternatives to America's traditional school structure (Lauen, 2009; Cleary & English, 2005; Kuo, 2010). Implementing various aspects or components of these research-based strategies failed to produce sustainable results upon which school districts can rely. A review of research literature indicated most research is centered around elementary and middle grades, but secondary school research is sparse. More specifically, it was discovered that research comparing secondary charter schools with public schools is lacking, as are studies comparing career

academy charter schools with traditional public schools that have implemented career academies. The purpose of this study was to bridge that gap and to offer Georgia school districts insight into how secondary Georgia school students at each school type perform under this mixed model.

This study was a comparison of career academy charter schools to traditional public schools that have implemented career academies. Generalized findings were discovered using ANOVA to compare the means of the EOCT scores for each research question. Simple comparison using this type of analysis allowed each of the research questions to be answered. Although some grade level sample size discrepancies were observed, ANCOVA was performed using grade level as a covariate.

Explanation of the Sites and Sample

As mentioned in Chapter 1, several limitations to the study impacted the number of test sites and the sample sizes for this study. Being denied access to charter school data at two test sites yielded only one viable charter school test site. Although the research questions were not grade specific, the participating charter school site did not include ninth graders the first year of operation. This lack of data prevented ninth grade academies from being utilized as part of the mixed reform model under career academies. Two public schools from two different Georgia school districts agreed to participate. The charter school site district also differed from both of the public school sites. Archival data were used to compare student achievement on end-of-course tests in English Language Arts, math, and science at a secondary career academy charter school with secondary public schools that have implemented career academies. The sample consisted of students in grades 10 through 12. Ninth grade public school data were available, but the lack of

comparison data rendered it unusable for ANCOVA analysis. The ninth grade data were included in the ANOVA analysis in the general comparison. The archival data obtained were for the academic year following the implementation of career academies at each test site. It should be noted that the EOCT data are course specific and not grade specific.

Discussion

Research Question 1.

The first research question tested whether or not a significant difference existed in student achievement in English Language Arts (as measured by the English Language Arts EOCTs) for students enrolled in career academy charter schools versus traditional public schools implementing career academies in the academic year following the implementation. To answer the research question, ANOVA was performed using school type as the independent variable and ELA EOCT scores as the dependent variable. In the comparison, there were 541 charter school test scores and 1,166 public school test scores. ANOVA did not produce a significant finding.

Though student grade level was not a component of the research question, ANCOVA was conducted using grade level as a covariate. Adding grade level as a covariate provided a different lens through which to compare the impact of career academies at the two different types of schools. The charter school sample included zero ninth graders, five tenth graders, 280 eleventh graders, and 256 twelfth graders. The public school sample included 582 ninth graders, 95 tenth graders, 471 eleventh graders, and 18 twelfth graders. Applying ANCOVA did not produce a significant finding either.

These results reflect a similar study by Seyedbagheri (2011) who found that reading test scores compared at Georgia elementary charter schools and public schools

did not differ significantly. In that study, third and fifth grade students' test scores on the Georgia Criterion-Referenced Competency Test (CRCT) were compared to determine if school type impacted test scores. The Georgia CRCT is a standardized test similar to EOCTs, but given to elementary and middle school-aged students. In that study, multiple *t* tests were used to compare mean test scores rather than ANOVA. Grade level analysis was not conducted for interaction effects in that study.

These studies are similar in that, regardless of grade level, the element of school type did not significantly influence test scores. This study carried that process one step further and determined that adding career academies and its attributes did not significantly impact student achievement for this research question. It is worth mentioning that the trend in the data indicated that charter schools insignificantly outperform the public schools in ELA as measured by the ELA EOCT, and that as student grade level increased so did the scores.

When it comes to educational research where student achievement is being used to gauge the impact of a new strategy or implementation, many extraneous factors have the potential to impact the findings. From test anxiety issues of students to the practices of classroom teachers, many uncontrollable factors can influence the results. In ELA, Seyedbagheri (2011) reported teachers complaining about reading programs they were being forced to implement in response to NCLB. It is speculative, but the lack of teacher buy-in or flawed reading programs may be to blame for the insignificant findings. Too, the lack of a significant difference between charter and public schools may be due to the fact that Georgia charter and public schools utilize the same ELA curriculum and EOCT. However, the results for this question may have been insignificant because Career and

Technical Education curriculums are not heavily infused with ELA standards when compared to other academic content areas.

Career and Technical Education courses, such as Agricultural Education, lend themselves to science and math elements more so than English Language Arts. For example, in Georgia, Agriculture Education Plant Science and Animal Science courses count as science credit courses for Georgia high school graduation purposes. The Georgia Department of Education recognizes the rigorous scientific standards taught in these courses, which are pathway specific. These standards are often cross-curricular aligned with science standards. As students progress through these pathways, and other similar pathways, science standards serve as foundational elements that become more rigorous with each course. English Language Arts standards are not as heavily infused in many of these courses, which would explain the lack of a significant finding. However, this may not be true for all pathways.

Research Question 2.

The second research question tested whether or not a significant difference existed in student achievement in math (as measured by Math EOCTs) for students enrolled in career academy charter schools versus traditional public schools implementing career academies in the academic year following the implementation. Again, ANOVA was applied to the data using school type as the independent variable and Math EOCT scores as the dependent variable. ANOVA results did not produce a statistically significant finding. However, ANCOVA revealed there was a significant difference once the covariate was introduced into the analysis. The analysis indicated the public school outperformed the charter school. Additionally, the covariate interaction was

significant indicating that as grade level increased, so did test scores. This was true for grades ten and eleven, but not for twelfth grade students.

For the same reasons charter schools did not significantly differ from public schools in ELA, the same can be said for why initial results indicated no difference in math. However, the significant difference observed once the covariate was introduced is intriguing. The career academies in this study utilized student choice through career pathways. A career pathway is a series of three classes that become more intense as students progress through the pathway. For instance, students enrolling in an Agriculture Mechanics Systems Pathway would first take Basic Agriculture Science before taking Agriculture Mechanics One and Agriculture Mechanics Two (Georgia Department of Education, 2015).

Considering the different skills students learn in Career and Technical Education classes, it is plausible to believe that math and science standards are more heavily infused into pathway courses than other academic content areas. With that in mind, if students are honing their math skills through Career and Technical Education courses, and if pathway courses become more rigorous with each class in the series at different grade levels, then as students get older they are being forced to demonstrate more difficult math skills. With each additional pathway course the students take, they are constructing their knowledge through hands-on application of skills and concepts.

Continuing with the previously mentioned Agriculture Mechanics Systems Pathway, students would take Basic Agriculture Science, Agriculture Mechanics One, and Agriculture Mechanics Two. With each course the students take, the application of math skills would become more rigorous. For instance, Agriculture Mechanics One

students learn to use the Pythagorean Theorem to construct a set of steps, but in Agriculture Mechanics Two they learn to use formulas to calculate horsepower in motors. Following this logic, it is plausible there is a relationship between the age of the student and higher test scores. Additionally, there is even reason to believe student choice has some impact on student achievement. These results indicate that enrolling students in career academies based on their chosen career pathways is a beneficial component of career academies.

In this study, both types of schools offered similar pathways. In Georgia, schools may choose from a variety of pathways to offer their students. Typically, the pathways they choose to offer depends on the resources they have available, as well as the expectations of community stakeholders. The resources, including lab facilities, impact how much math or science emphasis is incorporated into the Career and Technical Education courses. When enrolling in career academies, students choose the career pathway they want to study based on their interests. Selecting the pathway they want to follow allows students to make a decision about their education. By choosing themselves, students are more likely to be focused, to have fewer absences, as well as have fewer discipline issues. All these aspects of the student directly impact their achievement in classes and on standardized tests.

Referring back to the study conducted by Seyedbagheri (2011), a comparison was also made using Math CRCT scores to compare elementary charter schools with public schools. The initial results from this study reflected Seyedbagheri's in that a significant difference was not observed when comparing standardized math scores from the charter schools with public schools. However, the ANCOVA results produced significant

findings for school type and grade level. These results infer the implementation of career academies positively impacted student achievement, particularly by grade level. These results were similar to Seyedbagheri's study that did not produce significant results, but did report the insignificant results indicated public schools outperformed charter schools on standardized math tests. Again, this study observed the same trend where the mean public school score was higher than the mean charter school score, but the difference was not statistically significant.

Research Question 3.

The third research question tested whether or not a significant difference existed in student achievement in science (as measured by Science EOCTs) for students enrolled in career academy charter schools versus traditional public schools implementing career academies in the academic year following the implementation. Again, one-way ANOVA was applied to the data using school type as the independent variable and Science EOCT scores as the dependent variable.

Previous research findings specifically comparing charter and public schools using standardized science scores were lacking. However, it was noted by Styron and Peasant (2010) that ninth grade students enrolled in ninth grade academies did increase science test scores by nearly 25 points. Their findings reported ninth grade academy scores were higher than their peers enrolled in traditional high schools. It is also worth mentioning that in the same study, ninth grade academy students also scored higher in math. Similarly, Duncan (2008) reported similar observations in science for small learning communities.

Other Findings

Since the start of charter schools in the early 1990s, research testing the effectiveness of the model has produced both positive and negative results. In 2004, Nelson, Rosenberg, and Van Meter (as cited in McDonald et al., 2007) concluded charter school students scored lower on national assessments compared to public school students. Similar results were reported by Braun, Jenkins, Grigg, and Tirre (2006) who reported charter schools had lower reading and math scores. These results correspond with results of a longitudinal study conducted by Solomon and Goldschmidt (2004) who found charter schools had lower initial test scores than students enrolled in traditional schools. McDonald et al. (2007) contradicted those findings reporting that out of 18 comparisons across all grades, 12 were statistically significant for charter schools outperforming their public school peers.

It is evident from those studies there is a lack of consensus that school type consistently influences student achievement. Across three research questions, this test too fails to support one school type over the other. Additionally, it fails to support the implementation of career academies as a consistent reform model across all academic content areas. The results of this study mirror those of Seyedbagheri (2011). Conducted in Georgia, that study compared elementary charter and public schools using standardized tests for third and fifth grade students. Both research studies yielded similar results in the areas of ELA and math. Superficially, the results indicated there was not a significant difference in student achievement scores when comparing charter schools and public schools. The ANCOVA results indicate underlying factors such as grade level do somehow impact student performance.

Conclusions

This study, to a degree, continues the evaluation of charter school effectiveness as it compares to public schools. Since the early 1990s, the evolution of charter schools has spawned debate among educators and politicians concerning the efficacy of this education reform model. Following the implementation of NCLB, the increased level of accountability sent school districts searching for effective research-based reform options. In some Georgia public schools, career academies have taken root as a reform model to help improve student achievement and schools' overall CCRPI rankings. Many charter schools have already adopted career academies, or themes as part of their charters, which make the schools unique.

Charter schools and public schools have been found to perform comparably on standardized tests (Seyedbagheri, 2011). By adding small learning communities, career pathways, student choice, and ninth grade academies under the umbrella of career academies seemingly produced little evidence that mixing reforms together produces significant positive results across the board. These results are congruent with Kemple and Snipes' (2000) research results that indicated "career academies did not improve standardized math and reading achievement test scores" (p. 15). Likewise, Castellano et al. (2003) submitted that career academies do not positively impact test scores on standardized tests (p. 254). These findings were reiterated in a report by Kemple and Scott-Clayton (as reported in Kuo, 2010) where they found career academies have no impact on graduation rates or standardized tests.

However, those results contradict Duncan's (2008) findings that indicated students enrolled in small learning communities, like career academies, had higher pass

rates in ELA and science than students not enrolled in smaller learning communities. The results of this research study agree with other research findings that career academy charter school students scored significantly higher in science than their traditional high school career academy peers (Duncan, 2008; National Center for Education Statistics, 2010). Styron and Peasant (2010) also reported increased levels of student achievement on high-stakes tests in the areas of math and science. Similarly, Stern et al. (as cited in Kuo, 2010) found increased levels of student achievement for students participating in career academies versus their non-academy peers.

Inconsistencies in research results fail to definitively demonstrate that career academies significantly improve student achievement in ELA, math, and science. Still, some research evidence supports the theory that career academies do contribute positively to schools' structures and benefit students in other ways. Many studies have demonstrated that career academies enhance student performance in terms of increasing attendance, increasing the number of credits earned, reducing the number of disciplinary referrals, and reducing the dropout rate while raising graduation rates (Kuo, 2010; Stern et al., 2010; Kemple & Snipes, 2000).

The purpose of this research study was to determine whether career academy charter schools had a more significant impact on student achievement in ELA, math, and science than traditional public schools implementing career academies. This study was unique in that it was intended to test the impact of career academies between charter schools and public schools. Like previous research, a general comparison provided evidence that there was no difference in ELA and math scores, but that science scores were significantly different for students enrolled in career academies at charter schools

than public schools. These findings reflect findings from other research studies that compared charter schools and public schools without career academies (Zimmer and Buddin, 2005). They found that there was not a significant difference in student achievement in charter schools and public schools in ELA and math.

Delving deeper into the data, ANCOVA revealed that introducing grade level as a covariate did alter the impact a bit in math. Generally, charters perform significantly better than public schools in science, but adding grade level as a covariate revealed public schools perform significantly better in math. The covariate did not influence ELA positively or negatively. Still, there is reason to give pause to consider the ramifications of the ANCOVA results on the Math EOCT. The findings imply student chosen career pathway courses become more academically challenging as students advance through the sequence at higher grade levels, which directly impacts student performance on End-of-Course tests in math.

Using grade level as a covariate on Research Question 2 shifted insignificant general findings to significant findings. Although speculative, the results show that career academies did have an effect. Those significant findings may be the result of CTAE curriculums being heavily infused with math skills, but it is also possible to infer that courses should be sequenced so that EOCTs are taken at higher grade levels. If school districts are scheduling EOCT courses at earlier grade levels to allow students more time to retake without interfering with their graduation schedules, they may be sabotaging their school effectiveness rating. Scheduling EOCT courses to be taken at higher grade levels may positively impact student achievement regardless of school type.

In conclusion, this study adds a small nugget of evidence to the research community in an area that was lacking. Far more experienced researchers have established that career academies do enhance student performance, although not always measurable using standardized tests. The results of this study are congruent to various studies in that student achievement was impacted in at least one out of three measures. Generally speaking, it supports other researchers that report charter schools and public schools perform equally as well in ELA and math. Still, the results of this study did not indicate that career academies with multiple reforms are capable of improving student performance in reading, math, and science consistently and simultaneously.

Research Concerns

This research was intended to help advance educational research so that school districts would have more insight and knowledge to help improve student achievement in three critical content areas. Schools are forced to implement research-based strategies proven to increase achievement, but research has failed to prove a one-size-fits-all model exists. This study was designed with a fresh new lens through which to evaluate student achievement, but limitations early on threatened the continuation of this study. Because the research questions guided the study, it was able to continue. However, had the one participating charter school denied access, this study would have been terminated. If researchers are to continue testing viable education reform options, data are needed. School administrators must be willing to share their archival data and make accommodations for researchers if education research is to advance further. Had schools not denied access, comparative analysis of all grade levels would have been conducted to determine if ninth grade academies are effective at each type of school. Additionally,

prior year data would have been available for the charter school sample to test whether converting from public school models to charter school models significantly impacted student achievement for each research question.

If legislators are going to continue crafting educational policies intent on improving student achievement, state departments of education must consider creating archival data bases that record data at the student level for each school regardless of school type. Student names could be removed, but the individual scores with all of the demographic information would be valuable. Lawmakers should also consider legislating the requirement that schools participate in research so that mixed methods and qualitative research studies have a chance to contribute to the education industry. Schools must be willing to participate in research studies if viable research-based solutions to America's stagnant education system are to be found.

Recommendations

In the time that this study began, two primary legislations have passed that will somewhat alter future research designs using standardized tests like EOCTs, and demand the need for more research about charter school models. Recently, the Georgia Department of Education retired the EOCT testing program that assessed student performance based on the current curriculum (Georgia Department of Education, 2014). Following the November 2014 administration, these tests will no longer be used. To meet the requirements of the A+ Educational Reform Act of 2000, the Georgia Department of Education will utilize Georgia Milestones Assessments to rank student achievement in the areas of "language arts, math, science, and social studies" (Georgia Department of

Education, 2014). With this in mind, future research should use scores from this new assessment system, so the impact of the research will be current.

Secondly, Georgia lawmakers have now passed legislation that will require Georgia's 180 school districts to "choose between being a charter, IE2 or a status quo system" (Field, January 2013). Known as the "Statewide Tiered Accountability and Flexibility System," school districts are able to receive extra funding and more autonomy depending on which status they choose (Field, January 2013). As school districts make their choices, research will be needed that will access the ramifications of such a policy on student achievement in Georgia schools.

Future researchers should consider replicating this study using the new Georgia Milestones achievement scores. This is especially important in the event that math, science, and English Language Arts curricula have changed in relation to the questions on the new assessment. Curriculum changes would have a significant impact on what and how students are being taught in academic classrooms and should correlate with Career and Technical Education curriculums.

Researchers replicating this study should also gain access to charter schools that converted from public to charter schools, so comparisons can be made between the academic year prior to the conversion and the year following the implementation. This would help provide evidence as to whether the implementation of career academies is significant following the first year of implementation. Longitudinal studies should be conducted to determine the impact of career academies using this model to determine the sustainability of the results. Because results of implementations are not always immediate, longitudinal studies might more precisely describe reform impacts.

Furthermore, when replicating this study, researchers should consider collecting other information including gender, ethnicity, student with disabilities status, the number of pathways offered, and pathway specific information. Longitudinal studies might reveal correlations between student demographics and specific pathways. This knowledge might be the key to designing career pathways by modifying Career and Technical Education courses to enhance reading, math, and science skills.

Researchers also might consider comparing Georgia EOCT scores with Georgia Milestones Assessments to determine how students perform on one test compared to the other. This is important given the new Statewide Tiered Accountability and Flexibility System where school districts have to choose a new status such as charter or status quo. With so many new things happening in the education system, and with standardized tests being used to measure school effectiveness, school administrators need as much information as possible to make meaningful changes in their school design strategies.

Finally, research helped shift education from curricula tracking to course sequencing. More research is need to determine if a correlation exists between course sequencing and grade level to determine if scheduling EOCT courses at later grade levels impact student achievement, regardless of school type.

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Appendix

Institutional Review Board Approval from Valdosta State University



*Institutional Review Board (IRB)
for the Protection of Human Research Participants*

PROTOCOL EXEMPTION REPORT

PROTOCOL NUMBER: IRB-030101-2014

INVESTIGATOR: Timothy Meeks

PROJECT TITLE: Quantitatively Comparing Academic Achievement in Secondary Charter & Public Schools Implementing Agriculture and Ninth Grade Academies

INSTITUTIONAL REVIEW BOARD DETERMINATION:

This research protocol is **exempt** from Institutional Review Board oversight under Exemption Category(ies) :2. You may begin your study immediately. If the nature of the research project changes such that exemption criteria may no longer apply, please consult with the IRB Administrator (irb@valdosta.edu) before continuing your research.

ADDITIONAL COMMENTS/SUGGESTIONS:

Although not a requirement for exemption, the following suggestions are offered by the IRB Administrator to enhance the protection of participants and/or strengthen the research proposal:

NONE

If this box is checked, please submit any documents you revise to the IRB Administrator at irb@valdosta.edu to ensure an updated record of your exemption.

Elizabeth W. Olphie

Elizabeth W. Olphie, IRB Administrator

8/15/14

Date

Thank you for submitting an IRB application.

Please direct questions to irb@valdosta.edu or 229-259-5045.