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A Matter of Time: The Relationship of Class Length and Demographics on the South Carolina Algebra I End-of-Course Test in South Carolina Middle Schools

Jennifer Addie Ramsey
Gardner-Webb University

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By
Jennifer Addie Ramsey

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This dissertation proposal was submitted by Jennifer Addie Ramsey under the direction of the persons listed below. It was submitted to the Gardner-Webb University School of Education and approved in partial fulfillment of the requirements for the degree of Doctor of Education at Gardner-Webb University.

_____	_____
Sydney Brown, Ph.D. Committee Chair	Date
_____	_____
Jane Clary, Ed.D. Committee Member	Date
_____	_____
Scott Smith, Ph.D. Committee Member	Date
_____	_____
Jeffrey Rogers, Ph.D. Dean of the Gayle Bolt Price School of Graduate Studies	Date

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Abstract

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For middle school students taking Algebra 1 as a high school credit, having sufficient instructional time to understand and explore the course content is crucial. While the focus of the literature review helps lend understanding to the study, there has been limited information concerning assessment scores in middle school math classes and the length of class time. This study investigated the differences in the End-of-Course Examination Program (EOCEP) test scores of middle school students in Algebra 1 as influenced by schedules used in South Carolina public middle schools for each individual year in a 5-year span of the 2010-2015 academic years. Framing this study were previous investigations done by Lewis, Dugan, Winokur, and Cobb (2005); Farmer (2005); and Howard (2010). Using a nonexperimental quantitative research methodology with a factorial analysis of variance (ANOVA) to determine significance, this study analyzed the relationship between two types of schedules, block and traditional period. The interactive effects of demographic covariables of ethnicity, socioeconomic status (SES), special services, and gender on EOCEP scores were examined through an analysis of covariance (ANCOVA), followed by a Bonferroni Post Hoc. Mean scores for each year demonstrated higher levels for block scheduling during the 2010-1011 and 2011-2012 school years. Traditional period scheduled students scored a higher mean during the 2013-2015 school years. Test results displayed significance between schedule type and Algebra 1 EOC test scores for the 2010-2011 and 2014-2015 academic years. Test results involving demographics found no significance for the 2010-2015 school years for gender. SES and special services were found to be significant in each academic year. Ethnicity was found to be significant in 2011-2012 and 2014-2015. Recommendations include considering SES and special services when determining schedule structure for middle school Algebra 1 courses. Ethnicity should be examined in closer detail before considering as a scheduling influence. Gender should not be considered as a factor when making schedule-option decisions.

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Chapter 1: Introduction

Overview

In South Carolina, academic success for both teachers and students is determined in part by test scores. Increasing student achievement is a focus of numerous studies and district reforms which often include research on the amount of time students spend in class. This study investigated time in the form of class schedule types used in South Carolina public middle schools during the individual 5 school years' span of 2010-2015 and achievement in the form of scores on the end-of-course (EOC) testing in Algebra 1.

Algebra in Middle School

Moses (2001) noted that "mathematics education is a civil rights issue" (p. 5). In that same vein, Schoenfeld (2002) pointed out that children who are not mathematically literate are not able to compete with their peers and are doomed to second-class economic status in our 21st century world. Looking at mathematics through a civil rights perspective, the U.S. public school math curriculum views the successful student as a "problem-solver" able to be an independent citizen adapting to the challenges that will be faced over a lifetime (Popkewitz, 2004, p. 18). Preparing students to participate fully in a world economy is both a civil right and a responsibility of education as our students' world changes rapidly with the introduction of more rigorous courses such as Algebra 1.

Higher education regards algebra as a gateway course, requiring successful course completion to continue in a particular major or for graduation. Historically, selective subgroups have been excluded from this requirement with the presumption of the material being too difficult, leaving algebra for advanced students or those with the "gifted and talented" identifier (Cogan, Schmidt, & Wiley, 2001; Rech & Harrington, 2000). Currently, all states require an initial algebraic course as a graduation

requirement. Many states are allowing students to meet this requirement early on during middle school grades, leaving time for them to acquire additional advanced mathematics credits in high school (U.S. Department of Education [USDE], 1997, 2008).

At one time, algebra courses offered in middle school were uncommon, as the class was considered a ninth-grade course (Star & Rittle-Johnson, 2009). In 1990, only 16% of middle school students nationwide were taking algebra. Over the last 2 decades, there has been a substantial national push for more students to take algebra in middle school (Loveless, 2008). Internationally, the number of middle school level students taking algebra is increasing at a rate much greater than in the United States. Reports supporting this increase led to a national push for students to take algebra by eighth grade. As a result of this push for algebra instruction in middle school, the percentage of middle school students enrolled in algebra increased to 24% in 2000 and 31% in 2007. By 2008, more than half of middle school students nationwide were enrolled in an algebra course (Loveless, 2008).

EOC Examination Program (EOCEP)

In 1998, South Carolina State Board of Education Regulation Number 43-262.4 (2004), known as the Educational Accountability Act of 1998 (EAA), required the development of EOC examinations and assessments for gateway courses. Students who took a gateway, or benchmark, course were required to participate in the EOCEP. The EOCEP is administered at the end of the coursework and counts for 20% of a student's final grade. The EOCEP is a standardized, multiple-choice test of 50-60 questions. The test is not timed, but students are limited to a school day (South Carolina Department of Education [SCDE], 2008). The EOCEP enables evaluation between South Carolina schools and reduces the teacher subjective measurement of student achievement. The

original EOCEP was field tested in 2002 and first used for grade calculation in the fall of 2003. In 2008, an initial algebra course was considered a gateway course for additional mathematics courses in South Carolina.

In 2015, South Carolina began a new system for teacher evaluations known as Student Learning Objectives (SLOs). SLOs are a part of the teacher evaluation system of student growth measurement. This evaluation system was developed as a part of the South Carolina Elementary and Secondary Education Act (ESEA) waiver for the federal Common Core Standards (SCDE, 2015). Within the objectives, teachers identify students with educational needs and create instructional strategies to improve their student performance. For teachers of gateway courses, the EOC test results can be a part of the evaluation data. With the emphasis on promoting educational quality utilizing an indicator of student achievement, standardized tests will continue. To increase student achievement and test scores, innovation is needed to develop ways to meet student academic needs during the school day. Changes have included the restructuring of class scheduling and, in South Carolina, the implementation of EOC testing.

An Abbreviated History of School Scheduling

In 1906, the Carnegie Foundation for the Advancement of Teaching, established by industrialist Andrew Carnegie, developed the Carnegie Unit, or credit hour, which was used as a measure of the amount of time a student studied a given subject. One standard Carnegie Unit is defined as 1 hour of instruction x 5 days a week x 24 weeks a year, or 120 hours overall of contact time with an instructor (Silva, White, & Toch, 2015). Schools in the United States use these credit hours as a determination for graduation requirements.

This time-based unit was not originally designed as a measurement of student

learning. Instead, the Carnegie Unit was initially created as part of the admissions process for higher education participating in a free pension system which was administered by the Carnegie Foundation for the Advancement of Teaching. The unit was used as a time-based measurement for university course offerings to determine levels of faculty workload necessary to qualify for free pensions after retirement. Filtering down from higher education, the Carnegie Unit has become the primary representation for course completion in American high schools (Laitinen, 2013).

High schools in America currently use this 120-hour standard to award course credit. A high school student typically earns seven to eight course credits per year over 4 years (Rettig & Canady, 2003). States vary in the minimum number of Carnegie Units required for graduation. From the initial development of the Carnegie Unit, determining the amount of necessary class time to maximize student achievement has been a focus of much debate.

Today, the most common class schedules in public schools are either the traditional periods or block scheduling (USDE, 1997). A traditional period day usually consists of seven or eight classes, 50-70 minutes in length. A block schedule day has four classes of 90-minutes each. With the emphasis on standardized testing, all school districts attempt to find what scheduling approach is most beneficial for students.

Over the last century, many viewpoints and theories have influenced class scheduling. Modern scheduling options were considered once the No Child Left Behind Act of 2001 was implemented (Wraga, 2001). A great deal of research has been dedicated to class scheduling and its impact in American high schools, but a review of the research has found no studies that relate the same depth of investigation with class scheduling and how it affects a middle school student's performance on equivalent high

school credit courses. While each schedule has its merits, this quantitative study explored the effect scheduling in middle schools across the state has on student performance on the South Carolina Algebra 1 EOC test.

Middle school scheduling research focuses mainly on the advantages and disadvantages of modeling middle school schedules after their high school counterparts. Possibly due to the relatively new increase in the amount of Carnegie Unit classes being taught in the middle schools, little research has been published on the effects of scheduling and success on EOC testing for middle school students taking these advanced courses. Results of this current research that demonstrate a relationship between EOC Algebra 1 test score results and the time in the middle school class will force educators to look at the reasons behind student performance on the test.

Purpose of this Study

The purpose of this quantitative study was to investigate the differences in the EOCEP test scores of South Carolina middle school students taking Algebra 1 as influenced by traditional period and block scheduling for the 5-year span of the 2010-2015 school years. Much discussion has occurred about the benefits of different types of schedules and the influence on student achievement. It would appear that scheduling more time in a subject (i.e., block schedule) would result in greater student achievement. This study was based on the studies of Lewis, Dugan, Winokur, and Cobb (2005); Farmer (2005); and Howard (2010). The study conducted by Lewis et al. examined three forms of scheduling: traditional period, block, and alternate block (AB) format. The assessments used in the study were a ninth grade Colorado levels exam and the ACT in English and mathematics. Demographic variables for the Lewis et al. study included gender, socioeconomic status (SES), and ethnicity. Farmer's study also involved the

three forms of scheduling that Lewis et al. examined but used the Virginia Standards of Learning (SOL) assessment. Farmer's study utilized the SES demographic. Howard used the 2005-2006 year scores of the South Carolina EOCEP test for high school students and also included gender, ethnicity, and SES. The previous studies added several pieces to the whole picture of schedule types and standardized testing for Algebra 1 with their use of quantitative analysis.

This study builds on the information and structure used in the previous studies to add to the body of knowledge related to schedule types and standardized testing. This study also included the demographics of gender, ethnicity, SES, and special services. Special services are defined by the SCDE as any student who receives services through an Individualized Education Plan (IEP) or 504 plan. The focus was the impact of scheduling type on EOCEP scores in public South Carolina middle schools. This inferential study investigated the differences in the EOCEP test scores of subgroups of middle school students taking the Algebra 1/Math for the Technologies test, as influenced by block and traditional period schedule options in South Carolina middle schools during the 2010-2015 school years.

Significance of this Study

A review of the literature indicates that several areas have not been explored in a review of studies involving scheduling. Most of the studies were conducted in midwestern and western states (Bottge, Gugerty, Serlin, & Moon, 2003; Lare, Jablonski, & Salvaterra, 2002; Lewis et al., 2005; Tan et al., 2002) and central states (Creamean & Horvath, 2000; Hackman, Hecht, Harmston, Pliska, & Ziomek, 2001; Harmston, Pliska, Ziomek, & Hackmann, 2003; Nichols, 2004; Trenta & Newman, 2002). Of the southern states, North Carolina (Lawrence & McPherson, 2000), Georgia (Cox, 2005; Gruber &

Onwuegbuzie, 2001), Mississippi (Griffin & Nicholson, 2002), and Virginia (Arnold, 2002) have been included in studies. Other than a few articles (Hughes, 2004; Owings, 2002; South Carolina State Board of Education, 2003) and the study by Howard (2010), South Carolina has not been thoroughly analyzed in terms of the impact of scheduling on test results.

Of the reviewed literature, only five studies compared the three primary models of high school scheduling: traditional period, block, and AB (Arnold, 2002; Farmer, 2005; Hackman et al., 2001; Harmston et al., 2003; Lewis et al., 2005). Very few studies controlled for the effects of ethnicity, SES, and gender (Farmer, 2005; Hackman et al., 2001; Harmston et al., 2003; Howard, 2010; Lewis et al., 2005). More research is indicated to explore schedules, time, and student demographics.

The review of the literature reveals that none of the studies involved middle school students taking Algebra 1. This study adds to the body of knowledge of educational achievement for middle school Algebra 1 students as related to scheduling with specific importance in comparing two types of schedules. The study controlled for ethnicity, SES, gender, and special services for students in South Carolina. This study went further by using actual scale scores rather than a mean, as used in the previous studies. Compiling the groups of data using individual scale scores rather than previously grouped means enables a more accurate group score result. The results of this study will be beneficial to administrators of middle schools in South Carolina who are increasing the number of high school credit courses offered to their advanced students and exploring new scheduling options or for parents deciding on their child's schooling options.

Research Questions

Two research questions formed the foundation of this study.

1. What is the relationship between South Carolina middle school instructional time allocation in the form of block and traditional period scheduling and middle school students' standardized test scores on the Algebra 1 EOC over the 2010-2015 academic years?
2. What is the interaction effect of South Carolina middle school scheduling options on the Algebra 1 EOC test scores and the demographic covariables of ethnicity, SES, gender, and special services for the individual 2010-2015 academic years?

Null hypothesis for Research Question 1. There will be no significant relationship between South Carolina middle school instructional time allocation in the form of block and traditional period scheduling and middle school students' standardized test scores on the Algebra 1 EOC over the 2010-2015 academic years?

Null hypothesis for Research Question 2. There are four null hypotheses for Research Question 2.

1. There will be no main effect for the interaction effect of South Carolina middle school scheduling options on the Algebra 1 EOC test scores and the demographic covariable of ethnicity for the 2010-2015 school years.
2. There will be no main effect for the interaction effect of South Carolina middle school scheduling options on the Algebra 1 EOC test scores and the demographic covariable of SES for the 2010-2015 school years.
3. There will be no main effect for the interaction effect of South Carolina middle school scheduling options on the Algebra 1 EOC test scores and the demographic covariable of gender for the 2010-2015 school years.
4. There will be no main effect for the interaction effect of South Carolina

middle school scheduling options on the Algebra 1 EOC test scores and the demographic covariable of special services for the 2010-2015 school years.

Theoretical Context and Framework

This study was based on the theoretical context and guiding principle that giving students more time to learn would result in greater academic achievement. According to Joyner and Molina (2012), course schedule type and time allocation should be allotted according to the individual needs of the students. Block scheduling gives students and teachers in the classroom more time to dedicate to the subject. Having only a few classes per day reduces the workload for students and preparation time for teachers and permits more interaction time between the teacher and student which leads to the development of interpersonal relationships, an essential component of J. Lloyd Trump's educational theories (The Center for Education Reform, 1996; Martinez & Holland, 2011).

It is a common belief that some high school subjects are identified as having different levels of complexity and, therefore, require a different amount of time for mastery (Canady & Rettig, 1995; Cavanagh, 2006). Block scheduling, as defined by a 70-90-minute time length, provides the teachers with the necessary time for in-depth learning by allowing the teacher extended instructional time through extended class time. This extended time offers students and teachers opportunities to participate in a variety of instructional activities such as project-based learning, hands-on activities, thematic units, and interdisciplinary activities that enhance comprehension and higher order thinking skills and engage the long-term memory and retention (The Center for Education Reform, 1996; Martinez & Holland, 2011). Due to the level of complexity, subject matter, and abstract concepts, some classes require the use of labs, computers, hands-on activities, manipulatives, and instructional models that often need more time. Therefore, some

classes require more time than others (Canady & Rettig, 1995; Cavanagh, 2006). Block scheduling allows teachers the time to build a solid instructional and relationship foundation as well as scaffolding lessons for deeper understanding of concepts.

An advantage of block scheduling is that it allows for a variety of methods and innovations to be brought into the instruction making it flexible for team teaching, thematic units, experiments, and fieldwork (The Center for Education Reform, 1996; Martinez & Holland, 2011). The longer periods permit lesson changes, enrichment activities, and teaching for mastery. The extended time enables teachers to advance or abandon the traditional lecture style that depends on delivering large amounts of information in a shorter time with a risk of not developing a deep understanding of content matter (Learning Spark. 2009). Block scheduling is believed to produce higher teacher and student morale, better student attendance, higher overall grades, and lower failure and dropout rates. "The Commission is convinced that if American students are to meet world class standards all children will need more academic time" (The National Education Commission on Time and Learning [NECTL], 1994, p. 10).

The present study was structured in line with the studies of Lewis et al. (2005), Farmer (2005), and Howard (2010). These studies examined scheduling types and a form of standardized testing in mathematics. All three studies included the three standard scheduling types of traditional period, block, and AB. The Colorado Levels exam, a ninth-grade year-end exam and the American College Test (ACT) were used in Lewis et al.'s study. Farmer used the Virginia SOL test data, and Howard used the EOC examination for Algebra 1 and English 1. Howard used the mean scores for the South Carolina EOC test. Demographics of gender and minority status were used in Lewis et al. and Howard. SES was used in all three studies. The framework for this study focused

on the relationship and interaction effect of two class scheduling options and the South Carolina Algebra 1 EOC scores as a result of the demographics of ethnicity, gender, SES, and special services as illustrated in the figure below. This figure demonstrates the possible relationship and interaction effect of class schedule types and demographics on the South Carolina Algebra 1 EOC scores for middle schools.

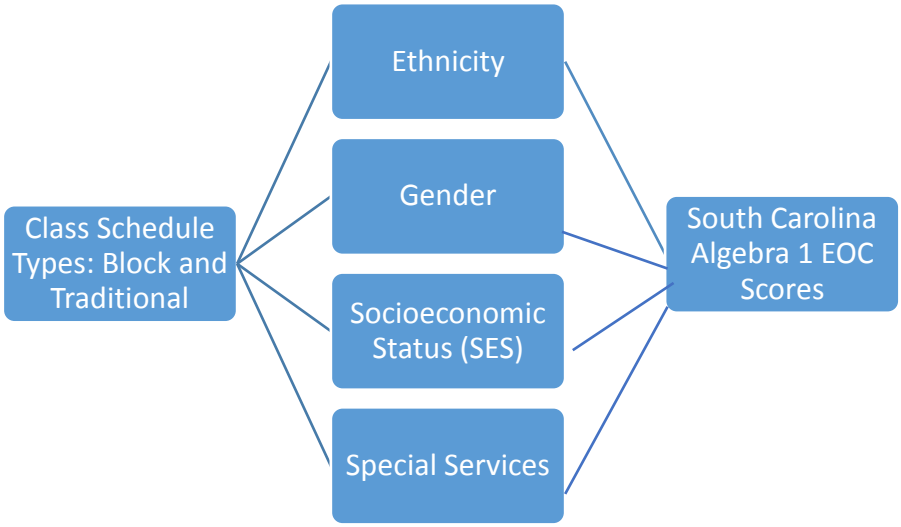

Figure. Framework for Class Scheduling.

Delimitations of the Study

This study did not focus on middle schools across the nation but only public middle schools in South Carolina. This focus group of schools and limited singular state testing allowed the study to fill a gap in the research found on state EOC testing in South Carolina. This research on the single EOC test in Algebra 1 represents a focus on Algebra 1 as a recognized gatekeeper course for high school mathematics courses in the United States (USDE, 2010). Algebra is "a 'gatekeeper' role within the continuum of high school math courses – that it must be taken and passed by any student who aspires to take calculus or other advanced mathematics" (Adelman, 1999, p. 2). As research has

shown, to convey readiness for advanced math courses, both college-prep and technical-oriented, students require a basic knowledge of algebra (Murnane & Levy, 1996).

Limitations of the Study

This study's focus was South Carolina public schools rather than all possible South Carolina middle schools due to the readily available data information from the State Department of Education, allowing for a research analysis of students the department serves. This study included schools that offer Algebra 1 as a Carnegie Unit course to middle school grades. This study only examined programs that utilize traditional or block scheduling. Schools with hybrid schedules for their Algebra 1 course were not used due to the potential inconsistency of hybrid implementation. The use of EOC testing is one indicator of academic achievement. Class scheduling is only one factor influencing academic achievement. EOC scores and actual class grades correlation were not established.

Summary of Methodology

The research used a quantitative, nonexperimental factorial ANOVA approach to examine the association between class scheduling and the performance on the EOC testing in the areas of Algebra 1/Math for the Technologies. A factorial analysis of covariance (ANCOVA) was used to determine the significance of the interactive effects of the covariables of ethnicity, SES, gender, and special services on Algebra 1 EOC scores.

Definition of Terms

Carnegie Unit. The standard instructional measure, defined as 120 clock hours of instructional seat time for a high school credit course (Martinez & Bray, 2002).

Block scheduling. Four 70- to 90-minute periods each school day for a full

calendar school year. Table 1 demonstrates the typical block scheduling used in public South Carolina middle schools (South Carolina State Board of Education, 2003).

Table 1

Block Schedule

Block Time	Course
85-90 minutes	Language Arts
85-90 minutes	Mathematics
85-90 minutes	Science/Social Studies
85-90 minutes	Elective Course 1 & 2

Traditional period schedule. A school day divided into seven or eight periods, generally of 45 to 70 minutes each for a full calendar school year. Table 2 shows a typical traditional schedule for public South Carolina middle schools (South Carolina State Board of Education, 2003).

Table 2

Traditional Period Schedule

Period Times	Period
45 minutes	Course 1
45 minutes	Course 2
45 minutes	Course 3
45 minutes	Course 4
45 minutes	Course 5
45 minutes	Course 6
45 minutes	Course 7

South Carolina EOC test. The test administered to all South Carolina high

school students to determine their mastery of the academic standards as set forth by the SCDE (2008).

Gifted and talented. Students identified in Grades 1-12 as demonstrating high performance ability or potential in academic and/or artistic areas (SCDE, 2008).

School choice option. Due to legislative decree, South Carolina students have the following options when choosing a public school setting (SCDE, 2008):

- Public charter schools;
- Virtual charter and magnet schools;
- Middle and early college programs;
- Single gender programs;
- Montessori schools;
- Military schools;
- Year-round schools;
- Career and vocational centers.

Special services. Any student who receives services through an IEP or 504 plan is identified as receiving special services in South Carolina. Also identified as a subcategory of Special Ed.

Middle schools. Typically comprised of Grades 6-8. Currently, South Carolina has 383 public schools that house grade levels that include at least one of the typical middle grade levels of 6-8 (SCDE, 2008).

Summary

This nonexperimental study investigated the relationship and interaction effect of scheduling type on Algebra 1 EOC scores as well as the effect scheduling had on the demographically identified subgroups' performance on the Algebra 1 EOC. Scheduling

methods can be a controversial school reform issue because of the various results for student achievement and test scores as reported by advocates for different scheduling types (The Center for Education Reform, 1996). Chapter 2 looks into the theories behind scheduling reform and the review of literature related to middle school algebra offerings and Carnegie Units. Chapter 3 explains the methodology and design of this study.

Chapter 2: Literature Review

Overview

This study examined the relationship and interaction effect between traditional and block scheduling on student achievement based on the South Carolina EOC Algebra 1 test results for public middle school students. This relationship has been investigated through a limited number of studies for high school students, but none appears to have addressed middle school students. Even fewer studies have examined the relationship of scheduling on state-specific mandated testing. The findings have been inconclusive or contradictory (Campbell, Brown, and Guy, 2009; Pliska, Harmston, & Hackmann, 2001).

This literature review examined research and information in six areas: (a) school scheduling history, (b) the theories behind reform, (c) scheduling related to the standardized test of EOC achievement levels in South Carolina, (d) scheduling and demographic influence, (e) scheduling and middle schools, and (f) the middle school child and Algebra 1. This research explores the relationship connections of these six components to the available research relevant to middle school schedules and the correlation to student academic success on EOC mathematic assessments. References for this literature review are cited from peer-reviewed journals and educational magazines, governmental reports and studies, and conference proceedings.

School Scheduling History

A review of the literature regarding school scheduling history shows that the 1950s brought great concern that America was falling behind in rigorous, competitive courses. The launch of Sputnik in 1957 by the Soviet Union, and then a second launch, was enough to push education and school reform to the forefront of government policy. Spurred by Russian space successes and other world events, America went through an

educationally innovative period of reform after the launch of Sputnik (Conant, 1959). With the National Defense Education Act (NDEA) of 1958, mathematics, science, and language initiatives were implemented as a way to remain competitive in the new nuclear age of technology (USDE, 2009).

During the 1960s and 1970s, one reform movement in schools dealt with school scheduling. Dr. J. Lloyd Trump, a professor at the University of Illinois and the Associate Director of the National Association of Secondary School Principals, advocated for change and innovation in the organization of the school day. Based on his belief in the need for increased time for relationship building and problem-based learning, one of Dr. Trump's proposals was to move away from the traditional schedule and examine the idea of classes of varying lengths (Queen, 2000). The Trump Plan, as it became called, encouraged schools and teachers to use different instructional strategies with varying amounts of student class time. Class time was built around 20-, 40-, and 60-minute intervals; and sections of school days were blocked out for student independent study, small group collaboration, and whole group instruction. Due to a significant amount of variance, the schedule format did not survive; but it did open doors for new scheduling opportunities and to a rise of pilot studies. New reform initiatives promoted alternatives to the traditional schedule to better utilize educational time (Rikard & Banville, 2005).

Following the educational reforms of the 1950s, 1960s, and 1970s, in the 1981-1982 school year, the Association for the Evaluation of Educational Achievement (AEEA) conducted a study of mathematical achievement for twelfth-grade students in 12 countries. Six topics–number systems, sets and relations, algebra, geometry, elementary functions and calculus, and probability and statistics–were assessed. Results of this study

revealed that Hong Kong students scored highest, Japan students were second, and the United States ranked last among advanced industrial countries (McKnight, 1987). With increasing concern over the country's educational system, Secretary of Education Terrel H. Bell, under President Ronald Reagan, created the National Commission on Excellence in Education. The commission found that achievement levels on standardized tests for high school students had dropped since the 1950s. Both the negative results of the study and public reaction to the outcome of the study prompted the National Commission on Excellence in Education (1983) to issue *A Nation at Risk*. Included in the report were comparisons of the amount of course time students in America spent and schools in nations with successful educational results as measured by 19 academic tests. Based on class hours, the time dedicated to mathematics courses in the higher-ranked, industrialized countries averaged about three times longer than time spent in American high schools. As potentially the biggest push for different scheduling options, the report encouraged schools to implement new pedagogical methods for engaging students and facilitating new ways of learning, opening up opportunities to examine class scheduling (National Commission on Excellence in Education, 1983).

Studies show that American students' typical school calendar year contained 180 school days, with about six hours of daily instructional time. In other countries, students were spending 8 hours a day, 220 days a year, learning. Time spent on core subjects was also shorter in U.S. schools (National Commission on Excellence in Education, 1983). This report led to educational reform with a major component related to school scheduling and investigating the benefits of traditional class length of 45-50 minutes vs. a 90-minute block schedule (Stanley, Spradlin, & Plucker, 2007).

Published in 1989 by Carnegie's Task Force on Education of Young Adolescents,

Turning Points: Preparing American Youth for the 21st Century was an investigation into the structure of middle schools. This task force (Carnegie Council on Adolescent Development [CCAD], 1989) determined that middle school students were in a transitional phase of development, prompting decisions to be made about their instructional needs. This report led to the incorporation of block scheduling (referring to class instructional time lasting about 90 minutes) into many of the middle schools across America, as many districts decided that a longer block of time in a course allowed for greater relationship building and depth of instruction.

In the 1990s, under The Education Council Act of 1991, Secretary of Education Richard W. Riley under President Bill Clinton created NECTL. The Commission published the report, *Prisoners of Time,* which focused on school scheduling and academic course structure as ways to build success (Stanley et al., 2007). The commission report noted, "The reform movement of the last decade is destined to flounder unless it is harnessed to more time for learning" (NECTL, 1994, p. 4). Educators were encouraged to stretch their thinking toward new ways to structure the student's academic day.

Both *Prisoners of Time* (Stanley et al., 2007) and *A Nation at Risk* (National Commission on Excellence in Education, 1983) resulted in changes in the national educational system and were instrumental in the reform movement throughout America as educators began to look at alternative schedules such as block scheduling and alternative day schedules and the effects on student learning (NECTL, 1994). The commission noted its agreement with previous scheduling ideas based on two main types of schedules, the traditional period day and the block schedule.

With the rise of capitalism, the average American needed more education to take

advantage of economic opportunities. Prior to the industrial revolution, students in American schools spent less than half of their year in school. Family farms or supportive jobs prevented regular attendance. After the transition into the industrial age, the typical educational curriculum, focused mainly on memorization, was found to be lacking as a best practice (Barlow, 1967). In 1835, through examination of the Prussian system developed by J. H. Pestalozzi, the recommendation of more "hands-on" activities was revisited. Pestalozzi stressed the importance of meaningful experience to create productive people (Smith, 2002). This move toward implementing activity-based instruction increased the focus on the length of class time needed.

The Copernican Plan, developed in 1983 by Joseph Carroll, proposed a move toward longer blocks so teachers could individualize and differentiate instruction (Carroll & Wild, 2005). This instructional reform led to the block scheduling option in the 1980s (Williamson, 2009). A block schedule typically consists of four 70- to 90-minute classes per day (Queen, 2008).

Advocates for block scheduling believe it allows for stronger teacher-student connections (Flannery, 2008). There is also the belief that the increase in time from block scheduling allows for more in-depth learning as well as higher teacher and student confidence in learning (Imbimbo & Gilkes, 2009). Rettig and Canady (2003) reported that teachers claim block scheduling allows them to plan extended lessons with various instructional strategies for individual learning styles.

Conversely, in a 1996 letter quoted in the research by Lindsay (2008), Dr. Frank Y.H. Wang, President of Saxon Publishers stated,

> If you are considering a block schedule, we suggest you do not. We believe that children learn most effectively when they are exposed to concepts in small, easily

> understandable pieces called increments and when new concepts and skills are reviewed continuously. (p. 3)

This pedagogical philosophy supports the idea that two or more opportunities to study the same material are much more efficient than a single opportunity (Lindsay, 2008). Lindsay (2008) made the assumption that a concept is only taught once during a block schedule and not revisited.

Research has shown both positive and detrimental effects of both block scheduling and the long-standing traditional period schedules (Lewis et al., 2005). A 1986 study by Raphael and Wahlstrom of 80 schools in Canada found that students on block scheduling scored significantly lower on the Second International Mathematics and Social Science Assessment (SIMSS) than students on a traditional period schedule. They also found that science scores were higher in high schools with traditional period schedules (Raphael & Wahlstrom, 1986). In their research, however, Rikard and Banville (2005) noted that the perception that block scheduling has an effect on achievement is inconclusive. In that same vein, Hackman (2004) found that there is little theoretical basis for block scheduling and limited research proving a correlation with student achievement. Lockwood's (1995) study of Algebra 1 and Geometry students in Alabama found no difference in test scores for block or traditional schedules for high school students. The sample populations of the previous studies involved high school students. This current study (conducted more than 20 years later) examined a population of public middle school students in South Carolina with the focus on schedule types within these schools.

Theories behind Schedule Reform

Two theories are believed to be the influences behind schedule reform,

behaviorism and constructivism. Behaviorism theory, based on the theories of B. F. Skinner, Ivan Pavlov, and John Watson, led instructional leaders to organize schools into seven to eight class periods a day. Based on the behaviorist principles, information is presented in small chunks with students doing an immediate practice of the learned concept (Hackman, 2004). The next skill or concept is presented and then also practiced. Repetition is used.

While behaviorism focuses on the teacher as transmitter of knowledge, constructivism theory emphasizes the role of the student as the learner (Hackman, 2004). School block scheduling philosophy has been primarily influenced by the constructivist theories of Vygotsky and Piaget. With the emphasis on depth of understanding rather than surface learning, constructivist educators who push for the longer, block scheduling are encouraged to be learning facilitators (Hackman, 2004). Although many reform movements in our nation's schools have advocated for block scheduling and increased instructional time, the research on this recommendation is inconclusive, and this section traces its history. Creswell (2009) noted,

> Social constructivists believe that individuals seek understanding of the world in which they live and work. Individuals develop subjective meanings of their experiences—meanings directed toward certain objects or things. These meanings are varied and multiple, leading the researcher to look for the complexity of views rather than narrowing meanings into a few categories or ideas. (p. 8)

Vygotsky believed students developed academically through engagement with consistent and systematic inquiry (Zuckerman, Chudinova, & Khavkin, 1998). Social interaction is a necessary component of inquiry used to internalize the instructional

material (Eun, 2008). Block scheduling promotes time to engage in metacognition and real world problem solving. The constructivist theory can be used in considering optimal student class time as well as the amount of time necessary to cover the required concepts and state standards. In turn, the amount of instructional interaction leads to decisions about the length of class instructional time.

Scheduling Related to EOC Achievement Levels in South Carolina

With the implementation of SLOs and the recognition for benchmark or gateway courses, research related to the examination of the relationship and interaction effects of student achievement related to scheduling, time, and demographics is critical. In 1998, the South Carolina EAA required the development of EOC examinations and assessments. Students who took a gateway, or benchmark course, were required to participate in the EOCEP. South Carolina uses the Algebra 1 course as the benchmark course for math advancement. Students who take Algebra 1 (honors, college prep level, or Algebra 1A and IB) are required to be successful in this course before moving on to the next high school mathematics course. The EOCEP is a standardized, multiple-choice test of 50-60 questions taken at the end of the coursework and counts for 20% of a student's final grade (SCDE, 2008). The test is not timed, but students are limited to a school day. The original EOCEP was field tested in 2002 and first used for grade calculation in the fall of 2003 (SCDE, 2008). The EOCEP enables evaluation between South Carolina schools and reduces the teacher subjective measurement of student achievement (SCDE, 2008).

Although there is limited research data on scheduling and EOC scores in South Carolina, there have been studies on scheduling and the score results using other assessments such as Advanced Placement (AP) scores, Scholastic Achievement Test

(SAT) scores, and Grade Point Average (GPA). The research for South Carolina schools is consistent with studies from other states. Much of the information shows inconclusive results in relation to schedule types and score results for various standardized tests. In 2003, the South Carolina State Board of Education conducted a study using data from the 2001-2002 high school report card variables of assessment forms and the various high school schedules available. The data analysis showed that high schools with traditional period schedules performed better on AP and SAT assessments than high schools with alternative or block scheduling (South Carolina State Board of Education, 2003). Another study attempted to investigate block scheduling in South Carolina high schools. The study investigated 4 years of SAT data for seven high schools that followed a block schedule. The mathematics score results on the SAT were inconclusive, though the verbal performance results demonstrated an increase in scores with block scheduling (Owings, 2002). Both of these studies concerned high school scheduling in South Carolina. There is no similar study for middle school students in South Carolina. This study examined the testing years 2010 through 2015. Each year was considered separately, allowing for school changes such as new schools opening or for schools modifying their schedules.

One study compared the GPAs of the 1995 class of Algebra 1 students with traditional scheduling and the 1999 class of Algebra 1 students at one high school with block scheduling (Hughes, 2004). The findings showed an increase in the mathematics GPAs for the block scheduling classes. With this study, limitations of different grading scales from the two different school years resulted in the use of a grade adjustment measure to compare the data as well as demographic changes that could have led to an elevated result. Though this study was focused on Algebra 1, the students were high

school level and not middle school. For this study, there was a single grading scale used by the SCDE for the EOC test results. Each year was examined separately, so changes on the scale used remained consistent.

A 2010 research study examining the relationship between South Carolina High School Assessment Program (HSAP) and three high school schedules (the block, AB, and traditional period) found no significant differences in the mean English/language arts and math passage rates among the three types of schedules (Norton, 2010). A 2012 causal-comparative study investigated the differences in the 2006 EOCEP test scores of ninth-grade students in English I and Algebra 1/Math for the Technologies and the influence of class scheduling. The results of the study showed no significant differences in scores (Howard, 2010).

A 2012 study of schedules and scores for the South Carolina EOC test for Algebra 1 using students from three consecutive freshman classes of block schedules and three from traditional schedules found a relationship existed between student scores on the South Carolina Algebra 1 EOC test and the type of schedule used. Students on a traditional period schedule had higher scores on the assessment than block scheduled students (Lancaster, 2012). Again, there is inconsistency in class time and results for high school students in South Carolina taking the EOC test for Algebra 1, just as there was in national research, and no middle school data included in the study. With the focus on one state and middle school students, this study attempted to gain an understanding of what is possibly a consistent, common factor in EOC Algebra 1 testing results.

Unlike earlier studies with similar objectives and parameters that examined mean scores for their variable, this study utilized individual scale scores to examine a block or traditional schedule influence. The use of individualized scores to create the means of

the groups allows for stronger analysis of the group data.

Scheduling and Demographic Influence

Several studies have considered the interaction effect of specific student demographics in relation to schedule types and overall student achievement. These studies focus on an individual demographic such as ethnicity or gender. This study examined the demographics of gender, ethnicity, SES, and special services. According to Hampton (1997), there are multiple benefits believed to be attributed to block scheduling, such as the opportunity for teachers to use a variety of instructional approaches and more instructional and individual time for students identified by demographics who are considered at risk.

In a report about classroom inclusion, Sage (1997) wrote that the implementation of a block schedule has potential to enhance and enrich learning opportunities for students with disabilities who are educated in general education classes. Meeting the needs of dual-identified, those who are identified as both gifted and special services (IEP or 504), can be a difficult task to accomplish. According to Hottenstein (1998), the possibility of meeting individual student needs is greater with block scheduling. No research has been found that examines students with special services and their performance in Algebra 1 in relation to schedule type.

A report by Shortt and Thayer (1995) stressed that the greatest asset of block scheduling is the flexibility to use the extra time to meet the needs of at-risk students. A study conducted by Algaze (1998) comparing student math achievement of at-risk, minority, and female demographics in block scheduled and traditional period settings found that students in block scheduled schools had significantly increased GPAs. The findings also indicated that at-risk students in their sample block schools had significantly

higher GPAs when compared to their sample of at-risk students in schools with traditional period schedules.

Schools have taken different routes in the reconfiguring of time to meet the needs of their language minority and limited English proficient students. Multiple resources have been used to reexamine the use of time to meet their particular needs. With a traditional schedule, the structure of how time is used often works against the achievement and successful participation of immigrant and limited English proficient students due to the reduced interaction and instructional time (Gandara, 2000).

Studies have indicated a difference in mathematical attitudes with regard to gender. Many studies have shown that girls have less positive attitudes toward mathematics at the middle and high school levels compared to boys. Research has indicated that girls become less engaged in mathematics beginning at the middle school level (Chudowsky & Chudowsky, 2010; Garza, 2001; Jones, Mullis, Raizen, Weiss, & Weston, 1992; Oakes, 1990; Simpson & Oliver, 1985). In middle school and high school mathematics, girls have lower self-efficacy (Chudowsky & Chudowsky, 2010; Garza, 2001; Randhawa, Beamer, & Lundberg, 1993; Thomdike-Christ, 1991) and are less interested in math-related careers (Garza, 2001; Thomdike-Christ, 1991). Although gender differences in mathematics achievement have been decreasing in recent years, they still exist (USDE, 2009). Several studies have suggested that constructivist learning environments are especially beneficial for girls' mathematical achievement (Garza, 2001; Lee & Burkam, 1996; Von Seeker & Lissitz, 1999; Yager & Weld, 1999). Mitchell and Gilson (1997) found that students' individual interest in mathematics classrooms increased substantially in classrooms that were high in situational interest, particularly for girls. Situational interest was characterized by personal relevance and active learning. In

the studies that directed this current study, using data from seven Colorado schools, Lewis et al.'s (2005) study resulted in mixed results. Mathematic performance showed a slightly positive growth from the traditional period schedules and a decrease in the AB schedule. The examination of gender and ethnicity variables showed no interactive effects of scores and schedule types. Farmer's (2005) study showed an increase of mathematic scores from a block schedule. The AB schedule showed no significant different in scores. Neither study found interactive effects for SES. In the Howard (2010) study, the Algebra 1 score as measured by the South Carolina Algebra 1 EOC test indicated that the block schedule is the best option for both genders and SES identified free lunch students. There was no significant difference in the scores for the demographics variable for any of the schedule types. These studies demonstrate the relevance of schedule types for mathematics instruction for multiple demographics, providing social components in learning and opportunities for students to participate actively in learning activities to benefit academic performance.

Scheduling and Middle Schools

Examining student schedules is an important part of delivering a meaningful curriculum focused on areas that affect student achievement (Queen, 2000). Schedules drive instruction; and when appropriate schedules are in place for student groups, academic achievement can be the result (Stanford & Reeves, 2005). Traditional period and block scheduling are the two major forms of student schedules. The traditional period schedule is broken up into periods of 45-70 minutes. A block schedule is typically 70-90 minutes. Block scheduling is a common form for secondary education courses, though many middle school courses remain in the period structure (Nichols, 2004). Block scheduling has been a scheduling consideration for more than 40 years, with an

increase in interest occurring during the 1980s. This increase occurred with the educational reform idea that teachers needed more time in the classroom to develop personal relationships with their students which would lead to student achievement. It was believed that the traditional period schedules and high student to teacher ratios reduced the opportunities to develop necessary relationships (Nichols, 2004). The block schedule gave teachers the ability to instruct differently with new, innovative strategies (Zepeda & Mayers, 2006).

A major area of the middle school concept involves course scheduling length. CCAD (1989) addressed America's middle school structure. The "turning point" developmental stage between childhood and adulthood was the focus of the report, as the Council believed middle school aged children faced many behavioral and academic decisions that would affect their future educational outcome. This report led many schools to implement block scheduling and team teaching. Flexible scheduling focusing on instructor collaboration for planning and units allowed instructors the ability to group students according to their needs (Gable & Manning, 1997). Viewing block scheduling as a flexible schedule, teams of grade-level teachers can collaborate and make connections between the different academic subjects (Murata, 2002). With schools focusing on schedule types as a way to adapt learning to developmental needs, information about middle school student's performance on a standardized test, such as for an EOC Algebra 1 course, will inform research-based schedule type decisions.

Algebra 1 and the Middle School Child

Research on middle school children and Algebra 1 is necessarily divided between the two areas. First, the research looks at Algebra 1 as it specifically relates to middle school children as well as how it differs from high school children. Next, research looks

at the development of middle school children, comparing them to elementary and high school students in their development.

Development and the middle school child. The developmental stages of a middle school child are unique. Middle school children are going through physical, social, and cognitive development changes that impact the classroom design. With the onset of physical changes, a natural separation of strengths and weaknesses occurs between the genders, and social needs increase (Wood & Sellers, 1997). The middle school ages are generally from 11 to 14; in this 4-year span exists a great diversity and variance. The middle school child goes through stages that open up opportunities for problem-based learning in the curriculum (Wood & Sellers, 1997). Middle school children can sustain a longer period of attention than they did in younger grades. Teachers of middle school children recognize the need for social interaction and peer relationships in the classroom (Wood & Sellers, 1997). These needs helped develop the middle school concept for schools.

Within this middle school concept, there was still a need to meet the academic challenges to serve gifted children. A push in the 1990s by the United States educational leaders encouraged the increase in the number of middle school students taking algebra before high school. As an additional motivator, Robert Moses labeled algebra as "the New Civil Right," emphasizing the social consequences of so many poor and minority students taking remedial and general math courses instead of algebra (Lacampagne, 1995).

Founded in 1905, the Carnegie Foundation for the Advancement in Teaching issued a report defining a term of instruction as "a course of five periods weekly throughout an academic year" (CCAD, 1989, p. 81). This instructional period,

accumulated over the course of a school year, was called a Carnegie Unit (Martinez & Bray, 2002). Though the construction of the Carnegie Unit gave structure and continuity to the implementation of high school courses, the algebra course has been a part of the high school curriculum since the 1800s. The Committee of Fifteen, which was created by the National Education Association in 1895, made a recommendation that algebra be part of the seventh- and eighth-grade curricula (Ornstein & Hunkins, 2008). Though this was encouraged, most schools continued to keep Algebra 1 at the high school level until the late 1980s when several middle schools began offering the Carnegie Unit of credit as an option for differentiation for students identified as gifted and talented.

In 1997, as a continued connection between education and civil rights, Secretary of Education Richard W. Riley stated in *Mathematics Equals Opportunity* that "The key to understanding mathematics is taking algebra or courses covering algebraic concepts by the end of the 8th grade. Achievement at that stage gives students an important advantage in taking rigorous high school mathematics and science courses" (USDE, 1997, p. 2). Ross (1993) made comparisons with educational opportunities offered to gifted students in the United States and those in other developed countries. *The Pre-K-Grade 12 Gifted Program Standards*, published in 1998 by the National Association for Gifted Children, gave guidelines for schools creating programs to serve the gifted and talented (Matthews & Shaunessy, 2010). Although there have been numerous studies relating course scheduling times and the achievement of high school students taking mandated EOC assessments, no detailed research has been done at the middle school level for students taking the Carnegie Unit courses. *A Nation Deceived: How Schools Hold Back America's Brightest Students*, published in 2004 by Iowa University, examined the benefits of accelerated learning for gifted students (Colangelo, Assouline,

& Gross, 2004).

In 2006, President George W. Bush established the National Mathematics Advisory Panel with the goal to investigate the state of mathematics in America (Executive Order, 2006). The Panel's *Reports of the Task Groups and Subcommittees* emphasized algebraic thinking in early education, with a major goal of developing "Critical Foundations of Algebra" skills during the K-8 years (USDE, 2008). An earlier study by USDE (1997) found that students who complete high school math courses beyond Algebra 1 have increased chances of earning a bachelor's degree (USDE, 2009). As a gateway course, Algebra 1 allows students to complete more of the necessary math courses at an earlier age and puts them in a better position for earning a college degree. In 2009, high school graduates who took Algebra 1 in middle school scored 31 points higher on the National Assessment of Educational Progress (NAEP) mathematics assessment than graduates who took Algebra I as their first high school math course (USDE, 2010). In an attempt to even the playing field with international competition for STEM (science, technology, engineering, and mathematics) careers, middle school students need the opportunities taking Algebra 1 allows. The offering of the high school credit course in a middle school program leads to questions of how best to schedule the advanced program.

Algebra 1 and the middle school. The gateway course to high school mathematics and science courses is algebra. Problem solving is essential for success in these courses. Early access to algebra may determine a student's future high school mathematic experiences and is required for all college-prep academic mathematics and science courses (Smith, 1996). If algebra can be completed at a middle school level, there is sufficient time to complete geometry, Algebra 2, precalculus and calculus in high

school. A common practice in middle schools across the United States is to allow a limited number of students to enroll in an algebra course before entering high school. In a 1994 report, the NAEP mathematics assessment showed that less than 20% of the nation's eighth graders took an Algebra 1 course (NCES, 1994). Researchers have suggested that early access to algebra may have positive influences in mathematics attainment during high school (Chambers, Dossey, Lindquest, & Mullis, 1988; National Center of Education Statistics [NCES], 1994).

A study by NCES (1994) found that effective middle grade schools had more eighth-grade students taking algebra than general mathematics. Limiting the number of students enrolling in an algebra course before high school remains a current practice of middle schools in the United States; however, some educational leaders in a few states such as school board members, superintendents, and principals who believe that instructional opportunities such as Algebra 1 are a civil rights issue have taken action on the information by implementing initiatives requiring all students to complete algebra before enrolling in high school. To determine readiness at the middle school level, researchers consider developmental stages.

Conclusion

The emergence of implementing Carnegie Unit courses in middle and junior high schools during the 1980s occurred shortly before the increased focus of school scheduling by the American government and school officials. Though research has covered scheduling and middle school general education courses, a review of the literature has shown that there is a need for additional research investigating middle school Carnegie Unit courses and schedule types. This study provides a unique addition to current research with the examination of the South Carolina EOC Algebra 1 standardized test

results for middle school students in relation to the schedule types of block and traditional, along with the selected demographics of gender, ethnicity, SES, and special services.

Chapter 3: Methodology

Research Design and Procedures

The focus of this study was to determine the relationship and interaction effect between class schedule types and scores on the South Carolina EOC test for Algebra 1 students in public middle schools using a nonexperimental quantitative research methodology with a factorial analysis of variance (ANOVA) to determine the significance. The study was based on the theoretical context and guiding principle that giving students more time to learn would result in greater academic achievement. With the foundation of the previous studies of Lewis et al. (2005), Farmer (2005), and Howard (2010), this study explored the interactive effects of the covariables of ethnicity, SES, gender, and special services on Algebra 1 EOC scores. A factorial ANCOVA was used to determine the significance along with a Bonferroni Post Hoc. Chapter 3 describes the methodology used in this study to explore these possible relationship and interaction effects and includes a detailed description of the study's design, instrumentation, sampling, method of data collections, and types of analysis. Table 4 summarizes the methodology used for this study.

Sample Population or Subjects

At the time of this study, 283 public schools in South Carolina contained students in at least one of the Grades 6-8. In 2015, 292 of those schools offered Algebra 1 and implemented the EOC test. For a confidence interval of 95%, 166 schools were to participate in the survey. Table 3 shows the number of public South Carolina schools with at least one of the middle grades and the number needed to participate based on a 95% confidence interval for each of the spring administrations for the 2010-2015 school years.

Table 3

Participation Needs for Each School Year Based on a 95% Interval

Admin Year	Number of Schools	Participation Number
2011	240	148
2012	253	153
2013	265	157
2014	279	162
2015	283	166

Data were analyzed from all of the public South Carolina schools that contain middle level grades that offer Algebra 1 for Carnegie credit. In the event that a school tested more than just middle grades, the data available from the State Department of Education were filtered for middle grade students only. The scores from schools that offer Algebra 1 in the middle grades were obtained via permission from the Data Recognition Corporation (DRC) data file from the South Carolina state educational department Office of Research and Data Analysis. Account access for the data was requested and granted by the District Web Access Administrator. A formal request for the required data sets was accomplished through the online data request form (Appendix A) using the account created by the District Web Access Administrator. The data request was based on schools identified by the school indicator code (RSchoolID). The request was for ethnicity (Fedreport, denoted by RaceEthnicity), gender, special services (InstrSetting, denoted by Special Ed), SES (meals), grade, and scale score (SS). Schools were sorted into the two schedule groups by their school indicator code based on the survey answers and follow-up contacts. The school indicator code was used for submission to the state department to obtain the scale scores and demographic

information. The demographic information was used to determine an interaction effect of schedule type and EOC scores within a particular demographic. Once the request was made, the Data Request Review Board managed the request to ensure the protection of identifiable student or educator information. The schedule type was obtained through a peer-reviewed Google form survey sent out to the local educational agency (LEA) of each South Carolina public school that contains middle grade levels (Appendix B). This survey should have only taken about a minute to complete. An informational email was sent out to the LEAs for each school (Appendix C). This email described the study, made the request for completing the survey, and gave general directions for accessing the survey. Contact information for the LEA of these schools was readily available to the public on the state educational department website (Appendix D). In order to achieve a 95% confidence level for the 2015 administration, 166 schools needed to reply to the survey. For schools that did not reply to the Google form, the information was gathered by follow-up contacts.

Research Questions

This research focused on the impact of scheduling type (block and traditional period) on Algebra 1 EOC scores in South Carolina. This inferential study investigated the differences in the EOCEP test scores of middle grade students in Algebra 1 as influenced by the two scheduling options of the block and the traditional period in South Carolina public middle schools that offer the Algebra 1 courses over the individual 2010-2015 school years. Research questions were as follows.

1. What is the relationship between South Carolina middle school instructional time allocation in the form of block and traditional period scheduling and middle school students' standardized test scores on the Algebra 1 EOC over

the 2010-2015 academic years?

2. What is the interaction effect of South Carolina middle school scheduling options on the Algebra 1 EOC test scores and the demographic covariables of ethnicity, SES, gender, and special services for the individual 2010-2015 academic years?

This study provides new information on the impact of middle school scheduling and the impact it has on academic achievement. To support the selected study design, the null hypotheses used to structure the study included the following.

Null hypothesis for Research Question 1. There will be no main effect between student scores on the South Carolina Algebra 1 EOC test and class scheduling among middle schools.

Null hypothesis for Research Question 2. There are four null hypotheses for Research Question 2.

1. There will be no main effect for the interaction effect of South Carolina middle school scheduling options on the Algebra 1 EOC test scores and the demographic covariable of ethnicity for the individual 2010-2015 academic years.
2. There will be no main effect for the interaction effect of South Carolina middle school scheduling options on the Algebra 1 EOC test scores and the demographic covariable of SES for the individual 2010-2015 academic years.
3. There will be no main effect for the interaction effect of South Carolina middle school scheduling options on the Algebra 1 EOC test scores and the demographic covariable of Gender for the individual 2010-2015 academic years.

4. There will be no main effect for the interaction effect of South Carolina middle school scheduling options on the Algebra 1 EOC test scores and the demographic covariable of Special Services for the individual 2010-2015 academic years.

Variables in the Study

Basic inferential statistical designs include independent and dependent variables (Salkind, 2008). The independent variable in this study was the type of scheduling option, block and traditional period. The dependent variable was the scale score on the Algebra 1 EOC exam. These data were obtained from the SCDE Office of Research and Data Analysis. To explore the EOC results and the effects of scheduling options in more depth, the covariates, or explanatory variables (Iverson & Norpoth, 1987) of ethnicity, SES, gender, and special services were analyzed. These data were obtained from the SCDE; a school administrator survey; and, when necessary, follow-up contacts.

Instrumentation and Materials

The South Carolina EAA of 1998 and its revision in 2008 required the development of EOC examinations in gateway, or benchmark, courses for high school grade levels. Currently, the following courses are considered gateway courses and are prerequisites for the EOCEP (Algebra 1, Mathematics for the Technologies 2, English 1, Physical Science, Biology 1, Applied Biology 2, and U.S. History and the Constitution). The standardized tests used for each of these courses are validated by the state department each time revisions are performed.

According to the South Carolina Board of Education Regulation 43-262.4, there are three purposes and uses of the EOCEP tests: (a) promote instruction in the specific academic standards for the courses, encourage student achievement, and document the

level of student mastery of the curriculum standards; (b) be an indicator of effectiveness for programs, schools, and school districts in the manner prescribed by the Education Oversight Committee in accordance with the provisions of the EAA of 1998; and (c) count as 20% of the students' final grades for gateway courses. This study is based on behaviorist and constructivist theories related to student instructional time and how they affect academic achievement. Following the frameworks of studies performed by Lewis et al. (2005), Farmer (2005), and Howard (2010), this study explored the interactive effects of the covariables of ethnicity, SES, gender, and special services on Algebra 1 EOC scores.

Quantitative Research Design

Because this research was quantitative in nature, the literature review section focused on quantitative studies. Qualitative studies have been conducted concerning scheduling options which focus on student and teacher attitudes in relation to the scheduling options (Biesinger, Crippen, & Muis, 2008; Rikard & Banville, 2005; Wilson & Stokes, 1999). This study was concerned with the quantitative aspects of achievement, and data were collected from the SCDE Office of Research and Data Analysis and survey data which included gathering historical scheduling data for Algebra 1 courses for South Carolina schools over the individual 2010-2015 school years.

The nature of quantitative research has roots in logical positivism with its reliance on scientific methods and traditional methods of education (Matthews, 2004). The quantitative study relies on the scientific method for educational research and employs "systematic, empirical methods that draw on observation or experiment" (Belzer & St. Clair, 2005, p. 1396). Quantitative research is based on the simplification of occurrence or trend into numerical values for conducting statistical analysis. Quantitative analysis

seeks to make generalizations to the larger population from a smaller sample size. These generalizations allow for prediction of future behavior (Gelo, Braakmann, & Benetka, 2008). This study applied the quantitative attributes of purposive, convenience sampling, data collection from sources made available from the SCDE Office of Research and Data Analysis, inferential statistical data analysis using Statistical Package for the Social Science (SPSS), and data interpretation through generalization (Gelo et al., 2008). This study incorporated inferential statistics to make inferences about larger populations based on a sampling of smaller populations. We can compare the differences of the scale scores to ask "How likely is it that . . . ?" An inferential study cannot prove a result is either correct or incorrect but instead can generate a statistical probability that what happens in the sample population will happen in the larger population (Gay & Airasian, 2003).

Data Analysis

Data were analyzed using SPSS. This analysis tool uses predictive analytics software to analyze data concerning attributes to gain a full understanding of anticipated future behaviors, applying these insights to improve performance in future outcomes (IBM Corporation, 2015). To explore the EOC results and the effects of scheduling options more in depth, the covariates, or explanatory variables (Iverson & Norpoth, 1987) of ethnicity, SES, gender, and special services (as identified by an IEP or 504 plan), were analyzed. The effect on demographic group membership in a particular type of scheduling plan was explored using a factorial analysis statistical method on the data obtained with permission from the SCDE Office of Research and Data Analysis. Initial approval for obtaining the data was obtained from District Web Access Administrator through the creation of an access account.

Four conditions must be met to use factorial ANOVA for analysis: (1) differences

between groups, as opposed to relationships, are being explored; (2) participants are not being tested more than once; (3) more than two groups are being analyzed; and (4) more than one factor is being examined (Salkind, 2008). This study met Salkind's (2008) conditions. The scheduling options were not related to each other. It is the difference in EOC scores that was of interest for this study. Each year was examined independently. Participants were not tested more than once during a school year. A test/retest option was not given in the same school year. Algebra 1 EOC tests are given after an entire course is completed, and any revisions to the test are made before the year of testing. The two independent variables for this study were schedule type and demographics. The schedule type, block or traditional period, for the total class remained the same and did not change in the middle of the year. All test data were cross sectional, meaning the data were analyzed for each of the individual years 2010-2015 in order to meet time/order conditions to compare different population groups at the same time. Although these tests were administered on different dates, the window for testing each year is consistent in South Carolina. Each test year was analyzed separately to determine the relationship and interaction effect within the given year. Scale test scores were used based on the data obtained from the SCDE Office of Research and Data Analysis.

Conditions must also be met with an ANCOVA. The assumptions made for an ANCOVA include the independence of the covariate and treatment effect, or similarities across the groups, and homogeneity of the regression slopes (Field, 2012).

There are limitations to using a nonexperimental research design. This study was not able to test and see if individual students were able to perform better if they were given a different schedule type nor if specific teaching methods had an interaction effect. There was a lack of control over threats to internal validity (Wallen & Fraenkel, 2001).

A possible threat included students who repeat Algebra 1 for a second school year who may have been exposed to the previous test form, but the same test was not repeated. Instrumentation implementation may vary through the choice of online or paper test versions. Since the type of schedule cannot be manipulated, interaction effects can be identified, but causation of effects cannot be determined.

Table 4

Research Methods Table

Research Question	Null Hypotheses	Tools	Data Collected	Data Analysis
What is the relationship between South Carolina middle school instructional time allocation in the form of block and traditional period scheduling and middle school student's scale scores on the Algebra 1 EOC over the 2010-2015 academic years?	There will be no main effect between student scores on the South Carolina Algebra 1 EOC test and class scheduling among middle schools over the individual 2010-2015 academic years.	EOC data obtained from the SCDE Office of Research and Data Analysis Survey data obtained from Districts/Principals Follow-up contacts	Algebra 1 EOC Scale Scores Schedule information from Survey	one-way ANOVA No Post Hoc given for two groups
What is the interaction effect of South Carolina middle school scheduling options on the Algebra 1 EOC test scores and the demographic covariables of ethnicity, SES, gender, and special services for the individual 2010-2015 academic years?	1. There will be no main effect for the interaction effect of South Carolina middle school scheduling options on the Algebra 1 EOC test scores and the demographic covariable of ethnicity for the individual 2010-2015 academic years. 2. There will be no main effect for the interaction effect of South Carolina middle school scheduling options on the Algebra 1 EOC test scores and the demographic covariable of SES for the individual 2010-2015 academic years. 3. There will be no main effect for the interaction effect of South Carolina middle school scheduling options on the Algebra 1 EOC test scores and the demographic covariable of gender the individual 2010-2015 academic years. 4. There will be no main effect for the interaction effect of South Carolina middle school scheduling options on the Algebra 1 EOC test scores and the demographic covariable of special services for the individual 2010-2015 academic years.			ANCOVA Bonferroni Post Hoc

Summary

Chapter 3 presented the purpose and goal of the study and the appropriateness of utilizing a quantitative design. This study utilized archived data of the 2010-2015 EOC Algebra 1 DNC Report from the SCDE. The chapter also described the population and sampling structure, data collection, and analysis methods to be used to show the relationship and interaction effect of scheduling types, block and traditional period, of South Carolina public middle school student scores on the Algebra 1 EOC test.

Chapter 4: Results

Descriptive Statistics

For the 2014-2015 school year, 283 public schools in South Carolina contained students in at least one of the Grades 6-8. Of those schools, 292 offered Algebra 1 and implemented the EOC test. For a confidence interval of 95%, 166 schools were needed to participate in the survey. After an 8-week allowance for completion of the survey, phone calls to schools were implemented in order to obtain the necessary number of schools needed for data analysis. Table 5 shows the number of public South Carolina schools with at least one of the middle grades, the number needed to participate based on a 95% confidence interval for each of the spring administrations for the 2010-2015 school years, and the number of schools surveyed.

Table 5

Participation Needs for Each School Year Based on a 95% Interval

Admin Year	Number of Schools	Participation Needed	Surveyed Schools
2011	240	148	156
2012	253	153	162
2013	265	157	163
2014	279	162	168
2015	283	166	173

Data were analyzed from all of the public South Carolina schools that contained middle level grades that offered Algebra 1 for Carnegie credit. In the event that a school tested more than just middle grades, the data available from the State Department of Education were filtered for middle grade students only. The scores from schools that offered Algebra 1 in the middle grades were obtained via permission from the DRC data

file from the South Carolina state educational department Office of Research and Data Analysis. Account access for the data was requested and granted by the District Web Access Administrator. A formal request for the required data sets was accomplished through the online data request form (Appendix A) using the account created by the District Web Access Administrator. The data request based on the school indicator code (RSchoolID) was Ethicity (Fedreport, denoted as Race/Ethnicity), Gender, Special Services (InstrSetting, denoted as Special Ed), SES (meals), grade, and scale score (SS). Due to privacy policies, the data request required a list of the schools based on the indicator code. Therefore, the survey participant information was obtained prior to the final request for data. The demographics information was used to determine an interaction effect of schedule type and EOC score within a particular demographic. Initially all public schools in South Carolina that contained Grades 6-8 were considered for this study. Not all of these schools in the 2010-2015 school years had schedules that fell within the two major categories of block or traditional period. Schools with hybrid schedules were removed from the study. Online schools were disqualified because of the inconsistency of schedules. Data were analyzed using SPSS.

An ANOVA was used to answer the research question associated with the type of scheduling in public South Carolina middle school grades and the effects on EOC testing during the 2010-2015 school years. Each year was analyzed separately. ANOVA was the best suited to the first research question in this nonexperimental study due to the use of both continuous and categorical variables. This is also an effective method to use when data for various groups are uneven in numbers by first performing an adjustment of variance. A post hoc test is not used when evaluating two groups with an ANOVA. An ANCOVA was used to answer the research question which included the identified

subgroups of gender, ethnicity, SES, and special services (IEP/504). Once the ANCOVA was used to determine the effects of the subgroups, a Bonferroni Post Hoc comparison was used.

Research Questions

There were two research questions that formed the foundation of this study.

1. What is the relationship between South Carolina middle school instructional time allocation in the form of block and traditional period scheduling and middle school student's scale scores on the Algebra 1 EOC over the 2010-2015 academic years?
2. What is the interaction effect of South Carolina middle school scheduling options on the Algebra 1 EOC test scores and the demographic covariables of ethnicity, SES, gender, and special services for the individual 2010-2015 academic years?

Null hypothesis for Research Question 1. There will be no significant relationship between South Carolina middle school instructional time allocation in the form of block and traditional period scheduling and middle school students' standardized test scores on the Algebra 1 EOC over the individual 2010-2015 academic years?

Null hypothesis for Research Question 2. There are four null hypotheses for Research Question 2.

1. There will be no main effect for the interaction effect of South Carolina middle school scheduling options on the Algebra 1 EOC test scores and the demographic covariable of ethnicity for the individual 2010-2015 academic years.
2. There will be no main effect for the interaction effect of South Carolina

middle school scheduling options on the Algebra 1 EOC test scores and the demographic covariable of SES for the individual 2010-2015 academic years.

3. There will be no main effect for the interaction effect of South Carolina middle school scheduling options on the Algebra 1 EOC test scores and the demographic covariable of Gender for the individual 2010-2015 academic years.
4. There will be no main effect for the interaction effect of South Carolina middle school scheduling options on the Algebra 1 EOC test scores and the demographic covariable of Special Services for the individual 2010-2015 academic years.

Findings and Discussion

Research Question 1. What is the relationship between South Carolina middle school instructional time allocation in the form of block and traditional period scheduling and middle school students' standardized test scores on the Algebra 1 EOC over the individual 2010-2015 academic years? To examine Research Question 1 for each identified year, an ANOVA was conducted to assess if differences exist on middle grades South Carolina EOC Algebra 1 test scores based on type of scheduling (block vs. traditional period). The independent variable was schedule type. As shown in Appendix E, students were identified as block scheduled (coded=1) or period scheduled (coded=2). The dependent variable was the student's scale score on the EOCEP Algebra 1 test.

For the 2010-2011 data, the results of the ANOVA were significant, $F(1,4738)=42.121$, $p<.05$, suggesting that differences exist on the middle school scale scores from the EOCEP Algebra 1 tests based on the schedule type (Table 6). Levene's test of equality of error variances indicated that F=22.994, p=.000 (Table 7). Due to

Levene's test of equality p value of <.05, a further robust test Brown-Forsythe was necessary (p=.000) (Table 8). The significance level held consistently. The more robust Welch test was also run to confirm significance (p=.000); therefore, the error variance of the dependent variable was equal across groups (Table 8). The assumption of homogeneity was not violated. For a consistency, the Kruskal-Wallis test was run to confirm significance levels [p=.000 (Table 9.1-2)]. The Kruskal-Wallis test evaluates whether the population medians on a dependent variable are the same across all levels of a factor.

The descriptive output in Table 10 revealed that the block schedule had a larger mean (*M*=92.04, *SD*=8.336) compared to traditional period (*M*=90.38, *SD*=9.206). The results of the ANOVA are summarized in Table 6.

Table 6

ANOVA 2010-2011

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3248.476	1	3248.476	42.121	.000
Within Groups	365403.251	4738	77.122		
Total	368651.727	4739			

Table 7

Levene's Test 2010-2011

F	df1	df2	Sig.
22.994	1	4735	.000

Design: Schedule Type.

Table 8

Robust Tests of Equality 2010-2011

	Statistic	df1	df2	Sig.
Welch	42.121	1	4692.098	.000
Brown-Forsythe	42.121	1	4692.098	.000

Asymptotically F distributed.

Table 9.1

Kruskal-Willis 2010-2011

	Schedule Type	N	Mean Rank
SS	1	2370	2485.98
	2	2370	2255.02
	Total	4740	

Table 9.2

Kruskal-Willis Test 2010-2011

	SS
Chi-Square	34.760
Df	1
Asymp. Sig.	.000

Grouping Variable: Schedule Type

Table 10

Means and Standard Deviations 2010-2011

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1	2370	92.04	8.336	.171	91.70	92.37	55	100
2	2370	90.38	9.206	.189	90.01	90.75	52	100
Total	4740	91.21	8.820	.128	90.96	91.46	52	100

For the 2011-2012 data, the results of the ANOVA were not significant, $F(1,5006)=1.160$, $p > .05$, suggesting that no differences exist on the middle school scale scores from the EOCEP Algebra 1 tests based on the schedule type (Table 11). Levene's test of equality of error variances indicated that F=3.496, p=.062 (Table 12). The error variance of the dependent variable was equal across groups. The descriptive outputs found in Table 13 revealed that the block schedule had a slightly larger mean (M=91.13, SD=8.936) compared to traditional period (M=90.86, SD=9.296). The results of the ANOVA are summarized in Table 11.

Table 11

ANOVA 2011-2012

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	96.451	1	96.451	1.160	.281
Within Groups	416178.444	5006	83.136		
Total	416274.894	5007			

Table 12

Levene's Test 2011-2012

F	df1	df2	Sig.
3.496	1	5004	.062

Design: Schedule Type.

Table 13

Means and Standard Deviations 2011-2012

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1	2504	91.13	8.936	.179	90.78	91.48	50	100
2	2504	90.86	9.296	.186	90.49	91.22	54	100
Total	5008	91.00	9.118	.129	90.74	91.25	50	100

For the 2012-2013 data, the results of the ANOVA were not significant, $F(1,5272)=1.295$, $p > .05$, suggesting that no differences exist on the middle school scale scores from the EOCEP Algebra 1 tests based on the schedule type (Table 14). Levene's test of equality of error variances indicated that F=.580, p=.446 (Table 15). The error variance of the dependent variable was equal across groups. The descriptive outputs found in Table 16 revealed that the block schedule had a slightly smaller mean (M=89.07, SD=9.026) compared to traditional period (M=89.36, SD=9.291). The results of the ANOVA are summarized in Table 14.

Table 14

ANOVA 2012-2013

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	108.655	1	108.655	1.295	.255
Within Groups	442267.516	5272	83.890		
Total	442376.172	5273			

Table 15

Levene's Test 2012-2013

F	df1	df2	Sig.
.580	1	5257	.446

Design: ScheduleType.

Table 16

Means and Standard Deviations 2012-2013

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1	2637	89.07	9.026	.176	88.73	89.41	52	100
2	2637	89.36	9.291	.181	89.00	89.71	57	100
Total	5274	89.21	9.159	.126	88.97	89.46	52	100

For the 2013-2014 data, the results of the ANOVA were not significant, $F(1,5300)=1.572$, $p > .05$, suggesting that no differences exist on the middle school scale

scores from the EOCEP Algebra 1 tests based on the schedule type (Table 17). Due to Levene's test of equality, as shown by Table 18, with a p value of <.05, a further robust test Brown-Forsythe was necessary (p=.215) (Table 19). The more robust Welch test was also run to confirm significance level (p=.215); therefore, the error variance of the dependent variable was equal across groups (Table 19). The assumption of homogeneity was not violated. The descriptive outputs in Table 20 revealed that the block schedule had a slightly smaller mean (*M*=90.89, *SD*=8.867) compared to traditional period (*M*=91.2, *SD*=9.289). The results of the ANOVA are summarized in Table 17. Descriptive outputs are presented in Table 17.

Table 17

ANOVA 2013-2014

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	129.619	1	129.619	1.572	.210
Within Groups	437012.426	5300	82.455		
Total	437142.046	5301			

Table 18

Levene's Test 2013-2014

F	df1	df2	Sig.
10.738	1	5298	.001

Design: Schedule Type.

Table 19

Robust Tests of Equality 2013-2014

	Statistic	df1	df2	Sig.
Welch	1.535	1	5285.592	.215
Brown-Forsythe	1.535	1	5285.592	.215

Asymptotically F distributed.

Table 20

Means and Standard Deviations 2013-2014

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1	2651	90.89	8.867	.172	90.55	91.23	57	100
2	2651	91.20	9.289	.180	90.85	91.56	57	100
Total	5302	91.05	9.081	.125	90.80	91.29	57	100

For the 2014-2015 data, the results of the ANOVA were significant, $F(1,5430)=22.305$, $p < .05$, suggesting that differences exist on the middle school scale

scores from the EOCEP Algebra 1 tests based on the schedule type (Table 21). Levene's test of equality of error variances indicated that F=.117, p=.732(Table 22). The error variance of the dependent variable was equal across groups. The descriptive outputs observed in Table 23 revealed that the traditional period schedule had a slightly larger mean (*M*=92.24, *SD*=8.706) compared to the block schedule (*M*=91.14, *SD*=8.594). The results of the ANOVA are summarized in Table 21.

Table 21

ANOVA 2014-2015

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1669.021	1	1669.021	22.305	.000
Within Groups	406315.773	5430	74.828		
Total	407984.794	5431			

Table 22

Levene's Test 2014-2015

F	df1	df2	Sig.
.117	1	5407	.732

Design: Schedule Type.

Table 23

Means and Standard Deviations 2014-2015

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1	2716	91.14	8.594	.165	90.81	91.46	51	100
2	2716	92.24	8.706	.167	91.92	92.57	48	100
Total	5432	91.69	8.667	.118	91.46	91.92	48	100

In the academic years of 2010-2011 and 2014-2015, a significance was found between the block schedule and traditional period schedule groups. There was no significance found in either of the individual academic years of 2012-2014. Both of the academic years of 2010-2012 had slightly higher means for the block scheduled group, whereas the other academic years had higher means in the traditional period group.

Research Question 2. What is the interaction effect of South Carolina middle school scheduling options on the Algebra 1 EOC test scores and the demographic covariables of ethnicity, SES, gender, and special services for the individual 2010-2015 academic years? To examine Research Question 2, an ANCOVA was conducted to assess if differences exist on the middle school scale scores from the middle grade EOCEP test scores in Algebra 1 based on type of scheduling (block vs. traditional period). The independent variable was schedule type. Students were identified as block scheduled (coded=1) or period scheduled (coded=2). The dependent variable was the student's scale score on the EOCEP Algebra 1 test. The covariates included student gender, identified as female (coded=1) and male (coded=2); SES, identified as paid meals

(coded=1), reduced meals (coded=2), and free meals (coded=3); ethnicity, identified as Hispanic (coded=1), American Indian or Alaska Native (coded=2), Asian (coded=3), Black or African American (coded=4), Native Hawaiian or other Pacific Islander (coded=5), White (coded=6), and Two or more races (coded=7); and special services, identified as Yes (coded=1) and No (coded=2) (Appendix E).

For the 2010-2011 school year, the mean change in scores for block scheduling was M=92.04(SD=8.330). The mean change in scores for period scheduling was M=90.38 (SD=9.206) (Table 24). Ethnicity (p=.119) and gender (p=.307) were not significant. Special services (p=.000) and SES (p=.000) were significant covariates. Overall, schedule type was not significant [F (1,4726)=.010, p=.990]. After adjustment by the covariates, the effect of scheduling type remained nonsignificant. As shown in Table 25, the schedule choice accounted for a significant amount of variance in the dependent measure–EOCEP Algebra 1 score. As shown in Table 26, the estimated marginal mean Algebra 1 score change for students in block scheduling was M=91.968 (SE=.179), and the estimated marginal mean Algebra 1 score for students in period scheduling was M=90.478 (SE=.179). The Bonferroni Post Hoc displayed on Table 27 shows a Mean Difference of 1.490 with a Standard Error of .251, with significance after adjustment. Overall, the model explained 5.9 % of the variance in Algebra 1 EOC scores for the 2010-2011 school year.

Table 24

Descriptive Statistics 2010-2011

Schedule Type	Mean	Std. Deviation	N
1	92.04	8.330	2367
2	90.38	9.206	2370
Total	91.21	8.818	4737

Table 25

Between-Subjects Effects 2010-2011

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	22327.437	10	2232.744	30.506	.000
Intercept	49893.512	1	49893.512	681.692	.000
ScheduleType * RaceEthnicity * Gender * SpecialEd * Meals	1.494	2	.747	.010	.990
ScheduleType * RaceEthnicity	312.154	2	156.077	2.132	.119
ScheduleType * Gender	172.958	2	86.479	1.182	.307
ScheduleType * SpecialEd	1211.257	2	605.629	8.275	.000
ScheduleType * Meals	2281.807	2	1140.904	15.588	.000
Error	345899.459	4726	73.191		
Total	39777535.000	4737			
Corrected Total	368226.896	4736			

R Squared=.061 (Adjusted R Squared=.059).

Table 26

Dependent Variable 2010-2011

Schedule Type	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
1	91.968	.179	91.617	92.319
2	90.478	.179	90.126	90.830

Covariates appearing in the model are evaluated at the following values: RaceEthnicity=5.38, Gender=1.48, SpecialEd=1.99, Meals=1.56.

Table 27

Bonferroni Comparisons 2010-2011

(I) Schedule Type	(J) Schedule Type	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval for Difference	
					Lower Bound	Upper Bound
1	2	1.490	.251	.000	.997	1.983
2	1	-1.490	.251	.000	-1.983	-.997

Based on estimated marginal means
The mean difference is significant at the .05 level.
Adjustment for multiple comparisons: Bonferroni.

For the 2011-2012 school year, the mean change in scores for block scheduling was M=91.14 (SD=8.934). The mean change in scores for period scheduling was M=90.86 (SD=9.298) (Table 28). Special services (p=.000), ethnicity (p=000), and SES (p=000) were significant covariates. As shown in Table 29, the covariate of gender (p=.700) was not significant. Overall schedule type was not significant [F (1, 4995)=1.172, p=.310]. After adjustment by the covariates, the effect of scheduling type was found to not be significant and did not account for a significant amount of

variance in the dependent measure–EOCEP Algebra 1 score. As shown in Table 30, the estimated marginal mean Algebra 1 score change for students in block scheduling was M=91.131 (SE=.174), and the estimated marginal mean Algebra 1 score for students in period scheduling was M=90.849 (SE=.174). The Bonferroni Post Hoc displayed on Table 31 shows a Mean Difference of .198 with a Standard Error of .249, with no significance after adjustment. Overall, the model explained 8.9% of the variance in Algebra 1 EOC scores for the 2011-2012 school year.

Table 28

Descriptive Statistics 2011-2012

Schedule Type	Mean	Std. Deviation	N
1	91.14	8.934	2503
2	90.86	9.298	2503
Total	91.00	9.118	5006

Table 29

Between-Subjects Effects 2011-2012

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	37959.598	10	3795.960	50.139	.000
Intercept	45064.195	1	45064.195	595.235	.000
ScheduleType * RaceEthnicity	1955.783	2	977.891	12.917	.000
ScheduleType * Gender	53.957	2	26.979	.356	.700
ScheduleType * SpecialEd	2148.604	2	1074.302	14.190	.000
ScheduleType * Meals	3543.183	2	1771.592	23.400	.000
ScheduleType * RaceEthnicity * Gender * SpecialEd * Meals	177.413	2	88.706	1.172	.310
Error	378162.390	4995	75.708		
Total	41869352.000	5006			
Corrected Total	416121.987	5005			

R Squared=.091 (Adjusted R Squared=.089).

Table 30

Dependent Variable 2011-2012

			95% Confidence Interval	
ScheduleType	Mean	Std. Error	Lower Bound	Upper Bound
1	91.088	.177	90.741	91.435
2	90.890	.178	90.542	91.238

Covariates appearing in the model are evaluated at the following values: RaceEthnicity=5.35, Gender=1.48, SpecialEd=1.99, Meals=1.60.

Table 31

Bonferroni Comparisons 2011-2012

(I) Schedule Type	(J) Schedule Type	Mean Difference (I-J)	Std. Error	Sig[a]	95% Confidence Interval for Difference	
					Lower Bound	Upper Bound
1	2	.198	.249	.427	-.290	.685
2	1	-.198	.249	.427	-.685	.290

Based on estimated marginal means
Adjustment for multiple comparisons: Bonferroni.

For the 2012-2013 school year, the mean change in scores for block scheduling was M=89.10 (SD=9.008). The mean change in scores for period scheduling was M=89.37 (SD=9.289) (Table 32). As shown in Table 33, special services (p=.001) and SES (p=.000) were significant covariates. Ethnicity (p=.270) and gender (p=.130) were not significant covariates. Overall schedule type was not significant [F (1, 5248)=.314 p=.731]. After adjustment by the covariates, the effect of scheduling type remained not significant and did not account for a significant amount of variance in the dependent measure–EOCEP Algebra 1 score. As shown in Table 34, the estimated marginal mean Algebra 1 score change for students in block scheduling was M=89.136 (SE=.176), and the estimated marginal mean Algebra 1 score for students in period scheduling was M=89.384 (SE=.177). The Bonferroni Post Hoc displayed on Table 35 shows a Mean Difference of .248 with a Standard Error of .248, with no significance after adjustment. Overall, the model explained 5.2 % of the variance in Algebra 1 EOC scores for the 2012-2013 school year.

Table 32

Descriptive Statistics 2012-2013

Schedule Type	Mean	Std. Deviation	N
1	89.10	9.008	2626
2	89.37	9.289	2633
Total	89.24	9.150	5259

Table 33

Between-Subjects Effects 2012-2013

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	23581.251	10	2358.125	29.703	.000
Intercept	68375.959	1	68375.959	861.267	.000
ScheduleType * RaceEthnicity * Gender * SpecialEd * Meals	49.779	2	24.889	.314	.731
ScheduleType * RaceEthnicity	207.852	2	103.926	1.309	.270
ScheduleType * Gender	324.445	2	162.222	2.043	.130
ScheduleType * SpecialEd	1185.293	2	592.646	7.465	.001
ScheduleType * Meals	3618.069	2	1809.035	22.787	.000
Error	416638.590	5248	79.390		
Total	42319199.000	5259			
Corrected Total	440219.840	5258			

R Squared=.054 (Adjusted R Squared=.052)

Table 34

Dependent Variable 2012-2013

Schedule Type	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
1	89.136	.176	88.791	89.480
2	89.384	.177	89.036	89.732

Covariates appearing in the model are evaluated at the following values: RaceEthnicity=5.32, Gender=1.48, SpecialEd=1.99, Meals=1.62.

Table 35

Bonferroni Comparisons 2012-2013

(I) Schedule Type	(J) Schedule Type	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval for Difference	
					Lower Bound	Upper Bound
1	2	-.248	.246	.316	-.734	.237
2	1	.248	.248	.316	-.237	.734

Based on estimated marginal means
Adjustment for multiple comparisons: Bonferroni.

For the 2013-2014 school year, the mean change in scores for block scheduling was M=90.89 (SD=8.865). The mean change in scores for period scheduling was M=91.23 (SD=9.286) (Table 36). As shown in Table 37, special services (p=.027) and SES (p=.000) were significant covariates. The covariate of ethnicity (p=.688) and gender (p=.337) were not significant. Overall schedule type was not significant [F (1, 5274)=2.016, p=.133]. After adjustment by the covariates, the effect of scheduling type was not significant and accounted for no significant amount of variance in the

dependent measure–EOCEP Algebra 1 score. As shown in Table 38, the estimated marginal mean Algebra 1 score change for students in block scheduling was M=90.963 (SE=.174), and the estimated marginal mean Algebra 1 score for students in period scheduling was M=91.268(SE=.174). The Bonferroni Post Hoc displayed on Table 39 shows a Mean Difference of .305 with a Standard Error of .245, with no significance after adjustment. Overall, the model explained 6.2% of the variance in Algebra 1 EOC scores for the 2013-2014 school year.

Table 36

Descriptive Statistics 2013-2014

Schedule Type	Mean	Std. Deviation	N
1	90.89	8.866	2645
2	91.22	9.284	2641
Total	91.06	9.078	5286

Table 37

Between-Subjects Effects 2013-2014

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	27718.077	10	2771.808	35.844	.000
Intercept	59079.665	1	59079.665	764.007	.000
ScheduleType * RaceEthnicity	106.386	2	53.193	.688	.503
ScheduleType * Gender	168.443	2	84.221	1.089	.337
ScheduleType * SpecialEd	557.847	2	278.924	3.607	.027
ScheduleType * Meals	5279.723	2	2639.862	34.138	.000
ScheduleType * RaceEthnicity * Gender * SpecialEd * Meals	311.854	2	155.927	2.016	.133
Error	407831.668	5274	77.329		
Total	44258712.000	5285			
Corrected Total	435549.745	5284			

R Squared=.064 (Adjusted R Squared=.062)

Table 38

Dependent Variable 2013-2014

			95% Confidence Interval	
Schedule Type	Mean	Std. Error	Lower Bound	Upper Bound
1	90.963	.174	90.623	91.303
2	91.268	.174	90.926	91.610

Table 39

Bonferroni Comparisons 2013-2014

(I) Schedule Type	(J) Schedule Type	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval for Difference	
					Lower Bound	Upper Bound
1	2	-.305	.245	.212	.174	.765
2	1	.305	.245	.212	.785	.200

Based on estimated marginal means
Adjustment for multiple comparisons: Bonferroni.

For the 2014-2015 school year, the mean change in scores for block scheduling was M=91.13 (SD=8.598). The mean change in scores for period scheduling was M=92.25(SD=8.704) (Table 40). As shown in Table 41, ethnicity (p=.001), special services (p=.021), and SES (p=.000) were all significant covariates. Gender (p=.548) was not a significant covariate. Overall schedule type was not significant [F (1, 5407)=1.283, p=277]. After adjustment by the covariates, the effect of scheduling type remained nonsignificant. The schedule choice did not account for a significant amount of variance in the dependent measure–EOCEP Algebra 1 score. As shown in Table 42, the estimated marginal mean Algebra 1 score change for students in block scheduling was M=91.204 (SE=.163), and the estimated marginal mean Algebra 1 score for students in period scheduling was M=92.074(SE=.164). The Bonferroni Post Hoc displayed on Table 43 shows a Mean Difference of .870 with a Standard Error of .229, with a significance after adjustment. Overall, the model explained 7.7 % of the variance in Algebra 1 EOC scores for the 2015 school year.

Table 40

Descriptive Statistics 2014-2015

Schedule Type	Mean	Std. Deviation	N
1	91.13	8.598	2707
2	92.25	8.704	2711
Total	91.69	8.669	5418

Table 41

Between-Subjects Effects 2014-2015

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	32202.748	10	3220.275	46.449	.000
Intercept	58151.721	1	58151.721	838.780	.000
ScheduleType * RaceEthnicity * Gender * SpecialEd * Meals	177.852	2	88.926	1.283	.277
ScheduleType * RaceEthnicity	1023.531	2	511.766	7.382	.001
ScheduleType * Gender	83.345	2	41.672	.601	.548
ScheduleType * SpecialEd	536.028	2	268.014	3.866	.021
ScheduleType * Meals	2698.392	2	1349.196	19.461	.000
Error	374861.654	5407	69.329		
Total	45957701.000	5418			
Corrected Total	407064.402	5417			

R Squared=.079 (Adjusted R Squared=.077)

Table 42

Dependent Variable 2014-2015

Schedule Type	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
1	91.204	.163	90.885	91.522
2	92.074	.164	91.753	92.395

Covariates appearing in the model are evaluated at the following values: RaceEthnicity=5.30, Gender=1.48, SpecialEd=1.99, Meals=1.72.

Table 43

Bonferroni Comparisons 2014-2015

(I) Schedule Type	(J) Schedule Type	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval for Difference	
					Lower Bound	Upper Bound
1	2	-.870*	.229	.000	-1.320	-.421
2	1	.870*	.229	.000	.421	1.320

Based on estimated marginal means
The mean difference is significant at the .05 level.
Adjustment for multiple comparisons: Bonferroni.

The ANCOVA analysis was used to explore the second research question which involved schedule type and the demographics of ethnicity, gender, special services, and SES in relation to the Algebra 1 EOC test scores for middle school students. As found in the ANOVA, block scheduling means were higher with the 2010-2011 and 2011-2012 academic years, while traditional period schedule means were higher in the other tested years. When considering the demographics collectively, no significance was found in any of the examined years. Ethnicity was found to be significant in 2011-2012 and 2014-2015. Gender was not found to be significant in any year. Special services and SES

were found to be significant in every year.

Summary

For this study, the alpha level was set at $\leq .05$. Data were grouped according to the schedule types of block and traditional period. Data were analyzed using an ANOVA. Levene's test for equality of variance was used along with the more robust tests of Brown-Forsythe and Welch, as needed. The Kruskal-Willis test was used for the 2010-2011 data set to confirm consistency of the factor groups. The school years of 2010-2011 and 2014-2015 displayed significant differences in schedule types, with 2010-2011 students in block scheduling with a higher average on the South Carolina EOC Algebra 1 test than traditional period scheduled students and 2014-2015 students on a traditional period schedule scoring higher on the South Carolina EOC Algebra 1 test. Though the academic years of 2011-2014 did not display significance, 2011-2012 had a higher mean for block schedules, while the 2012-2013 and 2013-2014 years had higher means for traditional period schedules. Data were further analyzed using an ANCOVA with the covariates of ethnicity, gender, and SES. Post Hoc comparison was performed using the Bonferroni Post Hoc Tests. This test was run to determine if there were statistical significant differences when comparing the means of the groups tested. For the covariate of ethnicity, significance was found for the 2011-2012 and 2014-2015 school years. Significance for gender was not found in any of the 2010-2015 academic years. Significance for special services and SES was determined to exist in all of the years tested. In the 2010-2011 and 2011-2012 school years, block scheduling was found to have a higher mean than traditional period scheduling. In the other 3 years, period scheduling had a higher mean. Recommendations in the form of a summary of the data analysis are presented in Chapter 5 along with a discussion of the null hypotheses.

Chapter 5: Discussion

Implications of Findings

The relationship between student achievement on the South Carolina EOC Algebra 1 test and scheduling is one each administrator must consider when meeting the academic needs of his/her students (Queen, 2008). Though most high schools that offer Algebra 1 set up their classes on a semester-long block schedule, middle schools vary with course schedule options of year-long block, traditional periods, or a hybrid schedule (Pliska et al., 2001). In examining the implications of this study, the individual academic years of 2010-2015 were examined. The following research questions were considered for each 2010-2015 school year.

1. What is the relationship between South Carolina middle school instructional time allocation in the form of block and traditional period scheduling and middle school students' standardized test scores on the Algebra 1 EOC over the individual 2010-2015 academic years?
2. What is the interaction effect of South Carolina middle school scheduling options on the Algebra 1 EOC test scores and the demographic covariables of ethnicity, SES, gender, and special services over the individual 2010-2015 academic years?

This study provided new information on the impact of middle school scheduling and the impact it has on academic achievement. To support the selected study design, the null hypotheses used to structure the study included the following.

Null hypothesis for Research Question 1. There will be no main effect between student scores on the South Carolina Algebra 1 EOC test and class scheduling among middle schools over the individual 2010-2015 academic years.

Null hypothesis for Research Question 2. There are four null hypotheses for Research Question 2.

1. There will be no main effect for the interaction effect of South Carolina middle school scheduling options on the Algebra 1 EOC test scores and the demographic covariable of ethnicity for the 2010-2015 school years.
2. There will be no main effect for the interaction effect of South Carolina middle school scheduling options on the Algebra 1 EOC test scores and the demographic covariable of SES for the 2010-2015 school years.
3. There will be no main effect for the interaction effect of South Carolina middle school scheduling options on the Algebra 1 EOC test scores and the demographic covariable of gender for the 2010-2015 school years.
4. There will be no main effect for the interaction effect of South Carolina middle school scheduling options on the Algebra 1 EOC test scores and the demographic covariable of special services for the 2010-2015 school years.

The findings for this study are discussed by each academic year. In examining question 1, in relation to the 2010-2011 school year, a significance was found between schedule type and South Carolina EOC Algebra 1 test scale scores for middle school students; therefore, the null hypothesis was rejected. For question 2, there were four covariates and, therefore, four null hypotheses to consider. A significance was found for the covariates of special services and SES. The null hypothesis was rejected for those covariates, while the null hypothesis was accepted for the covariates of ethnicity and gender.

In examining question 1, in relation to the 2011-2012 school year, no significance was found between schedule type and South Carolina EOC Algebra 1 test scale scores for

middle school students; therefore, the null hypothesis was accepted. For question 2, there were four covariates and, therefore, four null hypotheses to consider. A significance was found for the covariates of special services, ethnicity, and SES. The null hypothesis was rejected for those covariates, while the null hypothesis was accepted for the covariate of gender.

In examining question 1, in relation to the 2012-2013 school year, no significance was found between schedule type and South Carolina EOC Algebra 1 test scale scores for middle school students; therefore, the null hypothesis was accepted. For question 2, there were four covariates and, therefore, four null hypotheses to consider. A significance was found for the covariates of special services and SES. The null hypothesis was rejected for those covariates, while the null hypothesis was accepted for the covariates of ethnicity and gender.

In examining question 1, in relation to the 2013-2014 school year, no significance was found between schedule type and South Carolina EOC Algebra 1 test scale scores for middle school students; therefore, the null hypothesis was accepted. For question 2, there were four covariates and, therefore, four null hypotheses to consider. A significance was found for the covariates of special services and SES. The null hypothesis was rejected for those covariates, while the null hypothesis was accepted for the covariates of ethnicity and gender.

In examining question 1, in relation to the 2014-2015 school year, significance was found between schedule type and South Carolina EOC Algebra 1 test scale scores for middle school students; therefore, the null hypothesis was rejected. For question 2, there were four covariates and, therefore, four null hypotheses to consider. A significance was found for the covariates of ethnicity, special services, and SES. The null hypothesis was

rejected for those covariates, while the null hypothesis was accepted for the covariate of gender.

Inferences Based Upon the Results

The intent of this research was to determine if the schedule truly makes a difference for South Carolina middle school students taking the South Carolina EOC Algebra 1 test so educators can make a more informed decision in relation to scheduling to increase opportunities for success. After data were collected and analyzed for the 2010-2015 school years, a significant difference was found within special services for each year and for SES. Overall, for 3 of the 5 years, students on the traditional period schedule performed higher on the South Carolina EOC Algebra 1 test. The outcome of the research indicates that students on the traditional period schedule have an advantage over block-scheduled students in relation to academic achievement on the South Carolina EOC Algebra 1 test. Table 44 displays the findings for each academic year based on the ANOVA. Table 45 displays the findings for each academic year based on the ANCOVA.

Table 44

ANOVA Significance by Year

Academic Year	Higher Mean	Significance
2010-2011	Block	Yes
2011-2012	Block	No
2012-2013	Period	No
2013-2014	Period	No
2014-2015	Period	Yes

Table 45

ANCOVA Significance by Year

Academic Year	Higher Mean	Overall Significance	Demographic Significance
2010-2011	Block	No	SES Special Services
2011-2012	Block	No	Ethnicity SES Special Services
2012-2013	Period	No	SES Special Services
2013-2014	Period	No	SES Special Services
2014-2015	Period	No	SES Special Services Ethnicity

Application of the Results to Practice

Administrators have to determine which schedule will have an impact on academic success. The proposed study is based on the theoretical context and guiding principle that giving students more time to learn would result in greater academic achievement. When focusing on raising achievement, schools need to focus on which groups are not achieving at the same rates and the reasons behind this gap. Although scheduling is not the definitive answer to closing the achievement gap, it can be one part of the complicated puzzle of why certain groups are not performing as well as others and an approach toward solutions. Based on the results of this study, when examining scheduling options, special services received and the SES of the students should be considered important. Ethnicity was found to be significant in 2 of the 5 years, so some consideration or further examination should be utilized. Gender should not be a

considerable factor. Within the 5-year span, 3 of the 5 years had higher mean results for traditional period schedules. This result could lead one to recommend utilizing a traditional period schedule for middle school Algebra 1 classes; however, by not knowing the specifics of how traditional scheduling impacted those within the SES group or within special services, more research is needed to aid in the decision.

Questions for Further Research

Based on the data and research from this study, several questions for further research should be considered. The first question relates to finding specific differences within the significant covariates. A further study for SES and students receiving special services could result in understanding which groups benefited with longer block Algebra 1 classes and which were more successful with traditional period schedules. Many schools implement additional study courses for students identified with special services, but typically those students are served based on their disability. Middle school students taking Algebra 1 generally have strengths in mathematics, thus they are not typically served with mathematic assistance. Student SES often has been an area of discussion. Discovering which students performed more successfully in relation to SES and schedule types can give insight into meeting the needs of students. This could be expanded to include a qualitative piece for students, teachers, and family members to add opinions to the body of quantitative data. Depth could be added by matching schools of similar demographics for comparison of achievement on the South Carolina EOC Algebra 1 test.

Further research could be performed to look for similarities within other Carnegie courses offered in South Carolina middle schools such as English 1 and technology courses which also require an EOC examination. Consistency in results could lead to discussions on how scheduling can best benefit students who show a need for a particular

type of scheduling. A study could also examine particular students who take more than one middle school Carnegie course to see if there is consistency in performance levels in general or if the performance is course specific. This study also only examined one state with one focus of achievement, the South Carolina EOC Algebra 1 test. Considering other states and areas of assessment can add to the body of knowledge in relation to schedule types and middle school students.

Other important areas to consider for further research are the issues of closing the achievement gap through the relation of cultural differences in learning styles and stakeholder satisfaction. Educational leaders such as Dr. Robert Marzano stated that teacher effectiveness accounts for most of a student's academic achievement (Marzano, Pickering, & Pollack, 2001). Because of this potential for academic influence, types of schedules lend themselves to a multitude of instructional factors such as learning styles, classroom relationships, teacher quality, years of experience, and opportunities for interactions in the classroom. Further research into cultural attitudes could add to the conversation. Adding qualitative data on student and teacher satisfaction with scheduling options, possibly including the area of opinion when changing from traditional schedules to block schedules, may have had an impact on student achievement on the South Carolina EOC Algebra 1 test.

Summary

The purpose of this study was to determine the relationship and interaction effect between class schedule types and scores on the South Carolina EOC test for Algebra 1 students in public middle schools using a nonexperimental quantitative research methodology with a factorial ANOVA to determine the significance. The study was based on the theoretical context and guiding principle that giving students more time to

learn would result in greater academic achievement. With the foundation of the previous studies of Lewis et al. (2005), Farmer (2005), and Howard (2010), this study explored the interactive effects of the covariables of ethnicity, SES, gender, and special services on Algebra 1 EOC scores. A factorial ANCOVA was used to determine the significance. These data were obtained from the SCDE, a school administrator survey, and through follow-up contacts to schools in South Carolina.

This research indicates a consistency in the significant differences of scores on the 2010-2015 school years' South Carolina Algebra I EOC test scores in Algebra 1 based on the schedule for the demographic subgroups of special services and SES. The Carnegie course of Algebra 1 is considered a gateway to higher levels of high school mathematics. The opportunity to take Algebra 1 is believed to be a civil right. When the demographics showing significance are also areas with specific federal and state policies in place, attention must be given to ensure student success. South Carolina middle school administrators are encouraged to examine further the specific needs of their students in order to engage students in a schedule that affords the most advantageous circumstance to experience success on the South Carolina EOC Algebra 1 test. With students beginning to complete their high school course requirements in middle school, it is paramount that once educators become aware of areas of need, they must move forward with making decisions that encourage student success.

With the conflicting evidence presented in studies of block and traditional period scheduling in relation to Algebra 1, the conclusion must be that what works for one particular year, demographic, district, or state, may not work for others of the same attribute. However, if needs become evident within a study, as a method of best practice, considering these needs in relation to a school's own areas should be examined.

Furthering research in Algebra 1 is recommended, in addition to success in algebra in relation to other areas of education such as attendance (Creamean & Horvath, 2000; Lancaster, 2012), disciplinary referrals (Creamean & Horvath, 2000; Deuel, 1999; Lancaster, 2012), SAT and ACT scores (Cox, 2005; Lare et al., 2002; Lewis et al., 2005; Lancaster, 2012), overall GPAs (Gruber & Onwuegbuzie, 2001), and future success in high school and college (Dexter, Tai, & Sadler, 2006; Lancaster, 2012; Zelkowski, 2010).

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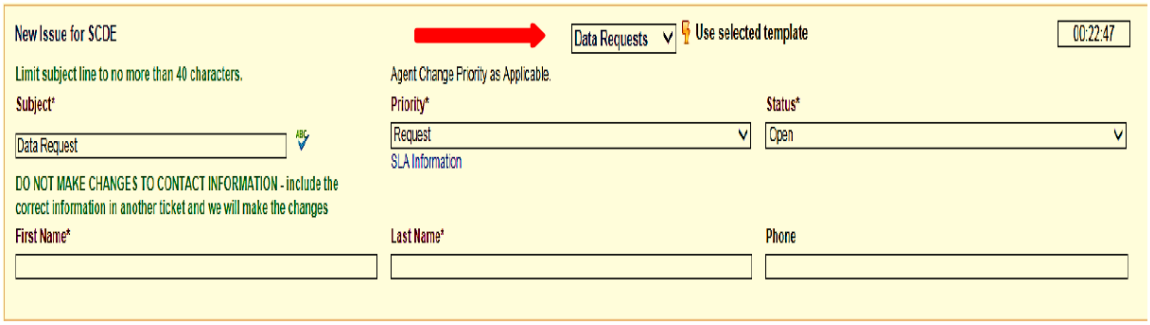
Appendix A

Data Request Form


New Issue for SCDE
Data Requests
Use selected template
00:22:47
Limit subject line to no more than 40 characters.
Agent Change Priority as Applicable.
Subject*
Priority*
Status*
Data Request
Request
Open
SLA Information
DO NOT MAKE CHANGES TO CONTACT INFORMATION - include the correct information in another ticket and we will make the changes
First Name*
Last Name*
Phone

Appendix B

Administration Survey

Scheduling Types Survey

This is a survey for all public South Carolina schools that include the Carnegie Credit course of Algebra 1 for middle grades (6-8). The purpose of this study is to examine middle schools in South Carolina to find if there is an interaction effect on student achievement on the South Carolina Algebra 1 End-of-Course test based on the scheduling type within the South Carolina Department of Education identified demographic subgroups of gender, ethnicity, Socio-economic status (SES), and those with Special Services (IEP/504). Your participation in this research project is completely voluntary. There are no known risks to participation beyond those encountered in everyday life. Your responses will remain confidential.

School Information

Please type in your school indicator RschoolID *

Your answer

Does your school offer Algebra 1 for high school credit to any of the grades sixth through eighth? *

- ○ Yes
- ○ No

Scheduling Types Survey

* Required

Schedule Type

This question will record the schedule types used during the 2010-2015 school years. If you changed your schedule type at any time during that five year period, please indicate that with your answer choice and you will be directed to specify the schedule types for each year.

Please indicate the type of schedule used for your Algebra 1 course during the 2010-2015 school years: *

- ○ Block Schedule (71-90 minutes)
- ○ Period Schedule (40-70 minutes)
- ○ Hybrid Schedule (A schedule that is not consistently a block or period schedule)
- ○ Our school changed schedule types during the 2010-2015 school years.

Scheduling Types Survey

* Required

Schedule Type

Your response indicated you changed schedule types. Please indicate the schedule types for each of the following school years:

School year 2010-2011 *

- ○ Block Schedule (71-90 minutes)
- ○ Period Schedule (40-70 minutes)
- ○ Hybrid Schedule (A schedule that is not consistently a block or period schedule)

School year 2011-2012 *

- ○ Block Schedule (71-90 minutes)
- ○ Period Schedule (40-70 minutes)
- ○ Hybrid Schedule (A schedule that is not consistently a block or period schedule)

School year 2012-2013 *

- ○ Block Schedule (71-90 minutes)
- ○ Period Schedule (40-70 minutes)
- ○ Hybrid Schedule (A schedule that is not consistently a block or period

School year 2013-2014 *

- ○ Block Schedule (71-90 minutes)
- ○ Period Schedule (40-70 minutes)
- ○ Hybrid Schedule (A schedule that is not consistently a block or period schedule)

School year 2014-2015 *

- ○ Block Schedule (71-90 minutes)
- ○ Period Schedule (40-70 minutes)
- ○ Hybrid Schedule (A schedule that is not consistently a block or period schedule)

Thank you for participating with this survey.Your responses will remain confidential and only group data will be made available.

100%: You made it. BACK SUBMIT

Appendix C

Email Letter to Administration

Date

Dear Principal,

You are invited to complete a survey as part of a research study on the relationship between class schedule types and results on the South Carolina Algebra 1 End-of-Course test for middle school students. This survey takes approximately one minute to complete and asks you to indicate the type of schedule your school follows. Results of this study could inform best practices regarding middle school scheduling.

Your participation in this research project is completely voluntary. There are no known risks to participation beyond those encountered in everyday life. Your responses will remain confidential. No one other than the researcher will know your individual answers to this survey.

If you agree to participate in this project, please answer the questions on the survey as best you can. Your responses will be processed confidentially and only group data will be made available. If you have any questions regarding the please feel free to contact me or my research advisor by phone or email using the information listed below. Your cooperation is greatly appreciated.

Sincerely,

Jennifer Ramsey

Sydney Brown, PhD
Research Advisor

Appendix D

Contact Information for Administration Survey

COUNTYN	DISTRICTC	DISTRICTN	GRADESER	PRINEMAIL	PRINFIRST	PRINFULLI	PRINLASTI	PRINPHON	PRINTITLE
Charlestor	1001	Charlestor	PK-5 SPED	reginald_bright@	Reginald	field no lo	Bright	843-764-2	Mr.
Richland	4001	Richland 0	9-12 SPED	rmcclure@richlar	Richard	field no lo	McClure	803-738-7	Mr.
Richland	4001	Richland 0	PK-5 SPED	lubaker@richlanc	Chantelle	field no lo	Baker-Parı	803-343-2	Dr.
Richland	4001	Richland 0	PK-5 SPED	dgilliard@richlan	Delores	field no lo	Gilliard	803-735-3	Ms.
Pickens	3901	Pickens 01	PK-5 SPED	melissaterry@pic	Melissa	field no lo	Terry	864-397-1	Mrs.
Lancaster	2901	Lancaster	6-8 SPED	Phillip.Mickles@l	Phillip	field no lo	Mickles	803-416-8	Mr.
Greenville	2301	Greenville	PK-5 SPED	mmitchel@green	Megan	field no lo	Mitchell H	864-452-0	Dr.
Abbeville	160	Abbeville 6	10-12 SPE	dbelldunlap@acs	Dorinda	field no lo	Bell-Dunla	864-366-9	Ms.
Abbeville	160	Abbeville 6	9-12 SPED	ccostner@acsdsc	Charles	field no lo	Costner	864-366-5	Dr.
Spartanbu	4205	Spartanbu	PK-4 SPED	Karen.McMakin@	Karen	field no lo	McMakin	864-949-2	Ms.
Charlestor	1001	Charlestor	9-12 SPED	judith_peterson@	Judith	field no lo	Peterson	843-746-1	Ms.
Horry	2601	Horry 01	9-12 SPED	rjones002@horry	Robin	field no lo	Jones	843-903-8	Ms.
Chester	1201	Chester 01	K-8 SPED	rbrakefield@ches	Robyn	field no lo	Caldwell	803-385-6	Ms.
Horry	2601	Horry 01	9-12 SPED	dstoudenmire@h	David	field no lo	Stoudenm	843-488-6	Mr.
Marion	3410	Marion 10	9-12 SPED	djameson@mario	Darrell		Jameson	843-423-1	Mr.
Horry	2601	Horry 01	PK-8 SPED	mmcloud@theac	Melissa	field no lo	McCloud	843-995-4	Ms.
Aiken	201	Aiken 01	10-12 SPE	whudson@acpsd	William	field no lo	Hudson	803-593-7	Mr.
Aiken	201	Aiken 01	PK-5 SPED	rkoelker@acpsd.r	Rebecca	field no lo	Koelker	803-641-2	Ms.
Aiken	201	Aiken 01	9-12 SPED	gcofer@acpsd.ne	Garen	field no lo	Cofer	803-641-2	Mr.
Aiken	201	Aiken 01	6-8 SPED	jbradley@acpsd.r	John	field no lo	Bradley	803-641-2	Mr.
Aiken	201	Aiken 01	9-12 SPED	kkennedy@lkcs.k	Keisha	field no lo	Lloyd-Kenr	803-644-4	Mrs.
Lexington	3202	Lexington	9-12 SPED	dbrooks@lex2.or	Dixon	field no lo	Brooks	803-822-5	Dr.

Appendix E

Coded Data Table

	TestAdmin	ScheduleType	Grade	RaceEthnicity	Gender	SpecialEd	Meals	SS
1	SP12	1	7	3	1	2	3	84
2	SP12	1	7	3	1	2	3	91
3	SP12	1	7	3	1	2	1	89
4	SP12	1	7	3	1	2	2	86
5	SP12	1	7	3	2	2	3	100
6	SP12	1	7	3	2	2	1	89
7	SP12	1	7	3	2	2	1	89
8	SP12	1	7	3	2	2	1	89
9	SP12	1	7	3	2	2	1	100
10	SP12	1	7	4	1	2	3	80
11	SP12	1	7	4	1	2	3	84
12	SP12	1	7	4	1	2	3	84
13	SP12	1	7	4	1	2	3	84
14	SP12	1	7	4	1	2	3	85