HIGH SCHOOL BLOCK SCHEDULING AND ITS AFFECTS ON STUDENT ACHIEVEMENT

by

ANGELA KATHLEEN REESE

(Under the Direction of Dr. William W. Swan)

ABSTRACT

There were two purposes for this study. First, the study compared student achievement on the Georgia High School Graduation Test (GHSGT) at a block-scheduled high school in Central Georgia (School One) with a traditional scheduled high school (School Two) in Central Georgia. Second, if there was a statistically significant difference in any one of the scores for the students, the study investigated whether there was a statistically significant difference among/between subgroups based on the disaggregations required by *No Child Left Behind* (2001) and the *A + Education Reform Act* (as amended, 2003).

Four hypotheses were developed for the total group to determine if there were any statistically significant differences in the GHSGT scores for mathematics, science, social science, and English for block-scheduled students compared to traditionally scheduled students. The results of the analyses of co-variance (ANCOVA) found that there were no statistically significant differences at the .05 level for any of the GHSGT subtest scores. For those subgroups that consisted of at least 40 students in each of the disaggregated variables, the analysis of data was conducted to determine the areas where a significant difference existed between the variables and the performance on the subtests of the GHSGT. This data presented outcomes that could be used by schools, whether block or traditional, in meeting requirements of accountability.

Males scored significantly higher than females on both the GHSGT science and social science subtests. In addition, a statistically significant difference was found between race and performance on the GHSGT mathematics and science scores. White students scored significantly higher than black students did on both the GHSGT mathematics and science subtests. Students who were not economically disadvantaged (not qualifying for free or reduced lunch) scored significantly higher on the GHSGT science subtest.

In conclusion, the type of scheduling, whether block or traditional, did not have an impact on high school students' achievement on the GHSGT. The outcomes of the research showed that while scheduling had no affect on GHSGT scores, gender, race, and economic status of students did affect their performance on subtests of the GHSGT.

INDEX WORDS: Block Scheduling, Georgia High School Graduation Test, Student Achievement, Traditional Scheduling

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DEDICATION

This study is dedicated to my family for their loving support throughout my pursuit of this degree, but especially to my “Daddy,” Billy Hodges, who died June 10, 2005, before he could witness the completion of this accomplishment. He was always there to encourage me and to provide unconditional love. His presence will be greatly missed as my family celebrates this achievement. I am sure that he is watching from heaven and has sent angels to accompany me as I move on to new endeavors. In my heart, he will always be with me.

I will forever cherish the role model provided by my mother, Kathleen Hodges. She has shown me how to keep going in tough times, through faith and perseverance. Her life speaks volumes.

I also dedicate this study to my husband and soulmate, Bob, for endless encouragement, patience, and understanding, for his wise council and belief in my ability to grow through this experience. To my children, Kenny and Billy, for their gifts of embracing independence in their teenage years, always doing their part, giving me space and time to grow and pursue dreams of my own. I am so blessed to share my life with such a remarkable family.

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In conclusion, God, family, University of Georgia professors, and friends are the reason I have accomplished this dream. Thank you.

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CHAPTER 1

INTRODUCTION

Restructuring the daily routine in an effort to improve organizational structure has been an ongoing challenge for educators. Cawelti (1994) defined restructuring as the significant changes made to increase productivity and effectiveness. Fundamental changes in learning and teaching expectations, as well as in the management and organization of schools, have been the underlying focus of restructuring (Canady, 1995).

A Nation at Risk, published in 1983 by the National Commission on Excellence in Education, provided recommendations for school reform. Included in those recommendations was an examination of the use of school time and its effectiveness. More recently, the National Commission on Time and Learning-- in its *Prisoners of Time* (1994) publication-- stated that the future of education depended on the effective use of school time. Rearranging time within the present calendar became an impetus for the use of block scheduling (Gruber & Onwuegbuzie, 2001).

Block scheduling modified the school day for larger blocks of time per class/subject period, typically 80 to 100 minutes. Block scheduling models were proposed to solve the problems created through the traditional model. These problems included overloaded schedules, seven preparations each day, a large number of students to serve within a day, and less planning time. In traditional scheduling, seven classes met daily for time varying from 45 to 55 minutes throughout the 180-day school year (Bolinger, 2000).

School systems, striving to meet unique needs, have adopted variations of block scheduling. The most popular of the block schedules included the 4 x 4 block and the alternating schedule. The 4 x 4 schedule had four classes meeting every day for 90 minutes for 90 days with four new classes meeting at the end of the 90-day period. Under alternating block scheduling, classes met every other day for 85-100 minutes throughout the 180-day school year (Bolinger, 2000). Also used by schools was the trimester accelerated block that divided the school year into three segments as opposed to two. Three 60-day trimesters were divided into 3 class periods of 110-130 minutes each. The quarter-on quarter-off accelerated block program divided the school year into four 45-day quarters that provided varied times for students to complete courses. For example, some students who needed two quarters to complete Algebra I would be allowed to do so. The student who finished Algebra I in one quarter would take a more advanced mathematics course the next quarter (Zepeda & Mayers, 2000).

A number of studies have been conducted on block scheduling over the past decade, some showing evidence of improved school achievement (Canady, 1995) and others showing no significant improvement (Veal & Schreiber, 1999) or a significant decline in achievement (Gore, 1997; Wronkovich, Hess, & Robinson, 1997). The Georgia Department of Education (2005) found no significant differences between the average percent of students passing on the block versus non-block schedule for any subtest of the Georgia High School Graduation Test (GHSGT) for either 2002-2003 or 2003-2004. A majority of teachers and students surveyed preferred block scheduling over traditional scheduling, providing an abundance of qualitative data. What was lacking in the research were evaluations based on hard data--data that measured student achievement rather than opinions of supporters or critics (Trenta & Newman, 2002).

Statement of the Problem

The problem of this study was to determine if 4 x 4 block scheduling in high school statistically significantly improved student achievement as compared to traditional scheduling. In reviewing the literature, contradictory findings in the study of block scheduling suggested that what worked best for one high school did not necessarily work best for another. Test scores were increased through the use of block scheduling for one school, but another found improvement using traditional scheduling. Insufficient data are available to determine the effectiveness of 4 x 4 block scheduling. Therefore, more rigorous studies and long-term assessments were needed to determine the impact of 4 x 4 block scheduling on increasing student achievement at the high school level (Hottenstein, 1998; Matthews, 1997).

Purpose of the Study

The purpose of this study was to compare the mean scores on the Georgia High School Graduation Test (GHSGT) (mathematics, science, social science, and English) for 11th grade students attempting the test for the first time for students who had participated for three consecutive years in a school using the 4 x 4 block scheduling model with those for 11th grade students who participated in three consecutive years in a school using traditional scheduling. This study required that the students remained at the same school for 9th, 10th, and 11th grades in either the 4 x 4 block scheduled model or traditional scheduled model. Eighth grade CRCT scores were used for all students as a covariate.

Hypotheses

Null Hypothesis 1- There will be no statistically significant difference between the mean scores, as adjusted for 8th grade CRCT scores, on the Mathematics test of the GHSGT for the experimental group and the control group.

Null Hypothesis 2- There will be no statistically significant difference between the mean scores, as adjusted for 8th grade CRCT scores, on the Science test of the GHSGT for the experimental group and the control group.

Null Hypothesis 3- There will be no statistically significant difference between the mean scores, as adjusted for 8th grade CRCT scores, on the Social Science test of the GHSGT for the experimental group and the control group.

Null Hypothesis 4- There will be no statistically significant difference between the mean scores, as adjusted for 8th grade CRCT scores, on the English test of the GHSGT for the experimental group and the control group.

If there is a statistically significant difference for any one of the tests (i.e., reject the null hypothesis for any test), then the following null hypotheses will be tested based on the disaggregations required by *No Child Left Behind* (2001) and the *A + Education Reform Act* (as amended in 2003):

Null Hypothesis a- There will be no statistically significant difference between the mean scores on the relevant test of the GHSGT between the sexes for the experimental group and the control group.

Null Hypothesis b- There will be no statistically significant difference between the mean scores on the relevant test of the GHSGT between/among the races/ethnicities for the experimental group and the control group.

Null Hypothesis c- There will be no statistically significant difference between the mean scores on the relevant test of the GHSGT between those students who are ESOL and those who are not for the experimental group and the control group.

Null Hypothesis d- There will be no statistically significant difference between the mean scores on the relevant test of the GHSGT between those students who are poverty eligible and those who are not for the experimental group and the control group.

Null Hypothesis e- There will be no statistically significant difference between the mean scores on the relevant test of the GHSGT between those students who are disabled and those who are not for the experimental group and the control group.

Justification of the Study

Block scheduling was embraced by high schools due to several factors (Justiz, 1984). The business community for many years demanded a fundamental change in education. This within itself was a major motivator for educators to evaluate current practices (Justiz, 1984; National Commission on Excellence in Education, 1983). Educators of students with special needs, including at-risk as well as gifted, found that block scheduling afforded a way to meet diverse special needs (Retting & Canady, 2001). Many schools moved to block scheduling to improve test scores, reduce discipline problems, and increase learning through longer class periods (Canady, 1995; Cawelti, 1994). Moreover, high schools used block scheduling to meet demands of accountability, improve education for all students, and simplify the structure of the school, thereby providing more flexibility and better organization (Oregon Department of Education, 1996).

The *No Child Left Behind Act* (2001) required school systems to demonstrate proficiency and adequate yearly progress for *all* students, including all races/ethnicities, socio-economic backgrounds, ESOL students, and students with disabilities. Schools not consistently meeting the criteria of *No Child Left Behind* were posted on a failing schools list. The pressure to meet these requirements made it necessary for educators to evaluate carefully all aspects of how they use the school day, including ways in which students were scheduled and instruction was delivered.

Research based on quantitative data assessing the impact of block scheduling on student achievement would provide school systems with a means to evaluate their present scheduling models. Data showing the effect of block scheduling on all disaggregations required by the *No Child Left Behind Act* (2001) and the *A+ Education Reform Act* (as amended in 2003) would be beneficial to the United States Department of Education, individual state departments of education, local systems, and communities. The data would also provide a benchmark for future growth.

Constraints/Limitations of the Study

1. The population included high school students in two high schools in two urban school districts in central Georgia. Therefore, generalizations of the research findings are limited to these two high schools or similar high schools.

2. Students in the study have completed the Georgia High School Graduation Test at different high schools in Georgia. Individual schools and teachers' instructional strategies and teaching skills remain individualized.

Definition of Terms

The following are definitions of terms used in this study:

Traditional Scheduling- Traditional scheduling in high schools arranged the school day into as many as seven classes meeting daily for time varying from 45-55 minutes throughout the 180-day school year. Teachers in traditional scheduling prepared for as many as 150 students each day of the week (O'Neil, 1995).

<u>Block Scheduling</u>- Block scheduling organized the day in which students and teachers met daily for longer periods, reducing yearlong classes to a semester. Daily student count for teachers was reduced to 90 or less, compared to the previous number of 150 for traditional scheduling (O'Neil, 1995). Four-by-four block scheduling was the focus of this study. This schedule had four classes meeting every day for 90 minutes for 90 days (one semester) with four new classes meeting at the end of the 90-day period (Bolinger, 2000).

Overview

Chapter I includes the discussion and the importance of this study, the statement of the problem, null hypotheses, justification of the study, constraints/limitations, and the definition of terms. Chapter II includes a review of the literature and research that is related to the study with sections on the history of school schedules, an overview of block schedules, advantages found in using block scheduling, disadvantages found in using block scheduling, and stakeholder reactions to block scheduling. Chapter III contains the research design and population and sample descriptions. It also includes a description of the procedures used for collection and treatment of the data. Chapter IV encompasses the analysis of the student achievement data. Chapter V contains the summary of the study and conclusions based on the analysis of the data. Recommendations for future study are also discussed.

CHAPTER 2

REVIEW OF THE LITERATURE

The review of the literature is divided into five sections. The first section focuses on the history of school schedules followed by sections addressing the overview of block schedules, advantages of block scheduling, disadvantages of block scheduling, and stakeholder reactions to block scheduling. A summary of the review follows.

History of School Schedules

Educators, continually seeking to improve organizational structure, have found new ways to reform and restructure the daily routine. Cawelti (1994) defined restructuring as the significant changes made to increase productivity and effectiveness. Cawalti (1994) found that restructuring in education had two fundamental goals---improving students' academic performance and making better use of instructional time.

The 1983 publication by the National Commission on Excellence in Education, *A Nation at Risk*, provided recommendations for school reform. Included in those recommendations was an examination of the use of school time and its present effectiveness. More recently, the National Commission on Time and Learning in its *Prisoners of Time* (1994) publication declared that the future of public education depended on the effective use of school time. Some looked at adding time to the academic year and the academic day. Others looked at redeploying the time already in the calendar. Rearranging time within the present calendar became the impetus for the use of block scheduling (Gruber & Onwuegbuzie, 2001).

During the 1960s, another form of scheduling called flexible modular scheduling was tried. This schedule was created in an effort to individualize instruction. Different classes were scheduled that supported different formats and lengths. Activities in the classes included lecture, small-group study, and individual help and labs. Plans for this type of scheduling were soon abandoned, as implementing modular scheduling became too difficult to administer (O'Neil, 1995).

Block scheduling was defined as a restructuring of the school day into classes longer than the traditional 50-minute period (Adams & Salvaterra, 1997). Lare, et al. (2002) stated that block scheduling might be the most significant reform strategy in secondary education in the last half of the 20th Century. Rettig and Canady (2001) found that 50% of high schools in the United States used some type of block scheduling.

Block scheduling was embraced by high schools due to several factors (Justiz, 1984). The business community for many years demanded a fundamental change in education. This within itself was a major motivator for educators to evaluate current practices (Justiz, 1984; National Commission on Excellence in Education, 1983). Educators of students with special needs, including at-risk as well as gifted, found that block scheduling afforded a way to meet diverse special needs (Retting & Canady, 2001). Many schools moved to block scheduling to improve test scores, reduce discipline problems, and increase learning through longer class periods (Canady, 1995; Cawelti, 1994). Moreover, high schools used block scheduling to meet demands of accountability, improve education for all students, and simplify the structure of the school, thereby providing more flexibility and better organization (The Oregon Department of Education, 1996).

Canady (2003), in a presentation at the *2003 High Schools That Work Conference* in Nashville, Tennessee, stated:

If increasing student success is the primary goal, we must think of time as a resource---not a standardized period of time for all courses and all students. Schedules should be based on student needs, which will vary with different groups of students. Too often, we determine a schedule format and hope/expect all students to fit. (p. 6)

Block scheduling has not been without criticism. Veal and Schreiber (1999) found that block scheduling had no effect on achievement in reference to student performance on the Indiana Statewide Testing for Educational Progress (ISTEP+) in reading and language arts. However, they found ANCOVA results for mathematics computation showed that traditionally scheduled students scored significantly higher than block scheduled students on the ISTEP+. Veal and Schreiber (1999) found that:

> traditional schedule students scored significantly higher on mathematics-computation than block and hybrid students. The traditional and block students had a mean difference of 4.175 and the traditional and hybrid students had a mean difference of 4.181. (p.6)

Others also found that block scheduling had a negative effect on student achievement (Gore, 1997; Wronkovich, Hess, & Robinson, 1997). For example, Wronkovich, et al. (1997) found that students on block schedule scored lower on the math portion of the PSAT than students in traditional, yearlong mathematics classes, although not statistically significantly so. Through teacher and student interviews, evidence was found that block scheduling for all courses and all students may have unwarranted results. The Wronkovich, et al. (1997) study concluded that there had “not yet been sufficient controlled longitudinal studies to lead to enthusiastic support for block scheduling” (p. 40).

Gore (1997) compared traditional, full-year scheduled students to block scheduled students and found that the traditional students outperformed block students for every subject. For example, the Provincial examination results of mathematics mean scores of full-year students was 69.41% compared to 64.63% for mathematics mean scores of semester block students.

Most of the literature emphasized the need for more research. Jenkins, Queen, and Algozzine (2001) stated that research comparing beliefs, practices, and actions of high school teachers on traditional and block schedules were meager. They also suggested that the absence of differences in teachers' views of traditional vs. block scheduling showed that the research on block scheduling was not sufficient. Rettig and Canady (2001) found that while block scheduling did not have a negative effect, they could not say that it had a positive effect on student achievement.

Contradictory findings in the study of block scheduling suggested that what worked best for one high school, did not necessarily work best for another. Test scores and grade point averages were increased using block scheduling for one school, but another found improvement using traditional scheduling. Therefore, more rigorous studies and long-term assessments were needed (Hottenstein, 1998; Matthews, 1997).

Overview of Block Schedules

Reform and restructuring at the high school level have focused on the use of time. Traditional schedules had students and teachers loaded with as many as seven different classes in a day. Teachers were teaching as many as 150 students each day of the week. Block scheduling was embraced in varying degrees of success in high schools throughout the United States as the answer to the time issue, relieving overburdened teachers and students. With block scheduling, students and teachers met daily for longer periods, reducing yearlong classes to a semester. Daily student count for teachers was reduced to 90 or less, compared to the previous number of 150 (O'Neil, 1995).

Five scheduling models in addition to traditional scheduling have been used in U.S. schools according to Canady and Rettig (1995). The accelerated block schedules, those that allowed students to take more courses within a certain period of time, included the 4 x 4 schedule, the alternating (A/B) schedule, the trimester accelerated block schedule, and the quarter-on quarter-off accelerated block schedule. Some schools also implemented the Copernican Plan that accommodated a variety of instructional strategies within differing blocks of time (Zepeda & Mayers, 2000).

Block scheduling models were proposed to solve the problems created through the traditional model. These problems included overloaded schedules, seven preparations each day, a large number of students to serve within a day, and less planning time. In traditional scheduling, seven classes met daily for time varying from 45-55 minutes throughout the 180-day school year. The most popular of the block schedules included the 4 x 4 block and the alternating schedule. The 4 x 4 schedule had four classes meeting every day for 90 minutes for 90 days with four new classes meeting at the end of the 90-day period. Under alternating block scheduling, classes met every other day for 85-100 minutes throughout the 180-day school year. For example, on day one, classes 1, 3, 5, 7 met and on day two, classes 2, 4, 5, and 6 met. Class 5 was constant throughout the year and met for the traditional 50 minutes (Bolinger, 2000).

The trimester accelerated block divided the school year into three segments as opposed to two. Three 60-day trimesters were divided into 3 class periods of 110-130 minutes each. The quarter-on quarter-off accelerated block program divided the school year into four 45-day quarters that provided varied times for students to complete courses. For example, some students who needed two quarters to complete Algebra I would be allowed to do so. The student who finished Algebra I in one quarter would take a more advanced mathematics course the next quarter (Zepeda & Mayers, 2000).

Carroll (1990) developed the Copernican Plan in the 1960s. His plan consisted of two main configurations, accommodating a variety of instructional strategies within differing blocks of time. Students were enrolled in a four-hour, core subject (math or English) called a macroclass. Two or three shorter classes of 70-90 minute seminars consumed the remainder of the day. Every 30 days, students received a new schedule. The second configuration of the Copernican Plan provided each student with two classes lasting two hours each session. New schedules were provided every 60 days. Under both configurations of the Copernican Plan, athletics and extra-curricular activities took place after school (Carroll, 1990). Table 1 summarizes the most popular scheduling models used in the United States.

Advantages to the Use of Block Scheduling

Thomas (2001) found that while some schools returned to traditional scheduling after trying block scheduling, these were only a few isolated cases. Rettig and Canady (2001) surveyed stakeholders using block scheduling and observed that schools were persistent in staying with block scheduling because of the following advantages:

- Parents, teachers, students, and administrators were positive about their school’s block schedule.
- There was evidence that teacher and student attendance improved with block.
- There was evidence that discipline referrals were reduced and in-school suspensions declined.
- Student tardiness was reduced.
- Students’ grades, as reported by grade point averages, increased as well as the numbers on A-B Honor Roll.
- The 4 x 4 plan provided evidence that failure rates declined.
- The 4 x 4 plan allowed students to complete more courses than in the A/B or traditional schedules, thereby gaining more credits for graduation.
- While teachers faced more stress at the induction of block scheduling due to learning to plan and teach for longer periods, the stress eventually became less for both teachers and students.

Table 1
Most Popular Block Scheduling Models Used in the United States

SCHEDULING MODEL	LENGTH OF CREDIT YEAR	NUMBER OF CLASSES/DAY	LENGTH OF CLASS
Traditional	180 Days (Full Year)	7	55 Minutes
4 x 4 Block	90 Days (1/2 Year)	4	90 Minutes
Alternating A/B	180 Days (Full Year)	7 Classes Total 3 Alternating Classes; 1 Daily Class	85-100 Minutes
Trimester Accelerated	60 Days (1/3 Year)	3	110-130 Minutes
Quarter-On-Quarter Off	45 Days (1/4 Year)	4 Per Quarter	90 Minutes
Copernican Plan 1	30 Days	3-4	One 4-hour Class; Others 70-90 Minutes
Copernican Plan 2	60 Days	3-4	Two 2-hour Classes; Others 70-90 Minutes

- Graduation rates remained constant. Some data suggested that graduation rates were likely to increase more with the 4 x 4 plan than with the A/B plan. (p. 79)

Other studies also showed evidence of improved student achievement. A 1996 study of Chesapeake Public Schools by the Office of Program Evaluation showed that failure rates declined in 60% of the school's departments and that the percentage of A's and B's increased (Chesapeake Public Schools, 1996). The Metropolitan Educational Research Consortium in Richmond, Virginia commissioned a 1997 study that showed grade improvement in both alternating (A/B) and 4 x 4 scheduling (Pisapia & Westfall, 1997).

Cobb, Abate, and Baker (1999) studied junior high block scheduling and reported on the effects of block scheduling on student grade point average and standardized test scores. Five ANOVA's with repeated measures on the matching variable were used: semester GPA, cumulative GPA, and standardized test scores for mathematics, reading, and writing. All experimental/control group contrasts favored block scheduling (statistically significant at the $p < .10$ level) except mathematics. Students in traditional scheduling outperformed those in block scheduling for mathematics.

Other noted advantages were found in the reduction of student and teacher anxiety, improved relationships, and improved attitudes toward school for teachers and students. Because of less movement in the school with block scheduling, there was less chaos and confusion, resulting in a less stressful day. Less time was wasted in changing classes. In addition, with fewer classes and more in-depth study, teachers and students saw learning as less fragmentary (Lare, et al., 2002). Teacher attitudes improved due to fewer preparations and more time to undertake duties (Gruber & Onwuegbuzie, 2001). Block scheduling allowed for additional planning time, not previously afforded with traditional schedule.

Hottenstein (1999) summarized an effective move to block scheduling through six characteristics/behaviors:

1. The organization must believe change for the sake of school improvement is needed.
2. All stakeholders must be involved early in the process of change.
3. The school must study and select the most appropriate schedule.
4. Clear expectations for what will change in the block-scheduled classroom must be established.
5. The process of change must be handled effectively.
6. Clear expectations of measurement and accountability must be set. (p.4)

Bottoms (2003), in the opening general session of the 2003 *High Schools That Work Conference* in Nashville, Tennessee, shared statistics compiled by the Southern Regional Education Board on achievement gains of students on block scheduling from schools qualifying as *High Schools That Work* sites. The data from the National Assessment of Educational Progress (NAEP) showed schools using block scheduling which were also considered high implementation sites in the *High Schools That Work* practices, gained 6 achievement points in reading, 3 in mathematics, and 11 in science while traditionally-scheduled students not involved in *High Schools That Work* gained 5 achievement score points in reading, 0 in mathematics, and 4 achievement point gains in science. The NAEP scale scores range from 0 to 500. Differences observed were not statistically significant (U.S. Department of Education, 2004). Bottoms (2003) stated that schools could not raise standards with block scheduling alone.

Teacher attitudes have been most positive at the beginning of block schedule implementation (Khazzaka, 1997; Wilson & Stokes, 1999; Wyatt, 1996). A study by Averett (1994) suggested that even teachers who were initially very concerned about the change from traditional to block, usually changed their minds after a relatively short period. Teachers discovered that with a 90-minute block of time, they were able to present information, set up cooperative groups, and still have time for a variety of oral and written interaction. Previously, in a 55-minute class, there was barely enough time for set-up and lecture with much less interaction between and among the students and teacher. Increased interaction allowed teachers and students to develop stronger relationships and longer-lasting bonds (O’Neil, 1995).

Edwards (1995) described how a high school in Virginia used block scheduling to the advantage of both college preparatory and tech-prep students. Because of the extra time allowed in block scheduling, many college prep students completed a year of postsecondary education in addition to their high school program. Tech-prep students earned eligibility for full-time work experiences and job training during their final senior year.

O’Neil (1995) discussed how a small lab-based high school in Illinois, Benjamin Franklin High School, used the time provided through block scheduling to produce a higher quality product. This school’s philosophy was based on Glasser’s beliefs. Student work was evaluated on quality outcomes. Grades below a B were not accepted at Benjamin Franklin High. The school did not track students. Because of the longer class schedule, teachers had time to group students based on mastery, accommodating the needs of students who learned different subjects at different rates. Their block schedule also allowed for a 45-minute period twice a week for reinforcement or acceleration. Benjamin Franklin High faculty found that block scheduling supported their philosophy of learning and helped them address individual student needs.

Teachers’ perceptions, however, fluctuated as things got better after an initial dip. Fleming, Olenn, Schoenstein, and Eineder (1997) referred to this tendency as an implementation dip. Stokes and Wilson (2000) found that teachers ranked the following three factors as most critical in maintaining their positive perceptions of an effective block schedule: daily planning, multiple-activity lessons in one period, and the use of hands-on activities. Teacher perceptions of the improvement of learning through block scheduling were maintained even after extended use

(Khazzaka, 1997; Kramer, 1997; Queen, Algozzine, & Eaddy, 1998; Wilson & Stokes, 1999; Wyatt, 1996).

Teacher philosophy of how students learn was re-visited in the move to block scheduling. Teachers had to review curriculum covered during the block and re-evaluate what parts of the curriculum were most important. While a move to block scheduling provided longer class periods, in some cases, the total minutes of face-to-face class time was reduced. Many teachers discovered that the most important factor regarding the change in teaching time was how much the student had learned and the quality of the learning experience (Canady, 1995). The review of the curriculum led to intensive staff development in schools implementing block scheduling. Zepeda and Mayers (2000) stated: "If teachers are to be successful within a block schedule, they first need to be successful learners themselves" (p. 61).

Important areas of professional development for teachers implementing block scheduling included curriculum analysis, curriculum mapping, development of pacing guides, instructional pacing within blocks, and instructional audits. Zepeda and Mayers (2000) provided guidelines that were used by effective principals in providing opportunities for teachers in a block-scheduled format:

- Audit teaching strategies they currently use;
- Modify existing strategies and learn new ones;
- Experiment with varying instruction to complement new time parameters;
- Develop methods for transitioning a class from one learning activity to another; and,
- Design student assessment aligned with instruction in the block. (p. 87)

A comprehensive professional development program for implementing a block schedule should encompass a two-year plan. The plan includes study groups designed to evaluate issues relevant to teaching in the block, roundtable discussions, and workshops on specific teaching strategies proven effective in the block (Zepeda & Mayers, 2000).

Other issues related to a successful professional development effort in schools moving to block scheduling related to job-embedded learning. Job-embedded learning was defined by Wood and Killian (1998) as “learning that occurs as teachers and administrators engage in their daily work activities” (p. 52). According to Zepeda and Mayers (2000), “job-embedded learning means that staff development and supervision are continuous threads that can be found through-out the culture of a school” (p. 177).

Zepeda and Mayers (2000) provided four essential conditions to be met to ensure successful implementation of job-embedded professional development and supervision:

- Learning needs to be consistent with the principles of adult learning---learning goals are realistic; learning is relevant to the teacher, and concrete opportunities for practice of skills being learned are afforded;
- Trust in the process, in colleagues, and in the learner him/herself must be present---for learning to occur on the job, teachers must be able to trust the process (e.g., peer coaching, videotape analysis), their colleagues, and themselves. Teachers need to know that feedback will be constructive, not personal;
- Time within the regular school day needs to be made available for learning---traditionally, staff development takes place after hours, usually at some remote site. Job-embedded learning requires time to be available within the context of the normal working day at the teacher’s school site; and
- Sufficient resources must be available to support learning---providing release time for teachers’ professional development requires the creative use of human resources. In addition, outside facilitators are sometimes needed to assist teachers in learning new skills. Funding must be made available to meet these costs. (Zepeda, 1999a, as cited in Zepeda & Mayers, 2000, p. 178)

School administrators used teacher perceptions regarding the effectiveness of the move to block, as they worked toward continued school improvement. Zepeda and Mayers (2000) discussed the importance of teacher buy-in when moving toward block scheduling: “The teachers are the ones in the trenches. If the teachers do not embrace the block, the new schedule will merely be a surface change with little lasting impact.” (p.3)

The school leader was seen as vital in leading stakeholders toward improvement. Harris (2002) stated, “Leadership is about intervention and change; it is not about position or authority” (p.65). Professional development and assistance in managing the workload for teachers was essential. Leaders set the groundwork for establishing a capacity for change and determined whether the change would be short-term or long term.

Building the capacity for change required both pressure and support. The skilled leader discerned the difference between pressure that motivated teachers and pressure that caused stress for teachers. In addition, he/she understood the fine line between support that inspired and too much support that led to complacency (Harris, 2002).

Zepeda and Mayers (2000) also addressed the significant role of the leader to bring about any successful changes in the school:

> Structural changes are not achieved through superficial window dressing. The capability of the school to grow rests in the ability of the principal to build organizational capacity and to align the efforts of the organization with its people. (p. 2)

The principal was perceived as only one leader in the change process surrounding block scheduling. Other leaders included assistant principals, department chairs, instructional deans, lead teachers, and grade-level coordinators. These people comprised the administrative team and were paramount in providing supervision and feedback as block scheduling was implemented (Zepeda & Mayers, 2000). Zepeda and Mayers (2000) considered the teachers in this team:

> No longer can principals afford to assume that they are solely responsible for delivering supervision and staff development. Teachers are the cornerstones of learning in their classrooms. The role of the teacher as learner needs to emerge so that they have an empowered sense of fulfilling their learning needs. The principal's relinquishing of final authority over supervision and staff development will inspire confidence and autonomy in teachers. (p. 225)

Block scheduling was seen as beneficial in preparation for college where students met a few times a week for a longer period. Students in the traditional schedule had a more difficult time in transition to college scheduling (Lewin, 2002). The longer time-block allowed for less material to be covered, but in a more meaningful way. In-depth coverage of less material was supported by the national standards for both science (National Research Council, 1996) and mathematics (National Council of Teachers of Mathematics, 1989). Inquiry-oriented experiences, hands-on learning, and performance-based assessment were strategies endorsed by science and mathematics councils. The time afforded through block-scheduling models provided the longer timeframe needed for labs and projects and provided more opportunity for teacher/student interaction.

Studies showed that block scheduling provided for more advanced placement (AP) courses to be offered, allowing more students to complete these courses and successfully pass the test required for college credit. Studies also revealed increases in the Scholastic Aptitude Test (SAT) and High School Proficiency Test (HSPT) scores. Teachers credited the scheduling improvements to having more time to develop and review concepts (Evans, Tokarczyk, Rice, & McCray, 2002).

Traditional scheduling of standardized tests during the spring of the year favored students in yearlong, traditional classes, not block scheduled classes (Rettig & Canady, 2001). Students in a 4 x 4 semester block, who completed a class in the fall, took the spring exam nearly a full semester after completing the course. Those students in block missed two days of instruction while testing for every one day missed by yearlong traditional students. The testing schedule became especially significant for students hoping to obtain college credit or scholarships through courses such as advanced placement (AP), mathematics, music, and foreign languages, and occasionally physical education and English. Because of this, many schools adopted a hybrid block schedule where they met yearlong, every other day in these courses.

Disadvantages to Block Scheduling

Teachers on a block schedule found disadvantages regarding planning, although they had more time to plan than teachers did on traditional schedules. Block scheduling required teachers to over-plan in case students completed an assignment early. In addition, students who missed a block class had twice the assignments to make up compared to the traditional-scheduled student. In addition, more detailed, explicit instructions were required of teachers to ensure that a substitute had adequate work for students (Evans, et al., 2002).

The major controversy surrounding the move from traditional scheduling to block scheduling was centered on whether or not block scheduling increased student achievement on standardized tests in the long-term. Concrete, research-based findings, were not prevalent in the literature. Most of the articles dealing with block scheduling relied on theoretical suggestions and suppositions. Adding to the complexity of the different research approaches were the inconsistent findings of the few rigorous, practical studies on the effect of block scheduling. For example, Walker's (2000) study of 345 schools found that block scheduling improved the mathematics assessment, whereas Bateson (1990) found that block scheduling led to a drop in mathematics and science achievement. Findings revealed mixed results in key areas of student achievement, including test scores, attendance, and dropout rates (Evans et al., 2002).

Only one large-scale study comparing achievement on national standardized tests with a variety of scheduling models was found (Pliska, Harmston, & Hackmann, 2001). American College Test (ACT) scores for 38,089 students in 568 Iowa and Illinois schools were compared. The three scheduling models among these schools were the traditional seven period day, an eight-block alternating day (A/B schedule), and the 4 x 4 block semester schedule. This study showed negligible differences in ACT scores.

Two other studies in Georgia found similar results (Georgia Department of Education, 1998). The results showed that there was no significant difference in student achievement between traditional and block schedules. In addition, the Georgia Department of Education (2005) reported:

> From 1998 to 2002, non-block schedule schools had higher passing rates for each section of the Georgia High School Graduation Test (GHSGT), higher average SAT scores, and higher Advanced Placement (AP) test-taking and passing rates (passing equals scores of 3 or higher) than did block schedule schools. In the 2003-2004 school year, however, block schedule schools demonstrated higher passing rates on the English/Language Arts, Mathematics, and Social Studies portions of the GHSGT. Even so, non-block schedule schools still demonstrated higher passing rates on the Science portion of the GHSGT, as well as both areas of the SAT, and higher AP test-taking and passing rates than block schedule schools for 2003-2004. (p. 2)

SAT scores in many district reports remained the same in the long run (Lare, et al., 2002). Sturgis (1995) reported achievement in schools using block scheduling remained primarily unchanged. Arnold (2002) reported Test of Academic Proficiency (TAP) mean scale scores from 1991-1996 of A/B schedules vs. traditional schedules showed no meaningful statistical or practical difference in the schools. Neither school size nor location affected the outcome.

Canady (2003) found that there were seven factors that must be implemented in scheduling to improve student achievement:

1. Balance the workload of students. Pay special attention to homework requirements and independent work expected.
2. Balance the workload of teachers.
3. Provide extended learning time. Institutionalize this practice. Don’t just assume individual teachers will do it.
4. Provide time in the master schedule for tutorials. The teachers responsible for the initial instruction must provide this for some students in order for the appropriate bonding to take place.
5. Create a small-group, cared-about, learning environment. This practice is essential for the most alienated students in our schools.
6. Alter policies and grading practices that focus on sorting and selecting vs. teaching and learning.
7. Increase the amount of time students are actively engaged in their learning. (p. 6)

A four-year longitudinal study was conducted in Ohio where only quantitative data—e.g., grade point averages and attendance were reviewed-- not attitudes or perceptions (Trenta & Newman, 2002). Trenta and Newman (2002) examined only data that measured student achievement. They wanted to determine if there was a statistically and practically significant relationship between block scheduling and student grades, proficiency test scores, standardized test scores, and attendance. Data from the transcripts of 125 randomly selected students were assessed. They concluded that there was a positive and statistically significant relationship ($p < .01$) and a positive trend in the four academic areas measured. They did note, however, that the correlations only showed relationships, not the causes of the relationship. Therefore, it could not be determined that block scheduling was the cause of the greater degree of relationship.

Trenta and Newman (2002) found no statistically significant relationship between block scheduling and standardized test scores as measured by ACT scores. Their particular study was conducted during a time of a decline in ACT scores for the school district being studied. To determine if the decline in scores was attributed to block scheduling, they co-varied ability by holding IQ as a constant. The decline in ACT scores was not deemed statistically significant based on the co-variance analysis.

Attendance patterns were shown to vary by grade level in the Trenta and Newman (2002) study. They found that there were so many changes in attendance patterns, up and down, that the trends relating block scheduling to attendance were not clear. Once again, the research did not identify block scheduling as the factor in increasing student achievement.

Other studies comparing achievement on end-of-course examinations in algebra I, biology, U.S. history, and English for students in a traditional schedule vs. those in a 4 x 4 block semester plan found that end-of-course test results were equivalent (North Carolina Department of Public Instruction, 1997). The advantage of being able to complete more courses with the 4 x 4 block schedule was the only plus found in this study for choosing the block over the traditional scheduling.

Deuel (1999) investigated the effects of block scheduling in a large urban school district, Broward County Public Schools in North Carolina. Ten high schools using block schedules were compared to 13 high schools using a traditional schedule. Effects on academic achievement, student behavior, and staff perceptions were reviewed. Results indicated students on block scheduling earned more A's in general courses and higher grades in advanced mathematics courses. On all areas evaluated, traditionally scheduled students never outperformed block-scheduled students. The study also confirmed that staff perceived block scheduling as successful. The major impediment to change found in this study was resistance by some teachers to try something new. Hackman (1995) confirmed this when he found that teachers had to have time to assess how they could adjust to the new schedule and to prepare for the change.

Both students and teachers cited an increase in material covered in a shorter amount of time as a disadvantage, especially if class size was large. Teachers sometimes reverted to a lecture approach in order to cover more material, providing less time for reflection. Teachers also used less outside resources and depended more on their text to accommodate the fast pace and change in instruction. Even experienced teachers had to rely on more planning, returning to techniques used early in their careers. Anxiety also increased due to the fast pace. An investigation by Hurley (1997) showed that teachers were concerned that there were fewer total instructional hours for each class on a block schedule. This made it difficult to cover all the material students needed in order to pass the state-administered end-of-course exams. So much of the success of block scheduling depended on the teacher's ability to adjust instruction to find instructional strategies that engaged students and promoted higher levels of learning (Canady & Rettig, 1995). This led to strong implications for the need for professional learning for teachers implementing block scheduling.

Training needs in methods of sharing information, learning theory applications, assessment strategies, mastery of content, curriculum mapping and integration, and classroom organization were identified for schools implementing block scheduling. When fundamental changes in instruction were not considered, the block became a longer period with the same instruction. Teacher training in the best use of longer class times increased the likelihood of more effective instruction with block scheduling (Wyatt, 1996).

Canady (2003) showed that a schedule was only one resource within schools to manipulate the time variable. Changing the bell times alone was not found to increase student achievement. Whether or not going to the 4 x 4 or alternating (A/B) or a combination of blocks improved student achievement depended upon the selected use of time, the training of the teacher, the attitude and motivation of the student, and the curriculum used. Proficiencies shown in disaggregations addressed in The *No Child Left Behind Act* (2001) and the *A Plus Education Reform Act* (as amended in 2003) assisted schools in planning for student achievement. These Acts require school systems to demonstrate proficiency and adequate yearly progress for *all* students, including all races/ethnicities, socio-economic backgrounds, ESOL students, and students with disabilities.

<u>Stakeholder Reactions to Block Scheduling</u>

Different types of students reacted to block scheduling differently. Research showed that students with lower abilities did much worse in block scheduling than students with similar abilities in traditional scheduling. Top-ranking and more mature students' progress was measured as the same in traditional and block (Thomas, 1998; Von Mondfrans, 1972). The concern with the low achieving student was that compression of learning time did not consider their learning styles and needs. These students needed smaller amounts of information repeatedly given over time in different ways. Low-achieving students often needed longer than one semester to grasp concepts completely (Thomas, 2001). However, students who failed courses in the block schedule could often repeat the course without getting too far behind their classmates. Students on traditional schedules would have little incentive to stay in school when they were failing mid-year. They viewed their situation as hopeless (Canady, 1995).

Different reactions were noted between boys and girls to block scheduling. Slate and Jones (2000) found that boys reported changes in classroom behavior more often than girls did. Both boys and girls found it difficult to focus attention during block periods, with girls reporting this as a problem more often than boys did. Girls also showed a stronger preference for traditional scheduling than did boys. Cobb, et al. (1999) confirmed in their study that block scheduling had a more positive semester GPA effect on male students than female students. Attention spans of males and females, if not considered as the instructor planned the lessons, could be a major detriment to success in block scheduling. Johnson and Layng (1992) found that the average attention span of college students was 20 minutes.

Slate and Jone's (2000) study also revealed differences in reactions to block scheduling between African-American and White students. More behavioral and academic advantages to block scheduling were reported by African-Americans than by Whites. African-American students, however, showed the strongest preference of any group for returning to a traditional schedule. The reason for this was not discerned in the study.

Students in lower high school grades were more likely to believe that block scheduling would result in higher grades and higher standardized test scores for them as opposed to students in the upper grades. Juniors and seniors did not see academic benefits from block scheduling (Slate & Jones, 2000). Cobb, et al. (1999) supported these findings and noted that block scheduling had a more positive effect on tenth and eleventh graders than eighth and ninth graders.

> Thomas (2001) summarized block scheduling in the following way:
> Giving students more time in a single day to learn material but reducing the amount of time to one semester or less instead of a full year does not translate to escaping the prison of time. Instead, it merely changes the type of prison. Block schedules may give students more freedom within a day to discuss ideas and concepts but less time over the course of the year to develop and internalize concepts as part of a larger whole. (p. 75)

The cost of implementing block scheduling was another consideration important for school districts. Additional staff required to provide more courses in a semester block schedule, on-going training of teachers, on-going maintenance of block scheduling, and increased planning time for teachers, all increased the bottom line. Districts moving to block scheduling spent more money, primarily in personnel costs (Lare, et al., 2002).

Because of the increased costs to school systems implementing block scheduling, several high schools recently moved back to traditional scheduling. Hobbs (2002) reported that the Dallas Independent School District was considering this. Other systems cited in the above article who reverted from block to traditional scheduling due to costs were San Angelo School District, which reported saving $2.1 million; Grapeville-Colleyville School district eliminated 30 jobs, saving $1.2 million; and Irving School District that projected saving $3 million by going back to the traditional seven-class day.

Ector County Independent School District, Odessa, Texas, voted to end block scheduling in April 2003 (Leone, 2003). The school board quoted the savings for the system at $3.8 million annually. The board found the savings to be significant during a time when the Texas legislature cut funding to all entities of education. The Ector County School District clarified that the reason block scheduling cost more than traditional scheduling was that teachers in a block schedule ended up teaching fewer classes, even though they taught all but one period of each day. The result was that the district had to employ more teachers in block than in a traditional schedule. Other reasons for cutting costs by cutting block scheduling, according to Ector County, was that the district did not find benefits in reference to school performance. It was clarified, however, that block scheduling could not be blamed for test scores falling behind the state average since other districts with block had earned exemplary status from the Texas Education Agency. Students in Ector County protested the change back to traditional scheduling. They maintained that block scheduling allowed them to take more rigorous courses and to take more courses during the school year. One student addressed the board stating that, “It’s our understanding that this is because of budget cuts. We do not feel that this is a justifiable reason for the change.” (p. 2)

Hottenstein (1999) discussed school finance and school reform. He was of the opinion that finance was “second only to politics as a deterrent to school reform” (p. 5). According to Hottenstein, financial support and commitment should be foremost. Some schools failed in implementing block scheduling because the focus was on saving money, not on improving academic results.

Hottenstein (1999) addressed the need for school board leaders and administrators to research the scheduling alternatives available and determine the one that works in their school district:

> Selecting the right configuration for your school and tailoring the schedule to meet the academic needs of all students should be the goal. Block scheduling is only the means to get there. At the outset, school leaders must assess the strengths and weaknesses of its present schedule and set out to build a better one by involving all key stakeholders. Your motivation should not be cosmetic or trendy, but rather a commitment to improve your school system on an on-going basis. (p. 1)

Hottenstein (1999) also found that political interference negatively impacted educational decisions. In reference to this, he stated:

> Too many legislators and elected educational leaders are interested in getting re-elected and keeping people happy instead of doing what is right and logical for students and the educational program. For most politicians, change spells trouble and yields controversy, not opportunity. Staying the course and holding on to the status quo is much less traumatic than forging in a new direction…It is much easier to come up with reasons why something like block scheduling might not work rather than convince constituents that reform is needed. (p. 4)

As with any change in education, block scheduling required careful planning prior to implementation. Consideration had to be given to how the change will affect all stakeholders: administrators, teachers, students, parents and the community. Maintaining a focus on improving student achievement was paramount. The need for continued research into the overall benefits of block scheduling was evident.

Summary

School improvement was the focus of all studies that led to the implementation of block scheduling. Beginning with the evaluation by the National Commission on Excellence in Education in *A Nation at Risk* (1983) and later with the *Prisoners of Time* (1994) publication from the National Commission on Time and Learning, educators began the planning cycle to make better use of time in the classroom.

The previously used traditional schedule had students juggling as many as seven classes in one day with teachers preparing for as many as 150 students each day of the week. In an effort to make more efficient use of time during the school day, block scheduling was researched. Schools moved to block scheduling in hopes of meeting accountability standards, improving education for all students, and simplifying the structure of time in the school (Oregon Department of Education, 1996).

While some studies added more time to the academic year and day, rearranging the use of time already in the calendar was found to be most popular option. Among those options for accelerated blocks was the 4 x 4 block, the alternating (A/B) block, the trimester accelerated block, and the quarter-on, quarter-off block. Some also followed the Copernican Plan.

The school leader was seen as vital in leading stakeholders toward improvement. Harris (2003) stated, “Leadership is about intervention and change; it is not about position or authority” (p.65). Professional development and assistance in managing the workload for teachers was seen as essential. Leaders were the ones to lay the ground work for establishing a capacity for change and whether the change would be short-term or long term.

Building the capacity for change required both pressure and support. The skilled leader was able to discern the difference between pressure that motivated and pressure that stressed. He/she also understood the fine line between support that inspired and too much support that led to complacency (Harris, 2002). The leader had to remain focused and keep teachers focused on student achievement, setting higher standards and accelerating learning. Effective leadership from principals and teacher-leaders was vital in the improvement effort.

Professional development for teachers in the effective use of longer blocks of time was needed prior to implementation and should be accompanied by consistent follow-up and support.

Teachers needed time to share instructional strategies that worked for them with block, continually expanding their teaching repertoire. Focus groups were needed wherein interviews with students, parents, and administration could provide insight into how to make the change to block scheduling more conducive to learning and student success.

Major advantages to the implementation of block scheduling included improved attendance by teachers and students, reduced tardiness, a reduction in discipline referrals, improved grades, and the ability for students to complete more courses within a year’s time. Major disadvantages cited were in courses that needed to be yearlong such as Advanced Placement (AP), mathematics, and music. Standardized testing given only in the spring of the year put some students at a disadvantage. In addition, difficulties were faced due to the stresses connected with making a change to the routine and costs of implementation.

The question of how block scheduling affected student achievement cannot be resolved without more research. Most studies found no significant differences in student achievement when comparing students in traditional schedules vs. students in block schedules. If our initial vision was to prepare students for a successful future, it was seen as our responsibility to evaluate and provide the most effective use of time in getting there.

CHAPTER 3

PROCEDURES

This chapter describes the research procedures of the study. It includes the restatement of the purpose, research design, hypotheses, population and sample, instrumentation, data collection procedures, and statistical analysis.

Restatement of the Purpose

The purpose of this study was to compare the mean scores on the Georgia High School Graduation Test (GHSGT) (mathematics, science, social science, and English) for 11th grade students attempting the test for the first time for students who had participated for three consecutive years in a school using the 4 x 4 block scheduling model with those for 11th grade students who participated in three consecutive years in a school using traditional scheduling. This study required that the students remained at the same school for 9th, 10th, and 11th grades in either the 4 x 4 block scheduled model or traditional scheduled model. As 8th grade CRCT scores were used on all students, this study will require that the students were in the same school system for 8th grade.

Research Design

The research design for this study was a quasi-experimental control group design without random assignment using analysis of covariance (Campbell & Stanley, 1963). There were two groups, an experimental group and a control group. The experimental group of this study was those current 11th grade students in 2003-2004 who had participated in a 4 x 4 block scheduling instructional program for three consecutive years. The control group of this study was those current 11th grade students in 2003-2004 who had participated in a traditional instructional program for three consecutive years. Student data were pulled from two comparable school systems in terms of race and socioeconomic background.

Null Hypotheses

Ho1: There will be no statistically significant difference between the mean scores, as adjusted for 8th grade CRCT scores, on the Mathematics test of the GHSGT for the experimental group and the control group.

Ho2: There will be no statistically significant difference between the mean scores, as adjusted for 8th grade CRCT scores, on the Science test of the GHSGT for the experimental group and the control group.

Ho3: There will be no statistically significant difference between the mean scores, as adjusted for 8th grade CRCT scores, on the Social Science test of the GHSGT for the experimental group and the control group.

Ho4: There will be no statistically significant difference between the mean scores, as adjusted for 8th grade CRCT scores, on the English test of the GHSGT for the experimental group and the control group.

If there is a statistically significant difference for any one of the tests (i.e., reject the null hypothesis for any test), then the following null hypotheses will be tested based on the disaggregations required by *No Child Left Behind* (2001) and the *A + Education Reform Act* (as amended in 2003):

Hoa: There will be no statistically significant difference between the mean scores on the relevant test of the GHSGT between the sexes for the experimental group and the control group.

Hob: There will be no statistically significant difference between the mean scores on the relevant test of the GHSGT between the races/ethnicities for the experimental group and the control group.

Hoc: There will be no statistically significant difference between the mean scores on the relevant test of the GHSGT between those students who are ESOL and those who are not for the experimental group and the control group.

Hod: There will be no statistically significant difference between the mean scores on the relevant test of the GHSGT between those students who are poverty eligible and those who are not for the experimental group and the control group.

Hoe: There will be no statistically significant difference between the mean scores on the relevant test of the GHSGT between those students who are disabled and those who are not for the experimental group and the control group.

Population and Sample

The population of this study included 11th grade students in two comparable high schools in central Georgia, one using traditional scheduling the other high school using block scheduling. The sample of students was chosen from students who were enrolled for three consecutive years of instruction under either a traditional or a 4 x 4 block schedule beginning with the 2001/2003 school year, continuing through the 2003-2004 school year. This study required that the sample of the study remained at the same school for 9th, 10th, and 11th grades in either the 4 x 4 block scheduled model or traditional scheduled model. As 8th grade CRCT scores were used on all students, this study required that the students were in the same school system for 8th grade. Two groups of students were identified with each subgroup consisting of at least 40 students in each of the disaggregated variables:

Group 1 (Experimental)- Those current 11th grade students in 2003-2004 who have participated in a 4 x 4 block scheduling instructional program for three consecutive years. Groups were from comparable systems in Georgia.

Group 2 (Control)- Those current 11th grade students in 2003-2004 who have participated in a traditional instruction program for three consecutive years. Groups were from comparable systems in Georgia.

Instrumentation

The instrumentation used for this study was the Georgia High School Graduation Test total and subtest scores (Georgia Department of Education, 2004). The subtests of the test included the following: (a) mathematics, (b) science, (c) social science, and (d) English.

The Georgia High School Graduation test was developed to meet Georgia law O.C.G.A., section 20-2-281 (1991) which required that curriculum-based assessments be administered in the eleventh grade for purposes of graduation eligibility. As a requirement for earning a high school diploma, all students must pass all subtests, regardless of the diploma seal or type of diploma they are seeking (Georgia Department of Education, 2004).

Students take the GHSGT for the first time in their eleventh grade year. Five opportunities are provided for passing each of the tests before the end of the twelfth grade. Students who have met all other graduation requirements but do not pass all the required subtests of the GHSGT are eligible for a High School Certificate or Special Education Diploma. Upon leaving school with a High School Certificate or Special Education Diploma, students are allowed to re-take the GHSGT as often as needed in order to qualify for a high school diploma (Georgia Department of Education, 2004).

Test reliability refers to the accuracy of the test and is a necessary condition for conscientious and sound assessment. As a student has five opportunities to pass the GHSGT in all subject areas, the reliability coefficients would be viewed as the likelihood that a student who should pass will fail five times. The spring 1999 GHSGT average reliabilities for language arts was .96; for mathematics, .96, for science, .90, and for social studies, .95 (Georgia Department of Education, 2000).

Data Collection

Scores on the 2003/2004 GHSGT were collected on 11th grade students attempting the test for the first time who had completed three consecutive years of instruction under either a traditional or a 4 x 4 block schedule beginning with the 2001/2002 school year, going through the 2003/2004 school year. Eleventh grade students attended two comparable high schools in central Georgia in terms of race and socioeconomic status, one using traditional scheduling the other high school using block scheduling. Eighth grade CRCT scores for the 11th grade students in both the experimental and control groups were used to statistically control for initial differences between the two groups of students. Eleventh graders from one high school in a school system using traditional scheduling were compared to eleventh graders from one high school in a school system using 4 x 4 block scheduling.

The independent variable in this study was the scheduling of the school day, either traditional scheduling or 4 x 4 block scheduling. The dependent variables in this study were student achievement as measured by the first time attempted test data on the following areas of the GHSGT scores in 2003/2004 for students who had completed either three consecutive years in block scheduling or three consecutive years in traditional scheduling: (a) mathematics, (b) science, (c) social science, and (d) English.

There were four null hypotheses. The null hypotheses stated that there would be no statistically significant difference between the mean scores, as corrected for 8th grade CRCT scores, on the GHSGT in the following areas for the experimental group and the control group: (a) mathematics, (b) science, (c) social science, and (d) English.

If there was a statistically significant difference for any one of the tests (i.e., reject the null hypothesis for any test), then the following null hypotheses were tested based on the disaggregations required by *No Child Left Behind* (2001) and the *A + Education Reform Act* (as amended in 2003). Each subgroup consisted of at least 40 students in each of the disaggregated variables. The null hypotheses showed no statistically significant difference between the mean scores on that section of the GHSGT (mathematics, science, social science, or English) for the following subgroups: (a) race/ethnicity, (b) gender, (c) socio-economic levels, (c) ESOL students, and (d) students with disabilities.

Statistical Analysis

Analyses of the data were conducted. GHSGT scores of 11th grade students attempting the test for the first time who had three consecutive years of instruction through block scheduling were compared to GHSGT scores of 11th grade students attempting the test for the first time who had three consecutive years of instruction through traditional scheduling. The scores from the two groups were analyzed by ANCOVA to determine if there was a statistically significant difference in mean scores as adjusted for 8th grade CRCT scores. Data was disaggregated by race/ethnicity, gender, socio-economic backgrounds, ESOL students, and students with disabilities.

Quantitative data were analyzed using a one-way analysis of covariance with an alpha level of .05. The level of significance is the probability of making a Type I error when the null hypothesis is rejected. A Type I error occurs when one rejects the null hypothesis when it is true. A Type II error occurs when the researcher fails to reject the null hypothesis when it is false (Norusis, 1996). With a level of significance at the .05 level, there was a chance that in rejecting the null hypothesis, the decision may be incorrect five percent of the time.

CHAPTER 4

FINDINGS OF THE STUDY

This chapter presents the findings of the data collected in this study. It includes a restatement of the purpose, a description of the population of the study, and the outcomes of the data analysis in relation to the testing of the null hypotheses.

Restatement of the Purpose

The purpose of this study was to compare the mean scores on the Georgia High School Graduation Test (GHSGT) (mathematics, science, social science, and English) for 11th grade students attempting the test for the first time for students who had participated for three consecutive years in a school using the 4 x 4 block scheduling model with those for 11th grade students who participated in three consecutive years in a school using traditional scheduling. This study required that the students remained at the same school for 9th, 10th, and 11th grades in either the 4 x 4 block scheduled model or traditional scheduled model. As 8th grade CRCT scores were used on all students as a covariate, this study required that the students were in the same school system for 8th grade.

Scores from the Georgia High School Graduation Test (GHSGT) (a) mathematics, (b) science, (c) social science, and (d) English for 11th grade students from a block scheduled high school in Central Georgia and from a traditional scheduled high school in Central Georgia were collected. The two schools in the study were from separate school systems in Central Georgia. One-way analyses of covariance (ANCOVA) were conducted to ascertain if there were statistically significant differences between the scores of students who participated in block scheduling and the scores of students who participated in traditional scheduling.

Description of the Population of the Study

The students in this study attended comparable high schools in Central Georgia, although each high school was in a separate school system. Table 2 provides a comparison of the 2002 demographics of the student population from School One (block) and School Two (traditional). Both schools had similar enrollment based on race/ethnicity and gender, students participating in compensatory programs such as special education and ESOL, and students who were eligible for free/reduced price lunches (economically disadvantaged). School One, using block scheduling, had a total enrollment of 1698 (55.7% black, 41.7% white) with a special education population of 6.7%. School Two, using traditional scheduling, had a total enrollment of 1632 (43.3% black, 51.3% white) with a special education population of 9.6% (Georgia Department of Education, 2002).

Table 3 shows a comparison of 2002 test score data from the schools in the study. School One (block) had approximately the same percentage of students who passed the GHSGT on the first administration as School Two (traditional). Differences, however, were seen in 2002 test score performance of students taking the social studies and science portions of the GHSGT. The block scheduled students faired better on the social studies portion of the test in that 82% passed on the first administration of the 2002 GHSGT. Seventy-eight percent of those students from the traditional-scheduled environment passed the social studies portion of the 2002 GHSGT on the first administration. However, more of the traditional scheduled students passed the science portion of the 2002 GHSGT on the first administration (72%) compared to 69% of the students from the block-scheduled environment (Georgia Department of Education, 2002).

Table 2
2002 Demographic Comparisons of High Schools (Grades 9-12) in the Study

Demographic Information	School One (Block)	School Two (Traditional)
Enrollment	1698	1632
% Black	55.7	43.3
% White	41.7	51.3
% Hispanic	.9	2.3
% Asian	.8	2.2
% Amer. Indian	.5	.2
% Multi-Racial	.4	.6
% Male	49.6	47.4
% Female	50.4	52.6
% Students with Disabilities	6.7	9.6
% ESOL Services	.6	.3
% Econ. Disadvantaged	37.5	35.7
% Dropout Rate	5.8	6.8

Data obtained from the Georgia Department of Education, 2001-2002 Georgia Public Education Report Card.

Table 3
2002 Test Score Comparisons of High Schools (Grades 9-12) in the Study

Test Information	School One (Block)	School Two (Traditional)
% Passing GHSGT Mathematics 2002 (First Time Administered)	88	88
% Passing GHSGT Science 2002 (First Time Administered)	69	72
% Passing GHSGT Social Science 2002 (First Time Administered)	82	78
% Passing GHSGT English 2002 (First Time Administered)	97	95
SAT Total Scores 2002	926	958
ACT Composite Score 2002	17.2	18.9

Data obtained from the Georgia Department of Education, 2001-2002 Georgia Public Education Report Card.

Although not a focus of this study, a comparison of 2002 SAT and ACT test data from the two schools in Table 3 showed that School One (block) had an average SAT score of 926 (verbal 468, mathematics 458). School Two (traditional) performed higher on the 2002 SAT with an average SAT score of 958 (verbal 476, mathematics 482). Scores from the 2002 ACT revealed similar results in that School One (block) had an average composite score of 17.2 compared to School Two (traditional) with an average composite ACT score of 18.9 (Georgia Department of Education, 2002).

Students in the GHSGT data analysis were all first-time test takers enrolled in their respective high schools (traditional or block-scheduled) for three consecutive years. The total sample of students from both schools was 393. Of the 393 students involved in the study, 169 were male, 224 female, 5 were Asian-Pacific Islanders, 181 were Black, 4 were Hispanic, and 203 were White students. Of these students, none qualified for ESOL services, 101 were poverty eligible (eligible for free/reduced lunch), and 30 were disabled. Table 4 provided a breakdown by school of the sample of students in the study who took the GHSGT, Spring 2004.

Tests of the Null Hypotheses

The one-way analysis of covariance (ANCOVA) was used to determine if there was a significant difference at the .05 alpha level between the mean GHSGT scores of the (a) mathematics, (b) science, (c) social science, and (d) English for 11th grade students enrolled in a block-scheduled environment compared to the mean GHSGT scores of the (a) mathematics, (b) science, (c) social science, and (d) English for 11th grade students enrolled in a traditional-scheduled environment. If there was a statistically significant difference for any one of the tests (i.e., reject the null hypothesis for any test), then the following null hypotheses were tested based on the disaggregations required by *No Child Left Behind* (2001) and the *A + Education Reform*

Table 4
Population of the Study

	School One (Block)	School Two (Traditional)	Total Participants
Total Students	166	227	393
Male	66	103	169
Female	100	124	224
Asian	1	4	5
Black	86	95	181
Hispanic	0	4	4
White	79	124	203
Participants in ESOL Services	0	0	0
Students With Disabilities	5	25	30
Economically Disadvantaged	36	65	101

Act (as amended in 2003). Each subgroup consisted of at least 40 students in each of the disaggregated variables. The null hypotheses would anticipate no statistically significant difference between the mean scores on that section of the GHSGT (mathematics, science, social science, or English) for the following subgroups: (a) gender, (b) race/ethnicity, (c) ESOL students, (d) poverty-eligible students, and (d) students with disabilities.

Hypothesis 1

Hypothesis 1 compared the performance of students in a block-scheduled high school with students in a traditional scheduled high school using Spring 2004 GHSGT mathematics scores as the dependent variables. Eighth grade Spring 2001 CRCT mathematics scores were used as the covariate. GHSGT mathematics scores (adjusted by the pre-test) were analyzed using the Analysis of Covariance (ANCOVA) shown in Table 5. Based on this analysis, the null hypothesis was supported at the .05 level of significance for the GHSGT mathematics outcomes. As seen in Table 5, the adjusted mean for School One (block) was 532.291 for the mathematics posttest which showed no statistically significant difference in the adjusted posttest means for the two schools.

Hypothesis 2

Hypothesis 2 compared the performance of students in a block-scheduled high school with students in a traditional scheduled high school using Spring 2004 GHSGT science scores as the dependent variables. Eighth grade Spring 2001 CRCT mathematics scores were used as the covariate.

GHSGT science scores (adjusted by the pre-test) were analyzed using the Analysis of Covariance (ANCOVA) shown in Table 6. Based on this analysis, the null hypothesis was supported at the .05 level of significance for the GHSGT science outcomes. As seen in Table 6,

Table 5
Univariate Analysis of Variance for GHSGT Mathematics

Source	Type III SS	df	Mean Square	F	Sig.
Corrected Model	93411.836*	2	46705.918	113.825	.000
Intercept	313318.532	1	313318.532	763.577	.000
CRCTM	93193.940	1	93193.940	227.120	.000
School	384.747	1	384.747	.938	.333
Error	157566.629	384	410.330		
Total	110388586.0	387			
Corrected Total	250978.465	386			

*R Squared = .372 (Adjusted R Squared = .369)

Estimated Marginal Means- Dependent Variable- GHSGT Mathematics

School	Mean	Std. Error	N
School One-Block	532.291	1.597	161
School Two-Traditional	534.315	1.348	226

Table 6
Univariate Analysis of Variance for GHSGT Science

Source	Type III SS	df	Mean Square	F	Sig.
Corrected Model	62827.266*	2	31413.633	182.700	.000
Intercept	332491.578	1	332491.578	1933.748	.000
CRCTM	62680.711	1	62680.711	364.547	.000
School	65.973	1	65.973	.384	.536
Error	66025.530	384	171.941		
Total	100737579.0	387			
Corrected Total	128852.796	386			

* R Squared = .488 (Adjusted R Squared = .485)

Estimated Marginal Means- Dependent Variable- GHSGT Science

School	Mean	Std. Error	N
School One-Block	510.363	1.033	161
School Two-Traditional	509.525	.872	226

the adjusted mean for School One (block) was 510.363 for the science posttest, which showed no statistically significant difference in the adjusted posttest means for the two schools.

Hypothesis 3

Hypothesis 3 compared the performance of students in a block-scheduled high school with students in a traditional scheduled high school using Spring 2004 GHSGT social science scores as the dependent variables. Eighth grade Spring 2001 CRCT reading scores were used as the pre-test covariate.

GHSGT social science scores (adjusted by the pre-test) were analyzed using the Analysis of Covariance (ANCOVA) shown in Table 7. Based on this analysis, the null hypothesis was supported at the .05 level of significance for the GHSGT science outcomes. As seen in Table 7, the adjusted mean for School One (block) was 517.501 for the social science posttest which showed no statistically significant difference in the adjusted posttest means for the two schools.

Hypothesis 4

Hypothesis 4 compared the performance of students in a block-scheduled high school with students in a traditional scheduled high school using Spring 2004 GHSGT English/Language Arts scores as the dependent variables. Eighth grade Spring 2001 CRCT reading scores were used as the pre-test covariate.

GHSGT English/language arts scores (adjusted by the pre-test) were analyzed using the Analysis of Covariance (ANCOVA) shown in Table 8. Based on this analysis, the null hypothesis was supported at the .05 level of significance for the GHSGT English/language arts outcomes. As seen in Table 8, the adjusted mean for School One (block) was 541.118 for the English posttest, which showed no statistically significant difference in the adjusted posttest means for the two schools.

Table 7
Univariate Analysis of Variance for GHSGT Social Science

Source	Type III SS	df	Mean Square	F	Sig.
Corrected Model	57018.664*	2	28509.332	78.564	.000
Intercept	885969.902	1	885969.902	2441.498	.000
CRCTRDG	57016.657	1	57016.657	157.123	.000
School	1381.257	1	1381.257	3.806	.052
Error	141885.927	391	362.880		
Total	106619017.0	394			
Corrected Total	198904.591	393			

* R Squared = .287 (Adjusted R Squared = .283)

Estimated Marginal Means- Dependent Variable- GHSGT Social Science

School	Mean	Std. Error	N
School One-Block	517.501	1.485	167
School Two-Traditional	521.341	1.272	227

Table 8
Univariate Analysis of Variance for GHSGT English

Source	Type III SS	df	Mean Square	F	Sig.
Corrected Model	72005.195*	2	36002.598	38.574	.000
Intercept	938321.988	1	938321.988	1005.344	.000
CRCTRDG	65738.515	1	65738.515	70.434	.000
School	1339.326	1	1339.326	1.435	.232
Error	364000.459	390	933.335		
Total	114585966.0	393			
Corrected Total	436005.654	392			

* R Squared = .165 (Adjusted R Squared = .161)

Estimated Marginal Means- Dependent Variable- GHSGT English

School	Mean	Std. Error	N
School One-Block	541.118	2.382	167
School Two-Traditional	537.333	2.044	226

The analysis of data did not result in the rejection of the null hypotheses for any one of the tests (mathematics, science, social science, or English). It was determined that scheduling, whether block or traditional, did not affect the performance of students on any areas of the GHSGT. The analysis of the data following the null hypotheses based on the disaggregations required by *No Child Left Behind* (2001) and the *A + Education Reform Act* (as amended in 2003) to determine if block or traditional scheduling had an effect on any of the disaggregated variables, was therefore not necessary. However, for those subgroups (gender, race, ESOL, economically disadvantaged, and students with disabilities) that consisted of at least 40 students in each of the disaggregated variables, the analysis of data was conducted to determine the areas where a significant difference might exist. Schools, whether block or traditional, could use this information in meeting the requirements of accountability designated by *No Child Left Behind* (2001) and the *A + Education Reform Act* (as amended in 2003).

There were not enough participants in the study from the subgroups of ESOL students and students with disabilities. The subgroups that were analyzed were gender, race, and economically disadvantaged students.

Hypothesis a

Hypothesis *a* compared the performance of male and female students in a block scheduled high school with male and female students in a traditional scheduled high school using Spring 2004 subtests of the Georgia High School Graduation Test (mathematics, science, social science, and English.) GHSGT scores were used as the dependent variables. Eighth grade Spring 2001 CRCT scores were used as the covariates.

GHSGT mathematics scores (adjusted by the pre-test) were analyzed using the Analysis of Covariance (ANCOVA) shown in Table 9. Based on the analysis there was no interaction noted between the schools (block or traditional). When the data were analyzed based on gender, the null hypothesis was supported at the .05 level of significance for the GHSGT mathematics outcomes. As seen in Table 9, the adjusted mean for males was 534.368 and the adjusted means for females was 532.582, which showed no statistically significant difference in the adjusted posttest means for gender.

GHSGT science scores (adjusted by the pre-test) were analyzed using the Analysis of Covariance (ANCOVA) shown in Table 10. Based on the analysis there was no interaction noted between the schools (block or traditional). When the data were analyzed for gender, however, the null hypothesis was rejected. A statistically significant difference was seen at the .000 level of significance in reference to gender and performance on the GHSGT in science. The adjusted mean for males was 514.997 compared to 506.251 for females, thus showing that males performed significantly better on the GHSGT in the area of science.

GHSGT social science scores (adjusted by the pre-test) were analyzed using the Analysis of Covariance (ANCOVA) shown in Table 11. Based on this analysis there was no interaction noted between the schools (block or traditional). When the data were analyzed based on gender, however, the null hypothesis was rejected. A statistically significant difference was seen at the .002 level of significance in reference to gender and performance on the GHSGT in social science. The adjusted mean for males was 522.940 compared to 516.774 for females, thus showing that males performed significantly better on the GHSGT in the area of social science.

GHSGT English scores (adjusted by the pre-test) were analyzed using the Analysis of Covariance (ANCOVA) shown in Table 12. Based on the analysis there was no interaction noted between the schools (block or traditional). When the data was analyzed based on gender, the null hypothesis was supported at the .05 level of significance for the GHSGT English outcomes. As

Table 9
Univariate Analysis of Variance for Gender and GHSGT Mathematics

Source	Type III SS	df	Mean Square	F	Sig.
Corrected Model	93758.243*	4	23439.561	56.951	.000
Intercept	312803.065	1	312803.065	760.022	.000
CRCTM	93441.257	1	93441.257	227.035	.000
School	275.696	1	275.696	.670	.414
Gender	290.375	1	290.375	.706	.401
School*Gender	111.311	1	111.311	.270	.603
Error	157220.222	382	411.571		
Total	110388586.0	387			
Corrected Total	250978.465	386			

*R Squared = .374 (Adjusted R Squared = .367)

Estimated Marginal Means- Dependent Variables- Gender & GHSGT Mathematics

Gender	Mean	Std. Error	N
Male	534.368	1.623	166
Female	532.582	1.374	221

Table 10
Univariate Analysis of Variance for Gender and GHSGT Science

Source	Type III SS	df	Mean Square	F	Sig.
Corrected Model	69941.825*	4	17485.456	113.382	.000
Intercept	330158.796	1	330158.796	2140.869	.000
CRCTM	64106.506	1	64106.506	415.690	.000
School	191.710	1	191.710	1.243	.266
Gender	6958.689	1	6958.689	45.123	.000
School*Gender	11.506	1	11.506	.075	.785
Error	58910.971	382	154.217		
Total	100737579.0	387			
Corrected Total	128852.796	386			

* R Squared = .543 (Adjusted R Squared = .538)

Estimated Marginal Means- Dependent Variables- Gender & GHSGT Science

Gender	Mean	Std. Error	N
Male	514.997	.993	166
Female	506.251	.841	221

Table 11
Univariate Analysis of Variance for Gender and GHSGT Social Science

Source	Type III SS	df	Mean Square	F	Sig.
Corrected Model	60717.164*	4	15179.291	42.730	.000
Intercept	878153.134	1	878153.134	2472.016	.000
CRCTRDG	58683.484	1	58683.484	165.195	.000
School	1193.364	1	1193.364	3.359	.068
Gender	3548.010	1	3548.010	9.988	.002
School*Gender	4.683	1	4.683	.013	.909
Error	138187.428	389	355.238		
Total	106619017.0	394			
Corrected Total	198904.591	393			

* R Squared = .305 (Adjusted R Squared = .298)

Estimated Marginal Means- Dependent Variables- Gender & GHSGT Social Science

Gender	Mean	Std. Error	N
Male	522.940	1.480	170
Female	516.774	1.269	224

Table 12
Univariate Analysis of Variance for Gender and GHSGT English

Source	Type III SS	df	Mean Square	F	Sig.
Corrected Model	72161.331*	4	18040.333	19.238	.000
Intercept	934869.854	1	934869.854	996.936	.000
CRCTRDG	65786.730	1	65786.730	70.154	.000
School	1239.992	1	1239.992	1.322	.251
Gender	55.109	1	55.109	.059	.809
School*Gender	75.493	1	75.493	.081	.777
Error	363844.323	388	937.743		
Total	114585966.0	393			
Corrected Total	436005.654	392			

* R Squared = .166 (Adjusted R Squared = .157)

Estimated Marginal Means- Dependent Variables- Gender & GHSGT English

Gender	Mean	Std. Error	N
Male	539.640	2.404	170
Female	538.871	2.065	223

seen in Table 12, the adjusted mean for males was 539.640 and for females was 538.871, which showed no statistically significant difference in the adjusted posttest means for gender.

Hypothesis b

Hypothesis *b* compared the performance of different races of students in a block-scheduled high school with different races of students in a traditional scheduled high school using Spring 2004 subtests of the Georgia High School Graduation Test (mathematics, science, social science, and English.) GHSGT scores were used as the dependent variables. Eighth grade Spring 2001 CRCT scores were used as the covariates. In analyzing race, it was noted that the student population in the study included only five Asian students and four Hispanic students. Therefore, these students were not included in the analysis and were removed before analyzing the data. The races compared were black and white in reference to their performance on each of the subtests of the GHSGT.

GHSGT mathematics scores (adjusted by the pre-test) were analyzed using the Analysis of Covariance (ANCOVA) shown in Table 13. Based on the analysis there was no interaction noted between the schools (block or traditional). When the data were analyzed for race, however, the null hypothesis was rejected. A statistically significant difference was seen at the .012 level of significance in reference to race and performance on the GHSGT in mathematics. The adjusted mean for white students was 535.384 compared to 530.764 for black students, thus showing that white students performed significantly better on the GHSGT in the area of mathematics.

GHSGT science scores (adjusted by the pre-test) were analyzed using the Analysis of Covariance (ANCOVA) shown in Table 14. Based on the analysis there was no interaction noted between the schools (block or traditional). When the data were analyzed for race, however, the

Table 13
Univariate Analysis of Variance for Race and GHSGT Mathematics

Source	Type III SS	df	Mean Square	F	Sig.
Corrected Model	94617.724*	4	23654.431	57.178	.000
Intercept	303644.949	1	303644.949	733.983	.000
CRCTM	82511.961	1	82511.961	199.451	.000
School	251.813	1	251.813	.609	.436
Race	1867.448	1	1867.448	4.514	.034
School * Race	252.084	1	252.084	.609	.436
Error	154308.234	373	413.695		
Total	107803062.0	378			
Corrected Total	248925.958	377			

* R Squared = .380 (Adjusted R Squared = .373)

Estimated Marginal Means- Dependent Variables- Race & GHSGT Mathematics

Race	Mean	Std. Error	N
Black	530.764	1.551	177
White	535.384	1.489	201

Table 14
Univariate Analysis of Variance for Race and GHSGT Science

Source	Type III SS	df	Mean Square	F	Sig.
Corrected Model	66514.297*	4	16628.574	105.672	.000
Intercept	320638.345	1	320638.345	2037.608	.000
CRCTM	55492.687	1	55492.687	352.648	.000
School	98.289	1	98.289	.625	.430
Race	2429.779	1	2429.779	15.441	.000
School * Race	314.280	1	314.280	1.997	.158
Error	58695.346	373	157.360		
Total	98488915.000	378			
Corrected Total	125209.643	377			

* R Squared = .531 (Adjusted R Squared = .526)

Estimated Marginal Means- Dependent Variables- Race & GHSGT Science

Race	Mean	Std. Error	N
Black	507.318	.957	177
White	512.588	.918	201

null hypothesis was again rejected. A statistically significant difference was seen at the .000 level of significance in reference to race and performance on the GHSGT in science. The adjusted mean for white students was 512.588 compared to 507.318 for black students, thus showing that white students performed significantly better on the GHSGT in the area of science.

GHSGT social science scores (adjusted by the pre-test) were analyzed using the Analysis of Covariance (ANCOVA) shown in Table 15. Based on the analysis there was no interaction noted between the schools (block or traditional). When the data were analyzed for race, the null hypothesis was supported at the .05 level of significance for the GHSGT social science outcomes. As seen in Table 15, the adjusted mean for black students was 518.322 and the adjusted mean for white students was 520.866, which showed no statistically significant difference in the adjusted posttest means for race.

GHSGT English scores (adjusted by the pre-test) were analyzed using the Analysis of Covariance (ANCOVA) shown in Table 16. Based on the analysis there was no interaction noted between the schools (block or traditional). When the data were analyzed for race, the null hypothesis was supported at the .05 level of significance for the GHSGT English outcomes. As seen in Table 16, the adjusted mean for black students was 537.820 and the adjusted mean for white students was 540.896, which showed no statistically significant difference in the adjusted posttest means for race.

Hypothesis c

Hypothesis *c* compared the performance of students served by ESOL services in a block scheduled high school with students served by ESOL services in a traditional scheduled high school using Spring 2004 subtests of the Georgia High School Graduation Test (mathematics, science, social science, and English.) In analyzing ESOL students, it was noted that the student

Table 15
Univariate Analysis of Variance for Race and GHSGT Social Science

Source	Type III SS	df	Mean Square	F	Sig.
Corrected Model	58316.634*	4	14579.159	39.782	.000
Intercept	820753.136	1	820753.136	2239.576	.000
CRCTRDG	51617.620	1	51617.620	140.848	.000
School	1181.134	1	1181.134	3.223	.073
Race	570.125	1	570.125	1.556	.213
School * Race	477.492	1	477.492	1.303	.254
Error	139261.272	380	366.477		
Total	104227751.0	385			
Corrected Total	197577.906	384			

* R Squared = .295 (Adjusted R Squared = .288)

Estimated Marginal Means- Dependent Variables- Race & GHSGT Science

Race	Mean	Std. Error	N
Black	518.322	1.445	181
White	520.866	1.396	204

Table 16
Univariate Analysis of Variance for Race and GHSGT English

Source	Type III SS	df	Mean Square	F	Sig.
Corrected Model	71682.677*	4	17920.669	18.757	.000
Intercept	876621.574	1	876621.574	917.523	.000
CRCTRDG	57602.942	1	57602.942	60.291	.000
School	1587.080	1	1587.080	1.661	.198
Race	832.905	1	832.905	.872	.351
School * Race	338.946	1	338.946	.355	.552
Error	362104.979	379	955.422		
Total	112026194.0	384			
Corrected Total	433787.656	383			

* R Squared = .165 (Adjusted R Squared = .156)

Estimated Marginal Means- Dependent Variables- Race & GHSGT Science

Race	Mean	Std. Error	N
Black	537.820	2.332	181
White	540.896	2.258	203

population in the study did not include any ESOL students. Therefore, this analysis was not performed.

Hypothesis d

Hypothesis *d* compared the performance of students who were noted as poverty eligible or eligible for free/reduced lunch in a block scheduled high school with students who were noted as poverty eligible or eligible for free/reduced lunch in a traditional scheduled high school using Spring 2004 subtests of the Georgia High School Graduation Test (mathematics, science, social science, and English.) GHSGT scores were used as the dependent variables. Eighth grade Spring 2001 CRCT scores were used as the covariates.

GHSGT mathematics scores (adjusted by the pre-test) were analyzed using the Analysis of Covariance (ANCOVA) shown in Table 17. Based on this analysis there was no interaction noted between the schools (block or traditional). When the data were analyzed based on economic status, the null hypothesis was supported at the .05 level of significance for the GHSGT mathematics outcomes. As seen in Table 17, the adjusted mean for economically disadvantaged students was 532.445 and for non-disadvantaged students was 533.522, which showed no statistically significant difference in the adjusted posttest means for economic status.

GHSGT science scores (adjusted by the pre-test) were analyzed using the Analysis of Covariance (ANCOVA) shown in Table 18. Based on the analysis there was no interaction noted between the schools (block or traditional). When the data were analyzed for economic status, however, the null hypothesis was rejected. A statistically significant difference was seen at the .017 level of significance in reference to students' economic status and performance on the GHSGT in science. The adjusted mean for students who were not economically disadvantaged was 510.968 compared to 507.116 for students who were economically disadvantaged, thus

Table 17
Univariate Analysis of Variance for Economic Status and GHSGT Mathematics

Source	Type III SS	df	Mean Square	F	Sig.
Corrected Model	93596.436*	4	23399.109	56.795	.000
Intercept	305494.687	1	305494.687	741.501	.000
CRCTM	87114.539	1	87114.539	211.446	.000
School	553.831	1	553.831	1.344	.247
Ec. Status	76.122	1	76.122	.185	.668
School*Ec. St.	153.806	1	153.806	.373	.542
Error	157382.029	382	411.995		
Total	110388586.0	387			
Corrected Total	250978.465	386			

* R Squared = .373 (Adjusted R Squared = .366)

Estimated Marginal Means- Dependent Variables- Economic Status & GHSGT Mathematics

Economic Status	Mean	Std. Error	N
Economically Disadvantaged (Free/Reduced Lunch)	532.445	2.164	101
Not Econ. Disadvantaged	533.522	1.217	286

Table 18
Univariate Analysis of Variance for Economic Status and GHSGT Science

Source	Type III SS	df	Mean Square	F	Sig.
Corrected Model	64143.091*	4	16035.773	94.664	.000
Intercept	327905.155	1	327905.155	1935.718	.000
CRCTM	56380.268	1	56380.268	332.829	.000
School	85.124	1	85.124	.503	.479
Ec. Status	973.326	1	973.326	5.746	.017
School*Ec. St.	86.200	1	86.200	.509	.476
Error	64709.705	382	169.397		
Total	100737579.0	387			
Corrected Total	128852.796	386			

* R Squared = .498 (Adjusted R Squared = .493)

Estimated Marginal Means- Dependent Variables- Economic Status & GHSGT Science

Economic Status	Mean	Std. Error	N
Economically Disadvantaged (Free/Reduced Lunch)	507.116	2.164	101
Not Econ. Disadvantaged	510.968	1.217	286

showing that students who are not economically disadvantaged performed significantly better on the GHSGT in the area of science.

GHSGT social science scores (adjusted by the pre-test) were analyzed using the Analysis of Covariance (ANCOVA) shown in Table 19. Based on the analysis there was no interaction noted between the schools (block or traditional). When the data were analyzed for economic status, the null hypothesis was supported at the .05 level of significance for the GHSGT social science outcomes. As seen in Table 19, the adjusted mean for students who were economically disadvantaged was 518.373 and for non-economically disadvantaged was 519.704, which showed no statistically significant difference in the adjusted posttest means for economic status.

GHSGT English scores (adjusted by the pre-test) were analyzed using the Analysis of Covariance (ANCOVA) shown in Table 20. Based on this analysis there was no interaction noted between the schools (block or traditional). When the data was analyzed for economic status, the null hypothesis was supported at the .05 level of significance for the GHSGT English outcomes. As seen in Table 20, the adjusted mean for students who were economically disadvantaged was 535.762, which showed no statistically significant difference in the adjusted posttest means for economic status.

Hypothesis e

Hypothesis *e* compared the performance of students served with disabilities in a block-scheduled high school with students served with disabilities in a traditional scheduled high school using Spring 2004 subtests of the Georgia High School Graduation Test (mathematics, science, social science, and English.) In analyzing students with disabilities, it was noted that School One (block) had only five students with disabilities and School Two(traditional) had 25 students with disabilities. Therefore, this analysis was not performed.

Table 19
Univariate Analysis of Variance for Economic Status and GHSGT Social Science

Source	Type III SS	df	Mean Square	F	Sig.
Corrected Model	57243.520*	4	14310.880	39.298	.000
Intercept	869651.755	1	869651.755	2388.056	.000
CRCTRDG	53048.063	1	53048.063	145.669	.000
School	1511.025	1	1511.025	4.149	.042
Ec. Status	118.885	1	118.885	.326	.568
School*Ec. St.	163.076	1	163.076	.448	.504
Error	141661.071	389	364.167		
Total	106619017.0	394			
Corrected Total	198904.591	393			

* R Squared = .288 (Adjusted R Squared = .280)

Estimated Marginal Means- Dependent Variables- Economic Status & GHSGT Social Science

Economic Status	Mean	Std. Error	N
Economically Disadvantaged (Free/Reduced Lunch)	518.373	2.009	102
Not Econ. Disadvantaged	519.704	1.132	292

Table 20
Univariate Analysis of Variance for Economic Status and GHSGT English

Source	Type III SS	df	Mean Square	F	Sig.
Corrected Model	73511.780*	4	18377.945	19.671	.000
Intercept	927683.809	1	927683.809	992.958	.000
CRCTRDG	58635.270	1	58635.270	62.761	.000
School	853.623	1	853.623	.914	.340
Ec. Status	1435.303	1	1435.303	1.536	.216
School*Ec. St.	2.136	1	2.136	.002	.962
Error	362493.874	388	934.263		
Total	114585966.0	393			
Corrected Total	436005.654	392			

* R Squared = .169 (Adjusted R Squared = .160)

Estimated Marginal Means- Dependent Variables- Economic Status & GHSGT English

Economic Status	Mean	Std. Error	N
Economically Disadvantaged (Free/Reduced Lunch)	535.762	3.228	101
Not Econ. Disadvantaged	540.395	1.813	292

Summary of the Findings

A summary of the findings of the research was provided in Tables 21- 23. Table 21 showed the findings in reference to determining if scheduling, block or traditional, statistically significantly affected GHSGT scores in mathematics, science, social science, and English. The data showed that no areas of the GHSGT showed a statistically significant difference between block scheduled or traditional scheduled schools.

Table 22 showed the findings in reference to NCLB disaggregations of gender and race. While there were no interactions between the two schools, block or traditional, a statistically significant difference was found between gender and science and social science scores. Males scored significantly better than females on both the GHSGT science and social science subtests.

Table 23 showed the findings in reference to NCLB disaggregations of ESOL services, economically disadvantaged students, and students with disabilities. There were not enough students in the sample to run the data for ESOL students. Once again, there were no interactions between the two schools, block or traditional. A statistically significant difference was found between races and performance on the GHSGT mathematics and science scores. White students scored significantly better than black students did on both the GHSGT mathematics and science subtests. Economically disadvantaged students also scored significantly lower on the GHSGT science subtest. Those students who were not economically disadvantaged scored significantly better. There were not enough students in the sample to run the data for students with disabilities.

Table 21
Summary of the Findings
Scheduling & GHSGT

Hypothesis	Test	Dependent Variables	Independent Variables	Statistical Significance
Ho1	ANCOVA	Scores on GHSGT Mathematics	Scheduling Models (Block or Traditional)	No
Ho2	ANCOVA	Scores on GHSGT Science	Scheduling Models (Block or Traditional)	No
Ho3	ANCOVA	Scores on GHSGT Social Science	Scheduling Models (Block or Traditional)	No
Ho4	ANCOVA	Scores on GHSGT English/LA	Scheduling Models (Block or Traditional)	No

Table 22
Summary of the Findings
NCLB Disaggregations & GHSGT: Gender, Race

Hypothesis	Test	Dependent Variables	Independent Variables	Statistical Significance
Hoa	ANCOVA	Scores on GHSGT Mathematics	Gender	No
	ANCOVA	Scores on GHSGT Science	Gender	Yes Males > Females
	ANCOVA	Scores on GHSGT Social Science	Gender	Yes Males > Females
	ANCOVA	Scores on GHSGT English/LA	Gender	No
Hob	ANCOVA	Scores on GHSGT Mathematics	Race	Yes White > Black
	ANCOVA	Scores on GHSGT Science	Race	Yes White > Black
	ANCOVA	Scores on GHSGT Social Science	Race	No
	ANCOVA	Scores on GHSGT English/LA	Race	No

Table 23
Summary of the Findings
NCLB Disaggregations & GHSGT: ESOL, Economic Status, Students with Disabilities

Hypothesis	Test	Dependent Variables	Independent Variables	Statistical Significance
Hoc	ANCOVA	Scores on GHSGT	ESOL	Not enough students in sample
Hod	ANCOVA	Scores on GHSGT Mathematics	Economic Status	No
	ANCOVA	Scores on GHSGT Science	Economic Status	Yes Not Economically Disadvantaged > Economically Disadvantaged
	ANCOVA	Scores on GHSGT Social Science	Economic Status	No
	ANCOVA	Scores on GHSGT English	Economic Status	No
Hoe	ANCOVA	Scores on GHSGT Subtests	Students with Disabilities	Not enough students in sample

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

There were two purposes for this study. First, the study investigated whether participation in a block-scheduled environment resulted in a significant increase in the level of achievement on four subtests of the Georgia High School Graduation Test (GHSGT) when compared to the scores of students who participated in a traditionally scheduled environment. Second, if there was a statistically significant difference in any one of the scores for the students, the study investigated whether there was a statistically significant difference among/between subgroups of gender, race, students served by ESOL services, students deemed economically disadvantaged, and students with disabilities.

The students in the study were those 11th grade students attempting the GHSGT for the first time and who had participated for three consecutive years in a school using either the 4 x 4 block scheduling model or those 11th grade students who participated in three consecutive years in a school using traditional scheduling. This study required that the students remained at the same school for 9th, 10th, and 11th grades in either the 4 x 4 block scheduled model or traditional scheduled model. As 8th grade CRCT scores were used for all students, this study required that the students were in the same school system for 8th grade. The total sample included 387 students for the mathematics and science tests, 393 students for the English test, and 394 students for the social science test.

The independent variable was the type of scheduling in which the student participated, either 4 x 4 block scheduling or traditional scheduling. The dependent variables were the achievement levels measured by the GHSGT in the areas of mathematics, science, social science, and English. One-way analyses of covariance were conducted on the students' mean scores on the subtest areas of the GHSGT.

Four hypotheses were developed for the total group to determine if there was a statistically significant difference in the GHSGT scores for mathematics, science, social science, and English for block-scheduled students compared to traditionally scheduled students. The results of the analyses of variance found that there were no statistically significant differences at the .05 level for any of the GHSGT subtest scores in the areas of mathematics, science, social science and English.

The analysis of data did not reject the null hypotheses for any one of the tests (mathematics, science, social science, or English). It was determined that scheduling, whether block or traditional, did not affect the performance of students on any areas of the GHSGT. The analysis of the data following the five null hypotheses based on the disaggregations required by *No Child Left Behind* (2001) and the *A + Education Reform Act* (as amended in 2003) to determine if block or traditional scheduling had an effect on any of the disaggregated variables, was therefore not necessary. However, for those subgroups (gender, race, ESOL, economically disadvantaged, and students with disabilities) that consisted of at least 40 students in each of the disaggregated variables, the analysis of data was conducted to determine the areas where a significant difference existed between the variables and the performance on the subtests of the GHSGT. This data presented unexpected outcomes that could be used by schools, whether block or traditional, in meeting the requirements of accountability designated by *No Child Left Behind* (2001) and the *A + Education Reform Act* (as amended in 2003).

There were not enough participants in the study from the subgroups of ESOL students and students with disabilities; therefore, only three hypotheses were developed. The subgroups that were analyzed were gender, race, and economically disadvantaged students. While there were no interactions between the two schools, block or traditional, a statistically significant difference was found between gender and science and social science scores. Males scored significantly better than females on both the GHSGT science and social science subtests. In addition, a statistically significant difference was found between races and performance on the GHSGT mathematics and science scores. White students scored significantly better than Black students did on both the GHSGT mathematics and science subtests. Students who were not economically disadvantaged as determined by not qualifying for free or reduced lunch, scored significantly higher on the GHSGT science subtest.

According to the literature presented in Chapter 2 and the data analyzed in this study, it can be concluded that the type of scheduling, whether block or traditional, did not have a statistically significant impact on high school students' achievement on the GHSGT. The unexpected outcomes of the research showed that while scheduling had no affect on GHSGT scores, gender, race, and economic status of students did affect their performance on subtests of the GHSGT. The findings of this study bear importance because it could provide Boards of Education and the community a research base for determining whether to use block scheduling or traditional scheduling and how to best plan for intervention strategies for race, gender, and economic status of students taking the GHSGT.

Conclusions

Several conclusions can be made from the analyses conducted for this study. It was apparent that scheduling was not a factor in the achievement of students on the subtests of the GHSGT. Neither scheduling model, 4 x 4 block or traditional, could be determined to be better than the other. Bottoms (2003) stated that schools could not raise standards with block scheduling alone. School systems needed to look further at the data, as well as the advantages and disadvantages of block scheduling included to determine if changing students' schedules would be beneficial. Basic advantages of block scheduling to be considered from the literature include flexibility, better organization, and simplification of the structure of the school (The Oregon Department of Education, 1996). Learning on a block schedule was viewed as less fragmentary (Lare et al., 2002) and teacher attitudes were improved due to fewer preparations, more planning time, and more time to undertake duties (Onwuegbuzie, 2001). A majority of teachers and students surveyed preferred block scheduling over traditional scheduling, providing an abundance of qualitative data (Canady, 1995; Hurley, 1997; Zepeda, 2000). What were lacking in the research were evaluations based on hard data that measured student achievement rather than opinions of supporters or critics (Trenta & Newman, 2002).

Basic disadvantages to block scheduling included those supported by this study concluding that the block schedule has had little impact on student achievement. This study provided more evidence that block scheduling did not have an effect on student achievement. Rettig and Canady (2001) found that while block scheduling did not have a negative effect, they could not say that it had a positive effect on student achievement. The Wronkovich et al. (1997) study concluded that there had "not yet been sufficient controlled longitudinal studies to lead to enthusiastic support for block scheduling" (p. 40).

The analyses of this study clearly supported the most recent study of block scheduling by the Georgia Department of Education (2005) that found no significant differences between the average percent of students on the block versus non-block schedule for any subtest of the GHSGT for either 2002-2003 or 2003-2004. The Georgia Department of Education (2005) study also pointed out that differences in achievement between school types (block vs. traditional) were often pre-existing prior to the implementation of block and that these differences remain after implementation. The Georgia Department of Education (2005) study discussed the need for further research into possible confounding variables, clearly indicating that more comparisons were needed.

Recommendations

To prove to be more effective, it is recommended that schools implementing both block and traditional scheduling strengthen its program by increasing teacher training in how to best plan for intervention strategies for race, gender, and economic status of students taking the GHSGT. It would be advantageous to share this study with the Georgia Department of Education so that this regulatory agency could use its findings to add to its research base. The results of this study could help educate the public about the advantages and disadvantages of block scheduling.

To expand or continue the findings of this study, further examination of the effects of scheduling on the Georgia High School Graduation Test is also recommended to determine the following:

- the effect of participation in block scheduling over a longer period of time to see if the effects of the scheduling change;
- the effect of a larger sample size of traditional vs. block scheduled students across the state; and
- the effects of traditional vs. block scheduling in relation to the accountability issues raised by *No Child Left Behind* (2001) and the *A + Education Reform Act* (as amended in 2003).

In conclusion, the type of scheduling, whether block or traditional, did not have an impact on high school students' achievement on the GHSGT. The unexpected outcomes of the research showed that while scheduling had no affect on GHSGT scores, gender, race, and economic status of students did affect their performance on subtests of the GHSGT suggesting a need for further examination of the effects of scheduling on the Georgia High School Graduation Test.

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