A COMPARATIVE STUDY OF THE EFFECT OF BLOCK SCHEDULING AND TRADITIONAL SCHEDULING ON STUDENT ACHIEVEMENT FOR THE FLORIDA ALGEBRA 1 END-OF-COURSE EXAMINATION

by

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ABSTRACT

The focus of this research was on the effect of school schedules on student achievement for ninth-grade students in a Florida school district. Data were collected from two central Florida high schools from the 2011-2012 and 2012-2013 school years.

Five one-way analyses of covariance (ANCOVA) were performed to ascertain if there was any interaction between school schedules and student achievement. Examined were the interactions (a) between schedule and schools, (b) schedule and male students, (c) schedule and female students, (d) schedule and Black students, and (e) schedule and Hispanic students. The independent variable, school schedule, consisted of two levels: traditional schedule and A/B block schedule. The dependent variable was the spring Algebra 1 End- of-Course Examination (EOC), and the covariate was the Florida Comprehensive Assessment Test (FCAT) Mathematics Eighth-grade Development Scale Score.

School schedule was not significantly related to students' spring Algebra 1 EOC scores, $F(1,788)$ $p = .932$. School schedule was not significantly related to male students' spring Algebra 1 EOC scores, $F(1,392)$ $p = .698$. School schedule was not significantly related to female students' spring Algebra 1 EOC scores, $F(1,393)$ $p = .579$. School schedule was not significantly related to Black students' spring Algebra 1 EOC scores, $F(1,186)$ $p = .545$. School schedule was not significantly related to Hispanic students' spring Algebra 1 EOC scores, $F(1,184)$ $p = .700$.

To my family

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CHAPTER 1
THE PROBLEM AND ITS CLARIFYING COMPONENTS

Introduction

Accountability in educational reform has centered on the No Child Left Behind Act [NCLB] (2002) since the passage of the legislation in the fall of 2001. NCLB made standardized testing the measure of schools' effectiveness. "The rise and fall of test scores in reading and mathematics became the critical variable in judging students, teachers, principals, and schools."(Ravitch, 2010 p. 15). The accountability components of NCLB required states to choose their assessment tools and test students in Grades 3-8 yearly and once in high school in reading and mathematics (Ravitch, 2010). The trend in accountability for student success on tests can be seen through reforms within school districts.

Educational accountability and student achievement are at the core of Florida's Senate Bill 4 Educational Accountability, F.S. 1003.413 (2010). The bill provides a timeline for the elimination of the Florida Comprehensive Assessment Test (FCAT) for mathematics (Grades 9 and 10) and science (Grade 11). The bill requires students to pass a state-wide end-of-course examination (EOC) in order to receive credit for Algebra 1 and Biology courses. Additional courses that require an EOC, which will count as 30% of the course grade are: Geometry, Algebra II, Chemistry, and Physics. These new requirements were put into place to ensure educational accountability in student assessment (Senate Bill 4 Implementation).

In the 1983 report, *A Nation at Risk*, the following were recommended.

> The time available for learning should be expanded through better classroom management and organization of the school day. If necessary, additional time should be found to meet the special needs of the slow learner, the gifted, and others who need more instructional diversity than can be accommodated during a conventional school day or school year. (Schott, 2008, p. 18)

This recommendation gave states and school districts the impetus to start looking at new ways to schedule schools. For example, Florida's State Board of Education in March of 2011 approved the following rule amendment to 6A-6.054 K-12 Student Reading Intervention Requirements.

> (b) Middle school students who score at Level 1 or Level 2 on FCAT Reading and have intervention needs in the areas of decoding and/or text reading efficiency fluency must have an extended time for block of reading intervention. This extended time may include, but is not limited to, students reading on a regular basis before and after school with teacher support, or for accelerate foundational reading skills. (Florida Department of Education [FLDOE], n. d., para 5)

Lawrence and McPherson (2000) conducted a study to compare the academic achievement of high school students on block schedules with the academic achievement of high school students on traditional schedules. The goal of the researchers was to determine what impact, if any, block scheduling had on academic achievement. The study was a continuation study of Carrol's 1994 research in which it was determined that students on block scheduling earned

higher course grades than students on a traditional schedule. Lawrence and McPherson (2000) collected data over a four-year period from 1992-1996. The results were not what the researchers expected. They expected students in block scheduling to score higher than students on a traditional schedule. "The mean scores on the traditional schedule were consistently higher than the mean scores on the block schedule which came as a surprise" (Lawrence & McPherson, 2000, p. 3).

Problem Statement

Numerous research studies concerning how school schedules (block schedule versus traditional schedule) impact student scores on the SAT have been conducted (Bennett, 2000). Additional studies have also been conducted on faculty perceptions of the transition from a traditional schedule to a block schedule (Lawrence & McPherson, 2000). A review of the literature revealed, however, that little research has been conducted on the effects of students' schedules on end-of-course examinations. Lawrence and McPherson asserted "There is a lack of scientific support regarding the effect of block scheduling on student academic achievement" (Lawrence & McPherson, 2000).

Purpose Statement

This study compared student performance on Florida's Algebra 1 End-of-Course Examination for students educated in a 4x4 (A/B) block schedule to those of students

educated in a traditional seven period day schedule. Students must pass the Florida Algebra 1 End-of-Course Examination to receive a high school diploma. There have been numerous research studies completed on the impact that school schedules (block schedule and traditional schedule) have on SAT scores (Bennett, 2000). Little research has been completed, however, on effects of school schedules on end-of-course examinations (Lawrence & McPherson 2000). Senate Bill 1076 K-20 Education, F.S. 1000.03 (2013) requires end-of-course examinations to count as 30% of a student's final grade in biology and geometry. Coupled with Senate Bill 4 Educational Accountability, F.S. 1003.413 (2010) educational leaders need to put students and teachers in the best environment for academic success. This study was conducted to compare the spring, 2012 and 2013 Algebra 1 End-of-Course Examination scores of two public high schools located in central Florida. Each high school operated using a different school schedule. One high school operated on a 4 x 4 (A/B) block schedule, and the other operated on a traditional seven-period day schedule. The question for educational leaders was clear. Did the type of schedule significantly impact student achievement on the Algebra 1 End-of-Course Examination?

Significance of the Study

The push towards more accountability in education has been an attempt to close the student achievement gap. This can be conceptualized as narrowing the difference in test scores between the distinct groups of students (Murphy, 2010).

The importance of understanding and closing the achievement gap can be seen by its impact on the individual. Murphy (2010) cited numerous studies to emphasize that employment opportunity and earning ability were correlated with an individual's educational history. He also investigated educational achievement gaps as a direct cause of socioeconomic inequality: that the economic inequality that arises from one's educational level can result in undermining social and economic justice which threatens the principles of democracy (Murphy, 2010). Murphy concluded that reducing test score differentials was important in reducing educational inequality.

With these new demands on teachers, students, school districts, and communities, according to Marzano and Waters (2009), it is imperative that students are placed in the correct educational environment to ensure maximum educational benefits leading to student achievement. School district leadership has five primary responsibilities: (a) ensuring collaborative goal setting, (b) establishing nonnegotiable goals for achievement and instruction, (c) creating broad alignment with and support of district goals, (d) monitoring achievement and instruction goals, and (e) allocating resources to support the goals for achievement and instruction (Marzano & Waters, 2009.

Marzano listed 21 responsibilities for site based leaders in schools, indicating that "all 21 play a role in having a positive correlation to student achievement" (Marzano, Waters, & McNulty, 2005, p. 63). Student achievement is the primary goal for both district and school-based leadership.

The main difference in leadership responsibility between district and school-based leadership centers on situational awareness (Marzano & Waters, 2009). The district and

school-based leadership share nonnegotiable goals, with the main goal being student achievement. School-based leadership, however needs to be more attuned to the specific needs of the individual school's students and teachers to help achieve the nonnegotiable goals.

Effective school district level leadership can have a positive effect on student achievement. In discussing leadership, Marzano and Waters (2009) found that effective leadership at the district and school levels affect what happens in the classroom. By introducing non-negotiable goals of student achievement and teacher instruction, monitoring these goals, and providing resources towards teacher instruction the district can positively influence teacher instruction. "Effective leadership at the district and school levels changes what occurs in classrooms, and what happens in classrooms have a direct effect on student achievement" (Marzano & Waters, 2009, p. 11). In an analysis of district, school, teacher, and student achievement, these researchers found that a rating of excellent at district leadership with average teacher level, students showed a predicted gain of 13 points in reading achievement and 17 points in mathematics achievement (Marzano & Waters, 2009).

This study was conducted to add to the body of research concerning the impact that a student's school schedule has on student achievement as measured by end-of-course examinations. This study should be helpful to school decision makers as they determine what, if any, considerations are needed as they contemplate changing high school schedules from traditional to block or block to traditional.

Conceptual Framework

The heart of school organization is the schedule of the courses. District and school leaders "need to know about organizational theory so they can think more clearly about making better- informed choices" (Owens & Valesky, 2010, p. 14). Effective leadership strategies are the key to successful implementation of scheduling a school. Lessel (2011) argued that the organization as a whole must be dedicated and involved in effecting the necessary changes within the organization.

School leaders must work through a number of structural issues when setting the schedule of a school. School leaders must consider class size, student contact hours in a course, professional development programs, and teacher assignments. Depending on the needs of students and staff in the school district the organizational structure of a school becomes important (Murphy, 2010).

There are two major perspectives on educational organizations; Bureaucratic Theory and Human Resource Development Theory (Owens & Valesky, 2011). The bureaucratic theory emphasizes the need to develop clear written rules and procedures to set standards and guide the actions of students and teachers. Included in this is the bell-schedule (Owens & Valesky, 2011). Having the research data to support a school schedule is important, but only if the data, in fact, drives the change process. Educational leaders must consider the strengths and weaknesses of schedules before they seek to implement change (Lessel, 2011).

School leaders must look at ways to restructure schools to meet the needs of the students and educators. The importance of structure to teacher and student performance

is essential. There are six distinguishing characteristics of high-quality team structure. "High performing teams: shape purpose; translate common purpose into specific, measurable performance goals; are manageable size; develop the right mix of expertise; develop a common commitment to working relationship; hold themselves collectively accountable"(Bolman & Deal, 2008, pp. 111-112).

Leadership strategies to meet the challenges of the changing trends in accountability should take into account the four frameworks in organizations: a multi-faceted approach utilizing structural, human resource, political, and symbolic frames (Bolman & Deal, 2008). Each of the frames is characterized by basic assumptions.

The five basic assumptions proffered by Bolman and Deal (2008) that comprise the political frame of an organization are as follows.

1. Organizations are coalitions of assorted individuals and interest groups.
2. Coalition members have enduring differences in values, beliefs, information, interests, and perceptions of reality.
3. Most important decisions involve allocating scarce resources-who gets what.
4. Scarce resources and enduring differences put conflict at the center of day-to-day dynamics and make power the most important asset.
5. Goals and decisions emerge from bargaining and negotiation among competing stakeholders jockeying for their own interests. (pp. 194-195)

Leaders must also look at the symbolic frame. Symbols carry powerful intellectual and emotional messages "that stimulate energy in moments of triumph and offer solace in times of tribulation" (Bolman & Deal, 2008, p. 252). The symbolic frame

focuses on how people perceive the environment around them. There are five suppositions in the symbolic frame that help foster a more effective and cohesive organization. How organizations use the symbolic frame to resolve confusion and create vision, how organizations instill purpose and passion in their employees', and finally how organizations accomplish their desired goals (Bolman & Deal, 2008). Vision is also important in any organization. The vision of an organization helps define the direction and how to allocate resources to keep the organization focused on future decisions (Bolman & Deal, 2008).

Leaders also must pull from the human resource frame to meet the needs of the organization and the employees. The four basic assumptions that constitute this dimension are as follows.

1. Organizations exist to serve human needs rather than the converse.
2. People and organizations need each other. Organizations need ideas, energy, and talent; people need careers, salaries, and opportunities.
3. When the fit between individual and system is poor, one or both suffer. Individuals are exploited or exploit the organization-or both become victims.
4. A good fit benefits both. Individuals find meaningful and satisfying work, and organizations get the talent and energy they need to succeed. (Bolman & Deal, 2008, p. 122)

School leaders must examine how school schedules will impact the needs of their students and teachers.

Research Questions

The following research questions were addressed in this study:

1. What is the difference between Algebra 1 End-of-Course Examination scores for ninth-grade students who attend high school with a traditional schedule and those who attend high school with a 4 x 4 block schedule?

   H_{01} There is no difference between Algebra 1 End-of-Course Examination scores for ninth-grade students who attend high school with a traditional schedule and those who attend high school with a 4 x 4 block schedule?

2. What is the difference between Algebra 1 End-of-Course Examination scores for ninth-grade male students who attend high school with a traditional schedule and those who attend high school with a 4 x 4 block schedule?

   H_{02} There is no difference between Algebra 1 End-of-Course Examination scores for ninth-grade male students who attend high school with a traditional schedule and those who attend high school with a 4 x 4 block schedule?

3. What is the difference between Algebra 1 End-of-Course Examination scores for ninth-grade female students who attend high school with a traditional schedule and those who attend high school with a 4 x 4 block schedule?

   H_{03} There is no difference between Algebra 1 End-of-Course Examination scores for ninth-grade female students who attend high school with a traditional schedule and those who attend high school with a 4 x 4 block schedule?

4. What is the difference between Algebra 1 End-of-Course Examination scores for Black students who attend high school with a traditional schedule and those who attend high school with a 4 x 4 block schedule?

   H_{04} There is no difference between Algebra 1 End-of-Course Examination scores for Black students who attend high school with a traditional schedule and those who attend high school with a 4 x 4 block schedule?

5. What is the difference between Algebra 1 End-of-Course Examination scores for Hispanic students who attend high school with a traditional schedule and those who attend high school with a 4 x 4 block schedule?

   H_{05} There is no difference between Algebra 1 End-of-Course Examination scores for Hispanic students who attend high school with a traditional schedule and those who attend high school with a 4 x 4 block schedule?

Definitions

Block Schedule (A/B): Most students take eight courses during their school year. Half the classes are taken on Day A, the other half on Day B (alternating days). They attend four 90-minute classes each day. Each full credit course meets for 90 days over the school year.

Traditional Schedule: Most students take 7 courses over the school year. Full credit courses meet every day over the school year.

Florida's Algebra 1 End-of-Course Examination: The Algebra 1 End-of-Course Examination assessment is a computer-based, criterion-referenced assessments that measure the Next Generation Sunshine State Standards (FLDOE, 2012).

Methodology

The convenience sampling method was used to identify all ninth-grade students who take Algebra 1 from two rural high schools located in Central Florida. The sample included students from the ninth grade who were enrolled in Algebra 1 during the 2011-2012 and 2012-2013 school years. During this two year period, students enrolled in Algebra 1 would take Algebra 1 on a 4 x 4 (A/B) block schedule or would take Algebra 1 for 42 minutes every day.

High school A had a student population of 1,747 students. There were 1,008 White students, 229 Black students, 412 Hispanic students, 55 Asian students, and nine American Indian/Alaskan Native students. High school B had a student population of 1,755 students. The total number of free and reduced students was 803. There were 1,080 white students, 116 Hispanic students, 484 Black students, 34 Asian students, and nine American Indian/Alaskan Native students.

The variables in this study included student schedules, students' gender, students' race, and student scores on the Algebra 1 End-of-Course Examination. In this study, student schedules were the independent variable and were being examined to see how they affected the dependent variable, Algebra 1 End-of-Course Examination (EOC) scores.

The school district's Research and Accountability Department was contacted to obtain permission to conduct the study prior to initiating the research. A list of students was compiled and students' Algebra 1 EOC scale scores were inputted along with gender, race, and type of schedule. Once the student data had been entered into an Excel spread sheet any unique student identifiers, such as names, and student identification numbers, were removed from the data. The Excel spread sheet contained Algebra 1 EOC scale score, level, race, type of schedule, FCAT Mathematics Developmental Scale Score, and gender for each student.

The students' Algebra 1 EOC scale scores were analyzed using descriptive statistics. Frequency, mean, median, and mode were computed for each variable. A one-way analysis of covariance (ANCOVA) was performed to analyze the data for subgroups identified in the research questions and determine if there was a difference between the Algebra 1 End-of-Course Examination scale scores of the students in a traditional schedule compared to students in an A/B block schedule. ANCOVA is an appropriate method when testing the statistical significance between more than two groups to neutralize the effect of a more powerful, non-interacting variable. (Peascoe, n.d.). The probability of determining a difference was reported using the F statistic.

Delimitations

The study was delimited by the following.

1. Only ninth-grade students who took Algebra 1 in the 2012/2013 school year were included in the study.

2. Students' attendance rate or prior mathematics classes were not considerations in the study.
3. Measurement of achievement was delimited to results of the Spring 2013 Algebra 1 End-of-Course Examination scores.
4. Data used in the study were delimited to Algebra 1 End-of-Course Examination scores from two schools located in central Florida.

Limitations

The study was limited by the following.

1. One assessment, the Florida Algebra 1 End-of-Course Examination, was utilized to measure student academic achievement.
2. The generalizability of the results of the research was limited as the convenience sample was selected from only two central Florida High Schools.
3. Students' attendance rates may have affected their Algebra 1 End-of-Course Examination scores.
4. Teachers' level of effectiveness may have influenced students' Algebra 1 End-of-Course Examination scores.
5. Students' prior mathematics classes may have affected students' Algebra 1 End-of-Course Examination scores.

CHAPTER 2
REVIEW OF RELATED LITERATURE

Introduction

The primary purpose of the 2012 Florida State Statute (F.S.) 1008.22 Student Assessment Program for Public Schools was "to provide information needed to improve the public schools by enhancing the learning gains of all students." (F.S. 1008.22, 2012). The commissioner of education under F.S. 1008.22 "shall design and implement a statewide program of educational assessment that provides information for the improvement of the operation and management of the public schools" (para. 8). The statute requires schools to measure student achievement through a statewide assessment program. F. S. 1001.42 (2012) allows school districts to have control over program development and implementation to meet the needs of their students.

> If a school has a significant gap in achievement on statewide assessments pursuant to F. S. 1008.34(3) (b) by one or more student subgroups. . . , has not significantly decreased the percentage of students scoring below satisfactory on statewide assessments; or has significantly lower graduation rates for a subgroup when compared to the state's graduation rate, that school's improvement plan shall include strategies for improving these results. (para. 60)

Under federal Public Law 107-110 sec.1001 (2002), the No Child Left Behind Act, allow states and school districts control over "providing greater decision-making authority and flexibility to schools and teachers in exchange for greater responsibility for student performance"(Pub. L. No. 107-110, 2002).

One area that Public Law 107-110 (2002) addresses is providing students "an enriched and accelerated educational program, including the use of school wide programs or additional services that increase the amount and quality of instructional time" (Pub. L. No. 107-110, 2002). Increasing the school year is not the most efficient method to increase instructional time (Schott, 2008). Altering a school's schedule, to meet the needs of increased instructional time, is one way school districts are restructuring their organizations (Lawrence & McPherson, 2000). A typical approach schools are using to increase instructional time is block scheduling (Joyner & Molina 2012). With an increasing number of school districts adopting block scheduling (Bennett, 2000), there is a need for school districts to examine the feasibility of block scheduling being advantageous to student achievement. A University of Michigan report indicated the following:

> One important factor in achievement outcomes is the use of time throughout the school day. Dave E. Gullatt (2006) found that often only 60% of the school day is used for instruction, while the other 40% is used for non-instructional purposes. In response to the critical time issue, schools have been reassessing their curriculum schedules. (Musbach, n.d., para. 1)

This chapter reviews literature pertinent to the advantages and disadvantages of block scheduling. It has been organized to present the review in five sections: (a) types of block scheduling, (b) student achievement, (c) advantages of block scheduling, (d) disadvantages of block scheduling, and (e) summary.

Types of Block Scheduling

Lawrence and McPherson (2000) have described how educational restructuring has centered on the time scheduled for classes. Zarlengo (1998) also addressed time: "In an attempt to address the issue of time management, [school districts] are experimenting with different configurations that 'recover' lost time and organize the day to maximize every moment" (p. 1). Block scheduling allows for the restructuring of the school day to create longer units of time for each course (Bennett 2000).

Public Law 102-62 (The Education Council Act of 1991) established the National Education Commission on Time and Learning (NECTL) that called for a comprehensive review of the relationship between time and learning in the nation's schools. The report that emerged from the committee in 1994, *Prisoners of Time*, described five obstacles related to time that present barriers to improving student achievement. The five time-related challenges that faced schools identified in the report were as follows:

- The fixed clock and calendar is a fundamental design flaw that must be changed.
- Academic time has been stolen to make room for a host of nonacademic activities.
- Today's school schedule must be modified to respond to the great changes that have reshaped American life outside school.
- Educators do not have the time they need to do their jobs properly.
- Mastering world-class standards will require more time for almost all students (NECTL, 1994).

Block scheduling was viewed as one way to address the supposed faulty design in school scheduling:

> Fixing the design flaw also makes possible radical change in the teaching and learning process. New uses of time should ensure that schools rely much less on the 51-minute period, after which teachers and students drop everything to rush off to the next class. Block scheduling--the use of two or more periods for extended exploration of complex topics or for science laboratories--should become more common. (NECTL, 1994, para. 2)

Block scheduling organizes the day into fewer, but longer, class periods to allow flexibility for instructional activities. Generally, block scheduling is introduced at junior and high school levels (Zarlengo, 1998). Zelkowski (2010) reported that the 90-minute block class was the most common time frame utilized by high schools in scheduling. Zelkowski noted, however, that more courses were less than 6o minutes in length and that the majority of courses ranged between 40 and 60 minutes. Zelkowski commented on different block scheduling configurations, each with several variations. He reported that the two most common forms of block scheduling were the 4 x 4 block schedule and the alternating day (A/B) block schedule.

4 x 4 Block Plan

This plan typically divides the school day into four 90-minute periods with time added for lunch and passing between classes. Each class lasts for one semester, although some schools make exceptions by maintaining the full-year schedule for Advanced

Placement (AP) and music classes. (Zarlengo, 1998). Frequently teachers are responsible for teaching three classes each semester and use the fourth class time for planning. Table 1 presents an example of a design of a high school's 4 x 4 block schedule for one academic year.

Table 1

Sample Design of 4 x 4 High School Block Schedule

Semester 1	Semester 2
Course 1	Course 5
Course 2	Course 6
Course 3	Course 7
Course 4	Course 8

A/B Plan

This plan, also called an alternate day plan, organizes each day into four 90-minute periods. A total of eight classes meet over two consecutive days ("A Day" and "B Day").

Table 2

Sample Design of an A/B High School Block Schedule

Day 1	Day 2
Course 1	Course 5
Course 2	Course 6
Course 3	Course 7
Course 4	Course 8

Traditional Schedule

According to a study from the University of Michigan the most commonly used schedule in high schools is a traditional schedule. This schedule allows for six or seven class periods in the school day throughout the entire academic year (Musbach, n.d.).

Table 3

Sample Design of a Traditional High School Course Schedule

Monday	Tuesday	Wednesday	Thursday	Friday
Course 1	Course 1	Course 1	Course 1	Course 1
Course 2	Course 2	Course 2	Course 2	Course 2
Course 3	Course 3	Course 3	Course 3	Course 3
Course 4	Course 4	Course 4	Course 4	Course 4
Course 5	Course 5	Course 5	Course 5	Course 5
Course 6	Course 6	Course 6	Course 6	Course 6
Course 7	Course 7	Course 7	Course 7	Course 7

Student Achievement

"The rise and fall of test scores in reading and mathematics became the critical variable in judging students, teachers, principals, and schools" (Ravitch, 2010, p. 15). The accountability components of NCLB require states to choose their assessment tool and test students in Grades 3-8 yearly and once in high school in reading and mathematics (Ravitch 2010). The trend in accountability for student success on tests can be seen through reforms within school districts on the restructuring of school schedules.

One of the goals of block scheduling has been to improve student academic performance (Zarlengo et al., 1998). Lawrence and McPherson (2000) compared the academic achievement of high school students on block schedules with the academic achievement of high school students on traditional schedules. The goal of the researchers

was to determine what impact, if any, block scheduling would have on academic achievement. The researchers ran four independent t-tests to compare students' test scores. The independent variable was the student schedule (block or traditional), and the dependent variable was the student scores on the Algebra 1, Biology, American History, and English 1 End-of Course Examinations. The researchers found that students on a traditional schedule scored statistically significantly higher than students on block schedules on the assessments in all four courses (Lawrence & McPherson, 2000).

Schott (2008) found no statistical significant difference between ninth-grade mean mathematics scores of students who were on block scheduling during the 2003-2004 school year and the 10th-grade mean mathematics scores of students switched back to a traditional schedule during the 2004-2005 school year. Bennett (2000), however, reported that a high school, in Indiana, on block scheduling for two years, showed improved test scores for the ACT; SAT scores were unchanged, and there was a decrease for AP scores.

Forman (2009) examined one public school system's change from a traditional schedule to a block schedule. The researcher collected data of Grade 10 students' mathematics and English scores on the Massachusetts Comprehensive Assessment System examination over a three-year period. Forman found that over the first two years of implementing block scheduling, there was a 15% increase of passing grades on the Massachusetts assessment.

Williams (2011) conducted a study to determine the impact of block scheduling on "student academic achievement, discipline, and attendance, and (b) administrator,

teacher, and student perceptions" (p. 5). In his study, he compared 2005-2010 data from a high school utilizing the A/B block schedule with that of a high school utilizing a traditional schedule. The quantitative portion of Williams'2011 study used reading and mathematics scores of the Florida Comprehensive Achievement Tests. The quantitative findings were mixed. Williams (2011) concluded that students on the block schedule earned higher reading scores but students on a traditional schedule earned higher mathematic scores..

Pisapia and Westfall (1997) conducted a study to determine the impact on student achievement for students on a semester block schedule as compared to those students on an alternating day block schedule. Students on semester block schedules experienced greater increases in overall grade point average than those on alternating block schedules. The researchers found that verbal scores rose more than mathematics scores in schools that switched to an alternating or semester block schedule (Pisapia & Westfall, 1997). The study showed that the Scholastic Aptitude Test scores were greater for students in alternating block schedules than for students in semester block schools. The students in two of four alternating block schools showed a decline on their advanced placement tests (Pisapia & Westfall, 1997).

Walker (2005), in an educational report presented to teachers, summarized findings regarding the development of a school's master schedule:

> To use a block schedule or a traditional schedule? Which structure will produce the best and highest achievement rates for students? The research is mixed on this due to numerous variables such as:

- socioeconomic levels
- academic levels
- length of time a given schedule has been in operation
- strategies being used in the classrooms
- what data is being used to measure achievement rates?
- how are students responding to the schedule?
- how long has the schedule been in effect? (Walker, 2005, p. 1)

Creamean & Horvath (2000) studied the effects of block scheduling on student achievement and attitudes. Data for analysis included the scores on objective, teacher-made tests covering the material taught in 90-minute class settings and 40-minute class settings. The researchers found no significant difference in student scores (Creamean & Horvath, 2000).

Gruber & Onwuegbuzie (2001) conducted a study to determine the effects of block scheduling on academic achievement. In this quantitative study, the Georgia High School Graduation Test scores of 146 high school students on a 4 x 4 block schedule were compared to those of 146 high school students on a traditional schedule. The researchers found no statistically significant difference in grade point averages or in scores on the writing portion of the Georgia High School Graduation Test (Gruber & Onwuegbuzie, 2001). There was, however, a significant difference in scores for language arts, mathematics, science, and social studies. In each subject area, students on a traditional schedule scored statistically significantly higher than students on a block schedule (Gruber & Onwuegbuzie, 2001).

Nichols (2005) completed a longitudinal study of five suburban high schools in Indiana. The study focused on student achievement in English language arts courses based on student grade point average. The schools included in the study transitioned from a traditional schedule to either a 4 x 4 block or A/B block schedule. In the early 1990s, the Indiana State Department of Education encouraged schools to transition towards block scheduling to provide more course offerings to students over their high school career (Nichols, 2005). Though Nichols found a significant increase in the number of English courses completed over a five- to six-year period, no significant changes were found in student achievement of A/B or 4 x 4 block scheduling over traditional scheduling (Nichols, 2005). The researcher also noted that minority students' grade point averages remained consistently lower than ethnic majority students (Nichols, 2005). This suggested that additional programs beyond innovative scheduling structures were needed in support of low-income and ethnic minority students (Nichols, 2005).

Muir (2003), in a meta-analysis study, looked at the effects on student achievement of schools that transitioned from traditional scheduling to block scheduling. His findings were mixed. In some studies that Muir examined, there was no change in achievement results. Other studies Muir examined indicated that advanced placement and fine art courses were negatively impacted by block scheduling. Still other studies illustrated improved student achievement in all subjects. Muir (2003) concluded that "The positive impact of block schedule seemed to hinge on changes to instructional strategies that engaged more learners, and teachers' receiving adequate training in implementing appropriate instructional strategies" (Muir, 2003, p. 1).

Tenney (1998), in a qualitative study, investigated the impact of block scheduling on students with emotional behavioral disorders/ADHD. He surveyed 23 teachers from 19 high schools in New Hampshire as to their perceptions of block scheduling on student performance. Achievement level was not mentioned, but the teachers surveyed had concerns about students' ability to maintain their academic focus (Tenney, 1998). Beaver (1998) examined the effects of block scheduling on the Indiana Statewide Testing for Educational Progress in the 1993-94 and 1994-1995 school years. The study was conducted to compare the 1993 language arts and reading scores when the school was on a traditional schedule to the 1995 scores when the school transferred to a block schedule. Beaver compared 130 scores from 1993 and 126 scores from 1995. No significant differences were noted in the language arts and reading scores (Beaver, 1998).

In 1997, the North Carolina State Department of Instruction conducted an evaluation of end-of-course examination scores from 1993-1996. By the 1995-1996 school year, North Carolina had 207 schools on block schedules. The evaluation compared the 1995 end-of-course test scores for block scheduled and traditional scheduled schools. The report examined data for five core subjects: English I; Algebra I; Economics, Legal, and Political Systems; Biology; and U.S. History (North Carolina, 1997). The findings showed the following:

> The EOC data does not change previous conclusions that there are essentially no significant differences between groups of blocked and corresponding nonblocked schools in terms of student performance on state EOC tests. There are also no

significant differences among groups of schools blocked for different numbers of years. (North Carolina, 1997, p. 4)

Trinkle (2011) examined the differences in student achievement on the end of course assessment in Geometry and the Grade 11 Literacy examination administered to students in Arkansas during the 2005-2006 and 2006-2007 school years. A total of 90% of the high schools in Arkansas operated on a traditional schedule, and only 5% operated on either a 4 x 4 block or an A/B block schedule (Trinkle, 2012). The researcher used an analysis of covariance to analyze differences in student achievement scores on the Geometry end-of-course and the Grade 11 Literacy assessments. No significant differences in the variances were found that could be attributable to scheduling type (Trinkle, 2012).

Williams, in a 1999 study, investigated the effects of block scheduling on students' grade point averages. Grade point averages of students from their ninth-grade year when they were on a traditional schedule were compared to grade point averages in their 10th-grade year on a block schedule. Three groupings of grade point averages were used to compare student achievement. After statistical analysis were run, the researcher found no significant differences in all three grade point average comparisons (Williams, 1999).

McCreary & Hausman (2001) used students' grade point average, scores on the Stanford Achievement Test 9, and credits attempted and earned in a study comparing a semester block schedule, an A/B block schedule, and a trimester schedule. The researchers found that students in a semester block schedule had a statistically higher

grade point average than students on the A/B block schedule or trimester schedule (McCreary & Hausman, 2001).

Nichols (2005) examined student data from five high schools that changed from a traditional to a semester block or A/B block schedule. Student achievement was based on their grade point averages in English and language arts. Nichols found no significant difference in student grade point average from a traditional schedule to block scheduling. Guskey and Kifer (1995) found that students' grade point averages and scores on the Maryland Functional Tests and Advanced Placement Test did not differ significantly. It was found, however, that Black students' scores improved significantly . (Guskey & Kifer, 1995).

Stader and DeSpain (1999) investigated why many small high schools in Missouri were utilizing block scheduling. In 1996, 163 three small high schools were using some form of Block scheduling. This study focused primarily on the perceptions of the effects of alternating day vs. modified block schedules. Stader and DeSpain designed their study to compare administrators' and teachers' perceptions of block scheduling to a traditional schedule . The researchers' questions centered on gaining insight into the effects of block scheduling on student achievement, school climate, and teacher methodology.

Stader and DeSpain (1999) looked at how teachers and administrators perceived changes to have occurred in the teaching process after the transition to a block schedule relative to the following six activities:

- lesson planning,
- assistance given to individual students,

- use of collaborative or cooperative learning,
- develop interdisciplinary units,
- teacher use of the extended learning time to foster critical thinking, and
- use of a variety of techniques to encompass different learning styles.(Stader & DeSpain, 1999, p. 7)

The researchers used student grades, the amount of homework assigned, quality of student work, curriculum coverage, and student enrollment in advanced courses as indicators for teachers and administrators perception of student achievement (Stader & DeSpain, 1999). They also asked the administrators their perceptions of the impact of block scheduling on students' ACT and mandated state test scores (Stader & DeSpain, 1999).

The analysis of data showed mixed results. Mathematics, science, and physical education teachers perceived an increase in the number of students who received A and B grades and a decrease in number of students who received D and F grades (Stader & DeSpain, 1999). It was also revealed that English and social studies teachers perceived no changes in student grades when the school transitioned to a block schedule (Stader & DeSpain, 1999).

Vermillion (1998) in a qualitative study of special education teachers found that 64% of the teachers surveyed perceived block scheduling as advantageous to students on independent educational plans. The teachers believed block scheduling allowed for more support services for students.

Glickman (1995) studied student achievement, using a measurement of student grades, in schools that operated on a block schedule. In his study of 820 high schools and 11,000 students, he found teachers at schools with block scheduling engaged students in active learning, as opposed to merely lecturing.

Stanley and Gifford, in their 1998 study, found that block scheduling improved student achievement. It allowed students to experience more courses over a four-year period than if they were on a traditional schedule. Stanley and Gifford also concluded that block scheduling encouraged active learning but that students on a block schedule would cover less of the curriculum than students on a traditional schedule. Though this concentration may allow for better mastery, they determined that block scheduling may not be conducive to achievement for students in districts that measure student achievement through standardized testing based on state curriculum guidelines (Stanley & Gifford, 1998).

Advantages and Disadvantages of Block Scheduling

Educators' opinions about block scheduling range from advantageous for students and teachers to unfavorable for both groups. Some of the advantages of using block scheduling which have been cited by researchers follow:

- Schools with block scheduling report fewer failing grades, dropout rates and discipline problems
- More time for student-teacher interaction
- Less time wasted in hallways and opening/closing classes

- Students can learn a subject in greater depth
- Students are exposed to a variety of instructional techniques
- Students have less information to absorb, less homework to complete
- Students can use their longer lunch blocks to participate in extra-curricular activities
- Teachers encounter fewer students each day, teach fewer classes each day and have longer prep periods
- Teachers are able to use a variety of instructional techniques. (Block Scheduling, n.d., p. 1)

McCoy and Taylor (2000) examined how block scheduling affected teachers' perceptions of school climate. The researchers studied 21 high schools that were utilizing a semester block schedule and found teachers perceived that student academic performance and discipline improved under block scheduling (McCoy & Taylor, 2000). The researchers also concluded that block scheduling encouraged collegiality and a sense of uninterrupted instructional time, leading to teachers' favorable attitudes towards block scheduling (McCoy & Taylor, 2000).

Musbach (n.d.), in a report for the University of Michigan, cited a 2006 study by Gullat who concluded that students in a traditional scheduled school were passive learners because lecturing was the most common teaching method utilized and did not allow for individualized instruction. This lack of time for individual instruction in a traditional schedule caused Musbach to agree with a 2006 study by Slavin stating that instruction from lecturing was a key factor in lowering academic achievement. Muir

(2003) also found block scheduling hinged on changes to instructional strategies that engaged more learners. Musbach, in the University of Michigan report, concluded that "In order to improve student achievement, a different instructional approach including less teacher directed and more student directed learning may be key" (para. 6). According to Musbach, a form of block scheduling, with additional time for each class, can improve individualized instruction and increase student achievement. This would foster greater student teacher interaction (Block Scheduling, n.d.).

Williams (2011) studied the impact of block scheduling on student discipline and attendance. The qualitative portion of his study was focused on administrators', teachers', and students' perceptions of the impact block scheduling had on student achievement, attendance, and discipline (Williams, 2011). The quantitative portion of his study showed a significant difference in discipline referrals over a five-year period from 2005-2010. Williams (2011) reported that 6,245 students who attended school on a traditional schedule received discipline referrals compared to 4,546 students under the A/B block schedule. The researcher did note that the difference in discipline referrals may be due to the difference in population between schools on a traditional and block schedule.

The qualitative portion of Williams (2011) study asked teachers, administrators, and students the following questions:

1. What is your overall perception of student academic achievement within block scheduling?

2. What is your overall perception of the impact block scheduling has on student discipline?
3. To what extent, if any, does the block schedule affect student attendance?
4. How does the block schedule influence the instructional strategies at your school?
5. What is your impression of transitioning from the traditional schedule to a block schedule? (p. 139)

The majority of responses by the administrators, teachers, and students supported that discipline improved on the A/B block schedule (Williams, 2011).

Gruber & Onwuegbuzie (2001) found that students' attitude toward school was an important factor in whether or not the student was an active member of the teaching-learning process. In a qualitative study of teachers' attitudes toward block scheduling, teachers reported their belief that because of fewer preparations, less students per semester, and less paper work, block scheduling had a positive effect on their preparation (Gruber & Onwuegbuzie, 2001). Students responded, in the same survey, that block scheduling reduced their homework, making block scheduling their preference (Gruber & Onwuegbuzie, 2001).

High schools are full of educational and organizational symbols, from a school's mascot to its vision statement. Vision is important in any organization. The vision of an organization helps define the direction and the optimal way to allocate resources to assist the organization to focus on future decisions (Bolman & Deal, 2008). Symbols carry powerful intellectual and emotional messages "that stimulate energy in moments of

triumph and offer solace in times of tribulation" (Bolman & Deal, 2008, p. 252). The symbolic frame focuses on how people perceive the environment around them. Williams (2011) reported "Qualities such as openness, trust, communication, and support shared by teachers are factors that encourage learning for students and job satisfaction and improved performance for teachers" (Williams, 2011 p. 42).

Shortt and Thayer (1998) examined the relationship between block scheduling and school climate. A Virginia Department of Education survey of urban, suburban, and rural schools using block scheduling revealed (a) a more relaxed environment, (b) a reduction in student-unsupervised movement, (c) less discipline referrals delivered to the office, (d) fewer student fights, (e) a positive effect on teacher attendance and morale, and (f) a positive impact on at-risk youth (Shortt & Thayer, 1998).

School districts must also pull from the human resource frame to meet the needs of the organization and the employees. The four basic assumptions that constitute this process are:

1. Organizations exist to serve human needs rather than the converse.
2. People and organizations need each other. Organizations need ideas, energy, and talent; people need careers, salaries, and opportunities.
3. When the fit between individual and system is poor, one or both suffer. Individuals are exploited or exploit the organization-or both become victims.
4. A good fit benefits both. Individuals find meaningful and satisfying work, and organizations get the talent and energy they need to succeed. (Bolman & Deal, 2008, p. 122)

An effective human resource policy must keep these core assumptions in mind when developing policies to invest, empower and retain their employees (Bolman & Deal, 2008).

Stader and DeSpain (1999) found that teachers working in a school with block scheduling believed that they had more opportunities to help individual students in the classroom and that block scheduling promoted cooperative or collaborative teaching techniques. Walker (2005) concluded that a school's schedule should meet the academic and instructional needs of the students. The emphasis must not solely be on reducing lecture method and eliminating student boredom but on structuring a culture that promotes student learning (Hackman, 2004).

Districts must look at ways to restructure schools to meet the needs of the students and educators. The importance of structure to performance is essential. There are six distinguishing characteristics of high-quality team structure. High performing teams: shape purpose; translate common purpose into specific, measurable performance goals; are manageable size; develop the right mix of expertise; develop a common commitment to working relationships; and hold themselves collectively accountable (Bolman & Deal, 2008, pp 111-112). If a school-based program has adopted block scheduling, school leaders will need to focus on the human resource frame of organizations as well. Bolman and Deal (2008) stated "Employees must have a significant ownership share in the company by sharing financial data, involving employees in decisions, breaking down the hierarchy, emphasizing teams and cross-training, and protecting jobs" (Bolman & Deal, 2008, p. 147).

Spencer and Lowe (1992) emphasized the need for schools to have a purpose in transitioning from a traditional to block schedule. The researchers found that teachers who transitioned from a traditional to block schedule were not given adequate training on how to effectively utilize the additional class time (Spencer & Lowe, 1992). Hackman (2004) surmised, "Absent a solid theoretical framework, secondary school faculties cannot fully grasp the purpose of these longer instructional units and are likely to view block scheduling as the end itself rather than a means to an end" (Hackman, 2004, p. 700). Lewis (1999) further emphasized the importance of school districts to routinely evaluate changes made to school schedules, stressing the importance of continued assessment to evaluate whether a transition from a traditional to block schedule would meet the school's needs (Lewis, 1999).

Khazzaka (1998) administered a survey to measure opinions of high school administrators of six schools that transitioned to a block schedule. From his qualitative study, he concluded that administrators perceived the following: the schools' climates were more relaxed; teachers utilized a variety of instructional strategies; there was evidence of increased collaboration, and student infractions of rules had declined (Khazzaka, 1998).

Calvery, Sheets, and Bell (1998) surveyed 200 high school students who switched from a traditional to block schedule. The students were given 12 Likert-type scaled items to rate their attitudes and perceptions of block scheduling. Though after one year of being on block scheduling, students showed an increase in liking the new schedule, they still preferred the traditional schedule (Calvery et al., 1998). Stader and DeSpain (1999)

found teachers in a modified or A/B block schedule preferred to remain in a block schedule. Conversely, they found teachers in the 4 X 4 block schedule supported a return to a traditional schedule.

Davis-Wiley (1995) surveyed 238 teachers and 10 administrators from two large eastern Tennessee high schools and found that the majority of the teachers perceived they were adequately prepared for the transition from a traditional schedule to a block schedule. The professional training prior to the transition led to an increase in variation in their teaching methods as well as an acceptance of block scheduling. A majority of the teachers studied did not want to return to a traditional schedule (Davis-Wiley, 1995).

In the Stader and DeSpain (1999) study, school climate was measured by several indicators:

- teacher and student daily attendance,
- the teacher/student relationship,
- frequency of hallway disruptions,
- class size,
- the level of stress,
- types and frequency of disciplinary referrals,
- if the school day was more or less hectic. (Stader & DeSpain, 1999, p. 6)

Stader and DeSpain (1999) found, in their qualitative study, that teachers and administrators perceived that student and teacher attendance improved, that the teacher/student relationship improved, and that hall disruption and disciplinary issues decreased. It was also revealed that teacher stress depended on the number of years of

experience an educator had with block scheduling. Though teachers with five or more years of teaching in a block schedule were found to have less stress than teachers with fewer than five years of teaching in a school that utilized a block schedule, no relationship was found between teacher stress level and subject area taught (Stader & DeSpain, 1999).

In their 1999 study, Stader and DeSpain also ascertained teachers' and administrators' perceptions on the effect of block scheduling on methodology. They assessed perceived changes in the teaching process in six ways:

- lesson planning,
- assistance given to individual students,
- use of collaborative or cooperative learning,
- develop interdisciplinary units,
- teacher use of the extended learning time to foster critical thinking,
- use of a variety of techniques to encompass different learning styles. (Stader & DeSpain, 1999, p. 8)

The perception among teachers and administrators was that block scheduling, A/B or modified block, allowed teachers "greater opportunity to help individual students, use collaborative or cooperative learning strategies, and improve student critical thinking skills" (Stader & DeSpain, 1999, p. 8).

The findings of Stader and DeSpain (1999) were in agreement with the 2011 North Carolina Department of Education report . The North Carolina Department of

Education listed the following as advantages of block scheduling in the delivery of instruction:

- Teachers have fewer students, thus they have the time to know their students better, to focus on their needs and learning styles, and to advise them as needed.
- There is more time for quality instructional time because there is less wasted class time.
- There is more class time to conduct extended activities such as seminars and projects.
- The reduced teacher workload frees time for improving the delivery of instruction and may include team teaching, interdisciplinary studies, and cooperative teaching strategies. (North Carolina Department of Education, 2011, p. 6)

The underlying assumption of the studies completed by Stader and DeSpain (1999) and Khazzaka (1998) was that if teachers and administrators perceived block scheduling as having a negative impact on teaching and learning, the school districts would want to return to a traditional schedule.

Some of the disadvantages of using block scheduling which have been frequently noted by researchers include the following:

- Longer time gaps between instruction and standardized exams,
- Student absences are difficult to make up,
- Teachers have not been trained to engage students for long periods of time,

- Subjects requiring regular repetition (e.g. math, foreign languages, music, etc.) are difficult to teach in this format,
- Lose continuity between classes if do not meet daily. (Block Scheduling, n.d., p. 1)

Teachers surveyed in North Carolina reported several disadvantages to block scheduling. The 2011 report from the North Carolina Department of Education listed the main concerns of teachers as loss of class time. Stader and DeSpain (1999) reported that administrators and teachers needed a longer planning period to prepare for classes, and the preparation was more difficult due to the lengthen instructional time.

Hackman (2004) argued that school leaders needed to focus on why a school should transition towards a block schedule. Schools that transition from a traditional to block schedule may do so for several reasons. Hackman indicated that though principals cited increased learning opportunities for students as an advantage, they "are at a loss to explain how scheduling adjustments are intended to promote improved student learning"(p. 700). Hackman argued that there may be a lack of substantive dialogue between teachers and administrators on why block scheduling may be a more advantageous schedule for both students and teachers

Block scheduling has been seen by educators and administrators as a cure for educational problems (Irmsher, 1996). Slate and Jones (2000) assessed teachers' and students' perceptions of block scheduling following a one-week trial period in a high school in southern Georgia. The researchers surveyed 1,205 high school students using a five-point Likert-type scale and addressed the following research questions:

> (a) What difficulties and advantages do students believe are associated with block scheduling? (b) What instructional behaviors do students perceive in teachers during block scheduling? (c) To what extent do students believe block scheduling is an acceptable alternative to traditional scheduling, and to what extent do they prefer block scheduling to traditional scheduling? (Slate & Jones, 2000, para. 11)

The study revealed that students perceived difficulties in the change from traditional to block schedule. Students' overall attitudes toward block scheduling, based on ethnicity did not differ significantly, African-Americans (M = 2.90; SD = 1.24) and Whites (M 2.87; SD = 1.33) (Slate & Jones, 2000). African-Americans (M = 2.51; SD = 1.12) showed a stronger preference for traditional scheduling than did Whites (M - 2.83; SD = 1.25) (Slate & Jones, 2000).

Slate and Jones (2000) concluded:

> Educational reforms designed to increase academic achievement are unlikely to have social validity with high school students because their reactions to educational changes are not strongly related to effects on achievement. In other words, increasing academic achievement may not be a highly valued goal for high school students. As a result, high school students' reactions to educational reform may differ significantly from the reactions of adults. (Slate & Jones, 2000 para. 32).

One of the advantages for 4 x 4 block scheduling was listed as "Teachers have fewer students, thus they have the time to know their students better, to focus on their needs and learning styles, and to advise them as needed" (Block Scheduling, n.d., p. 1).

The North Carolina Department of Education (2011) acknowledged that same advantage of a 4 x 4 block, but for an A/B block schedule did not list the number of students as a disadvantage. "In an alternate day setting, teachers still have to teach 150 students every other day, and still have the same amount of paperwork to correct and have the same amount of administrative paperwork to handle every other day" (North Carolina, 2011, p. 4).

Gruber& Onwuegbuzie (2001) referenced a common disadvantage of block scheduling as perceived by educators. They noted that missing one class in a block schedule was equivalent to missing two classes in a traditional format (Gruber & Onwuegbuzie, 2001).

Another common theme mentioned as a disadvantage of block scheduling was retention of material (North Carolina, 2011). "Researchers studying knowledge retention have identified two primary predictors of retention: (1) how well the original learning occurred and (2) the type of learning, that is, recall compared to comprehension or application of knowledge" (Shockey, 1997, p. 50). Shockey examined the instructional strategies used by teachers to eliminate the effects of the retention interval for students beginning Pre-Calculus on a 4 x 4 block schedule. Retention interval was defined as the time period between the initial exposure to concepts and the second exposure (Shockey, 1997). Shockey sought answers to the following questions:

> Is there a significant difference in scores on a pre-review test given at the beginning of a precalculus course among three groups of students identified by

the length of the retention interval (Group 1, zero months; Group 2, eight months; Group 3, 12 months)? (p. 88)

Is there a significant difference in the scores on an end-of-course test in precalculus among three groups of precalculus-merit students identified by the length of the retention interval (Group 1, zero months; Group 2, eight months; Group 3, 12 months)? (p. 94)

A significant difference was found by Shockey in the means of the pre-review test scores between students who started pre-calculus during the spring semester after taking Algebra 2 in the fall semester (retention interval of 0) and between students who finished Algebra 2 in the fall semester and did not take pre-calculus until the following spring semester (retention level 12). For the end-of-course examination, there was no significant difference in scores (Shockey, 1997).

One of the advantages of block scheduling has been championed by Hackman (2004). Hackman presented an argument that block scheduling could "facilitate student-centered learning practices associated with constructivism"(Hackman, 2004, p. 697). The author contrasted constructivism theory with a behaviorist approach. Behaviorists believe students learn through small increments followed by self-practice. This approach, according to Hackman, leads to direct instruction, and the teacher is the primary distributer of knowledge. In contrast, constructivism emphasizes the student role in the classroom.

Constructivist theory is based on the premise that individuals must be socially engaged in learning, actively creating knowledge from their existing knowledge base,

beliefs, and personal experiences. Constructivists advocate learners' participation in context-bound, real world problem solving and call upon students to engage in metacognition (Hackman, 2004). Block scheduling should foster this approach of learning.

Honeycutt and Friedman (2009) noticed that schools that transitioned from a traditional to block schedule were not showing increased student performance. They examined how block schedules vs. traditional schedules affected the teaching methods of teachers in the classroom. Honeycutt and Friedman reported that lecture was a common method of delivery for teachers in a block schedule: "Because of less time spent in a given course throughout the year, many teachers feel rushed to cram as much material into individual classes as possible. To compensate for this, many teachers tend to over rely on lecture"(Honeycutt & Friedman, 2009, p. 26).

The lack of improved student achievement may be caused by the lack of diverse teaching methodology in high schools. Hackman (2004) argued that high school teachers tend to direct instruction, regardless of schedule, due to a concern with curriculum. He posited that this may lead to teachers' resisting teaching methods perceived as reducing the emphasis on the curriculum.

Masoumi and Lindstrom (2011) conducted a study to look at the quality in virtual instruction. They concluded that any model for assuring quality education needs to focus on teaching content-based instruction centered on theoretical premises of teaching. The model for effective teaching centers on the answers to three questions; "What is good teaching/learning, how to improve student learning, and how and when it should be

undertaken" (Masoumi & Lindstrom, 2011, p. 28). They concluded that the theoretical foundation for teaching was not to be found in virtual schools because too many virtual courses were a composition of state benchmarks and were "not building on a comprehensive theoretical approach" (Masoumi & Lindstrom, 2011, p. 28)

The literature was silent on student achievement for full time virtual school students. Full time virtual schools are relatively new, and little research has been conducted in regard to student achievement (Cavalluzzo, Lowther, & Mokher, 2012). The exact numbers of virtual programs are unknown. (Hawkins, Barbour, & Graham, 2012,). Conducting research on student achievement on virtual education would be difficult, as most virtual programs are a blend of virtual and traditional classroom. This lack of clear data makes it difficult to find a causal effect for student growth.

In a study from 2007 to 2009, researchers for the Regional Educational Laboratory Appalachia evaluated the Kentucky Virtual Schools Algebra 1 program. Researchers compared 25 high school students: 13 students who took Algebra 1 through a virtual program and 11 students who had face-to-face instruction. The data showed that there was no significant difference between student achievement based upon the method of instruction (Cavalluzzo et al., 2012,). The majority of the research on blended virtual programs showed no significant differences in regard to student achievement. These non-significant "findings have helped educators and parents overcome the fear of a lack of quality in distance learning. . . ." (Hawkins et al., 2012) and led many to look at virtual school as viable alternative to traditional schooling. The question remains as to whether

students in a full time virtual school will show the same achievement level as their traditional school counterparts.

Miron and Urschel (2012) conducted a study of K12 Inc., the largest virtual school provider in the United States, that was focused on characteristics of the schools and student outcomes. The demographics for K12 Inc. students were as follows:

- K12 Inc. virtual schools enroll approximately the same percentages of black students but substantially more white students and fewer Hispanic students relative to public schools in the states in which the company operates.
- On average 39.9% of K12 students qualify for free or reduced-price lunch, compared with 47.2% for the same state comparison group.
- K12 virtual schools enroll a slightly smaller proportion of students with disabilities than schools in their state and in the nation as a whole.
- Students classified as English language learners are significantly under-represented in k12 schools; on average the k12 schools enroll .3% ELL students compared with 13.8% in same state comparison group and 9.6% in the nation.
- Most K12 schools serve students from grades Kindergarten to 12; however, K12's enrollment is greatest in the middle school grades. Enrollment decreases sharply in high school grades. (Miron & Urschel, 2012, p. 5)

In their analysis of K12, Inc. reports, Miron and Urschel (2012) found that only 27.7% of the schools met adequate yearly progress in the 2010-11 school year. Though this was similar to other privately managed virtual schools (27.4%), both lagged well

behind the average of 52% of public schools that met adequate yearly progress (Miron & Urschel, 2012). According to Miron and Urschel, this comparison needs to be viewed with caution as the low AYP numbers for virtual schools could be a result of virtual schools' not meeting the participation target of 95%.

One alarming trend in regard to K12, Inc. was that only seven of 36 full-time virtual schools operated by K12, Inc. were assigned satisfactory progress by state education authorities in the 2010-11 school year (Miron & Urschel, 2012). Two more areas of concern for the virtual schools were apparent in mathematics and reading achievement levels. Reading scores for K12, Inc. Grades 3-11 were between 2 and 11 percentage points below the state average. In mathematics, the scores were between 14 and 36 percentage points lower than students in their host states with the higher gaps in higher grades (Miron & Urschel, 2012). The problem with interpreting the discrepancies of the test scores was, however, the transient nature of the students. K12, Inc. reported that in the 2010-11 school year, 90% of its students had been enrolled for fewer than two years.

Hackman (2004) observed that much of the research on student achievement in traditional, block, and virtual settings has centered on climate or implementation of programs and little focus has been on pedagogy. Rikard and Banville (2005) surveyed high school physical education teachers as to their perceptions of block scheduling. The survey focused on six areas and how the transition from a traditional to block schedule had impacted their perception relative to: (a) planning and teaching practices, (b) student responses, (c) any change in student learning, (d) changes in student discipline and

management issues, (e) student absences, and (f) preferences of one format compared to the other (Rikard & Banville, 2005, p. 29). The responses to the survey showed a favorable trend towards block scheduling in all categories. What was interesting in the study was though teachers perceived student achievement as improving, the teachers had no quantitative proof (Rikard & Banville, 2005). Despite stating that block scheduling improved their teaching practice the researchers found that "These teachers described the predominant use of direct instruction whereas more indirect approaches such as problem solving activities, team building activities, designing original games and routines allow students to assume decision making roles and offer an alternative to student involvement" (Rikard & Banville, 2005, p. 33). These researchers were in agreement with the 2011 North Carolina report indicating that students may become bored easily if the teaching methods are too teacher focused.

In a Massachusetts report on learning time, teachers ranked time in the classroom as the most important factor that affected their ability to teach, and the time students spent in the classroom made a significant difference in student achievement (Massachusetts, 2020). The report also indicated that collaboration among teachers was perceived as critical for student achievement. Adequate time to communicate and plan with their peers to build and improve their teaching is skills was viewed as one advantage of extended time (Massachusetts, 2020).

When instructional time or planning time is not utilized effectively, more time added to a class period or school day will not ensure gains in student achievement (WestEd Policy Brief, 2001). There are three types of time utilized in an educational

setting: allocated time, academic learning time, and engaged time. Allocated time is the time students are required to attend school or a course, but there has been little to no significant correlation between allocated time and student achievement (WestEd Policy Brief, 2001). Engaged time refers to the time when students are participating in learning activities. There is a small correlation between engaged time and student achievement (WestEd Policy Brief, 2001). Academic engaged time is when students are learning during the class activities, and there is a high correlation between academic learning time and student achievement (WestEd Policy Brief, 2001).

Block scheduling lengthens the class period. Transitioning from a traditional schedule to a block schedule is only effective as part of an effort to improve academic learning time. The transition must be part of a larger reform effort to impact pedagogy, curriculum, and assessment (Block Scheduling, n.d.). Ensuring the appropriateness of the curriculum and instruction as well as increased time contribute to student achievement (WestEd Policy Brief, 2001).

Hackman (2004) argued that state mandated testing is a barrier to the advantages that block scheduling can offer. Block scheduling is not just altering class time, but is a redesign of the instructional program (Block Scheduling, n.d.). It is inherent in schools that have transitioned to block scheduling that though less curriculum is covered in a particular course students are able to process what they learn at a higher cognitive level (Block Scheduling, n.d.). The standards movement and high stake testing, influenced by the need to increase student academic learning time, may have an opposite effect for teachers in block schedules (Hackman, 2004). Hackman has posited that rather than

serving as a catalyst for student-centered learning, teachers may be relying on direct instruction to ensure that the curriculum that is being tested on end-of-course examinations is taught.

According to Hackman, if the movement towards high stakes testing in the first decade of the 21st century leads to more direct instruction in block schedule classrooms, there is a danger that the 90-minute class period will become the new traditional schedule. The drive to standardize the school day emerged during the scientific era of management. This era emphasized efficiency, mass production, and uniformity (Hackman, 2004). The Carnegie unit, which established 120 hours of class time per class to be delivered in 40- to 60-minute classes was adopted "as an organizational solution to the problem of efficiently educating large numbers of students" (Hackman, 2004, p. 699).

The concept of time and learning is not a new issue in the debate on how to improve student achievement. The 1894 comments of the U. S. Commissioner of Education William T. Harris were restated as being relevant in a 1994 statement of the National Education Commission on Time and Learning (NECTL):

> [T]he constant tendency [has been] toward a reduction of time. First, the Saturday morning session was discontinued; then the summer vacations were lengthened; the morning sessions were shortened; the afternoon sessions were curtailed; new holidays were introduced; provisions were made for a single session on stormy days, and for closing the schools to allow teachers...to attend teachers' institutes. (NECTL, 1994, para. 12)

By the 1980s, critics emerged challenging traditional schedules as outdated and not meeting the educational needs of students. The critics argued that 40- to 60-minute classes were too fragmented, encouraged direct instruction, and discouraged critical thinking skills (Hackman, 2004).

In a letter dated April 26, 1983 to the Secretary of Education, David P. Gardner, Chairman for the National Commission on Excellence in Education stated the purpose of the Nation at Risk report.

> Our purpose has been to help define the problems afflicting American education and to provide solutions, not search for scapegoats. We addressed the main issues as we saw them, but have not attempted to treat the subordinate matters in any detail. We were forthright in our discussions and have been candid in our report regarding both the strengths and weaknesses of American education (Nation at Risk, 1983, p. 1)

Indicators of the Risk

In its report, *A Nation at Risk*, the National Commission on Excellence in Education listed numerous risks that had been discovered by the commission in its fact-finding role. Following is an excerpt from the report detailing the problem:.

> The educational dimensions of the risk before us have been amply documented in testimony received by the Commission. For example:

- International comparisons of student achievement, completed a decade ago, reveal that on 19 academic tests American students were never first or second and, in comparison with other industrialized nations, were last seven times.
- Some 23 million American adults are functionally illiterate by the simplest tests of everyday reading, writing, and comprehension.
- About 13 percent of all 17-year-olds in the United States can be considered functionally illiterate. Functional illiteracy among minority youth may run as high as 40 percent.
- Average achievement of high school students on most standardized tests is now lower than 26 years ago when Sputnik was launched.
- Over half the population of gifted students do not match their tested ability with comparable achievement in school.
- The College Board's Scholastic Aptitude Tests (SAT) demonstrate a virtually unbroken decline from 1963 to 1980. Average verbal scores fell over 50 points and average mathematics scores dropped nearly 40 points.
- College Board achievement tests also reveal consistent declines in recent years in such subjects as physics and English.
- Both the number and proportion of students demonstrating superior achievement on the SATs (i.e., those with scores of 650 or higher) have also dramatically declined.
- Many 17-year-olds do not possess the "higher order" intellectual skills we should expect of them. Nearly 40 percent cannot draw inferences from

written material; only one-fifth can write a persuasive essay; and only one-third can solve a mathematics problem requiring several steps.

- There was a steady decline in science achievement scores of U.S. 17-year-olds as measured by national assessments of science in 1969, 1973, and 1977.
- Between 1975 and 1980, remedial mathematics courses in public 4-year colleges increased by 72 percent and now constitute one-quarter of all mathematics courses taught in those institutions.
- Average tested achievement of students graduating from college is also lower.
- Business and military leaders complain that they are required to spend millions of dollars on costly remedial education and training programs in such basic skills as reading, writing, spelling, and computation. The Department of the Navy, for example, reported to the Commission that one-quarter of its recent recruits cannot read at the ninth grade level, the minimum needed simply to understand written safety instructions. Without remedial work they cannot even begin, much less complete, the sophisticated training essential in much of the modern military. (*Nation at Risk,* 1983, p. 11)

Block scheduling emerged partly as a response to the criticism of education that arose in the 1980s (Hackman, 2004). Constructivists viewed the block schedule as a catalyst to improving student achievement. In order to have an effect on student achievement, according to Hackman, the transition to block scheduling must be accompanied by a transformation of instructional practices. Instructional strategies for schools that transition to block schedules include cooperative learning, teaming,

performance assessment, and problem based learning. If implemented in the right framework, according to Hackman, these strategies can improve student achievement. He argued that teachers in schools that have implemented block scheduling view different teaching techniques as a means of "eliminating boredom rather than on structuring a culture that promotes student learning"(Hackman, 2004, p. 700).

Schools that transition to block scheduling without a pedagogical foundation are not implementing any change to their schools' academic culture (Hackman, 2004). A strong theoretical foundation for the transition to block scheduling is needed to create a culture where teachers embrace learning strategies not to fill up time, but to help students "construct meaning from the curriculum" (Hackman, 2004, p. 702).

The 13th Annual Model School Conference, held in 2005, highlighted numerous schools as case studies for successful programs. The high schools profiled in the 2005 Model School Conference were all cited for being models for effective leadership. Among the schools highlighted were Littleton High School in Colorado, Brockton High School in Massachusetts, and McFatter Technical High School in Florida. All three high schools shared some form of block scheduling, increased student achievement, and a restructuring program centered on a clear vision (Model Schools Conference, 2005).

Littleton High School began a restructuring initiative in 2000 (Model Schools Conference, 2005). When restructuring an organization, according to Bolman and Deal (2008), leaders need to take into account the four frameworks in organizations and use a multi-faceted approach utilizing the structural, human resource, political, and symbolic frames. Littleton High School's transition to a block schedule was implemented utilizing

Bolman and Deal's organizational theory. Given that decision making is at the core of the political frame in organizations, the decision to transition to a modified block schedule was made after "an extensive collaborative decision-making process with students and faculty represented" (Model Schools Conference, 2005, p. 259). This method allowed for all five basic assumptions that make up the political frame of an organization to be met.

1. Coalition members have enduring differences in values, beliefs, information, interests, and perceptions of reality.
2. Most important decisions involve allocating scarce resources-who gets what.
3. Scarce resources and enduring differences put conflict at the center of day-to-day dynamics and make power the most important asset.
4. Goals and decisions emerge from bargaining and negotiation among competing stakeholders jockeying for their own interests. (Bolman & Deal, 2008, pp. 194-195)

Once the decision to transition to a modified block schedule was made, staff development for the faculty was provided for instructional strategies for both block schedule and constructivist learning. Staff development makes possible radical change in the teaching and learning process and the use of time (NECTL, 1994). The allocation of resources can "allow and encourage the use of active teaching strategies and greater student involvement" (Hackman, 2004, p.700).

Vision is important in any organization. The vision of an organization helps define the direction and how to allocate resources to keep the organization focused on

future decisions (Bolman & Deal, 2008). Littleton's vision was centered on answering the question "What should teaching and learning look like for our students?" (Model School Conference, 2005, p. 255).

In its 2004 accountability report for student achievement, based on the Colorado Student Assessment Program, Littleton High School reported scores above the state average in all subject areas. For ninth-grade students, scores at proficient or advanced in reading, writing, and mathematics were 70%, 58% and 40% respectively (Model School Conference, 2005). For 10th-grade students, the respective scores at proficient or advanced in reading, writing, and mathematics were 72%, 58%, and 33% (Model School Conference, 2005). The scores were above the state average in all subject areas (Model School Conference, 2005).

The International Center for Leadership in Education, when preparing the case study of Littleton High School for the Model School Conference, cited the school restructuring, school leadership, vision, shared responsibilities, and professional development as the most significant factors for the school's rising student achievement (Model School Conference, 2005). Listed among the principal's areas of strength were culture and embedded leadership (Model School Conference, 2005).

Another exemplary school presented at the Model School Conference (2005) was Brockton High School in Massachusetts. Having started its restructuring program in 1995, the school adopted a modified block schedule. The restructuring centered around collaborative instructional leadership, personalization, and scheduling (Model School Conference 2005). Student achievement increased to such a high point in 2002 that the

Massachusetts Commissioner of Education chose Brockton High School as the location to release that year's student achievement levels of the Massachusetts Comprehensive Assessment System (Model School Conference 2005). In 2004, 55% of 10th-grade students achieved either levels of proficient or advanced in English language, and 38% did so in mathematics (Model School Conference, 2005). The principal listed the continued work of the restructuring committee as one of the top five greatest attributes to the continued growth of student achievement at Brockton High School. This committee was structured to address 10 issues at the school, one of which was the school's schedule (Model School Conference, 2005).

Seven years after its first recognition, in 2012, Brockton High School was once again highlighted as a model school (Model School Conference, 2012). The case study developed to showcase the school revealed the following demographics:

- 4,250 students
- 74% minority
- 72% free/reduced lunch
- 11% with disabilities
- 14% English language learners
- 50% first language not English
- 33% grads w/state scholarships
- 99% passed ELA/math tests (Model School Conference, 2012, p. 1)

After the 2005 Model School Conference report, Brockton High School continued to show improvement in student achievement (Model School Conference, 2012). In

2008, 2010, and 2012, Brockton High School was a recipient of *US News and World Report*'s Bronze Medal, a Best High School in America award (Model School Conference, 2012).

In 2005, 2006, and 2007, over 20% of seniors was awarded Adams Scholarships and in 2008, 2009, 2010, and 2011, 25% of Brockton's graduating class received the scholarships (Model School Conference, 2012). In 2012, there was an 11% increase from 2005 when 33% of graduating seniors were awarded Adams Scholarships (Model School Conference, 2012). In 2012, Brockton High School still operated on a block schedule, and 99% of the students in the 2012 senior class passed the Massachusetts Comprehensive Assessment System in English and mathematics (Model School Conference, 2012).

In building the case study for recognition, the principal listed the work of the Leadership Team as one of the top three reasons for the continued success of student achievement (Model School Conference, 2012). The principals cited, "The Leadership Team is the driving force behind substantive change, the conduit for communication across disciplines, and the foundation to improve the continuity of instruction and consistency of building policies and procedures" (Model School Conference, 2012, p. 16).

Also recognized at the 2012 Model School Conference was Kennesaw Mountain High School in Cobb County, Georgia. Its restructuring began in 2011 when it adopted a 4 x 4 block schedule. Part of the transition initiative was made was to ensure a more personalized education. The restructuring centered around collaborative instructional

leadership, personalization, and scheduling (Model School Conference 2012). The case study presented for Kennesaw High School highlighted the rising student achievement, noting that the percentage of students scoring 3 or higher on Advanced Placement exams had exceeded district and state percentages (Model School Conference, 2012).

The International Center for Leadership in Education, in preparing the case study of Kennesaw High School for the Model School Conference, cited school restructuring and personalized approach as strengths (Model School Conference 2012). Personalization of education was noted as an important area in the NECTL (1994) report.

> Fixing the flaw means that time should be adjusted to meet the individual needs of learners, rather than the administrative convenience of adults. The dimensions of time in the learning process extend far beyond whether one student needs more time and another can do with less. The flexible use of time can permit more individualized instruction. (para. 6)

Summary

This review has been focused on the effects on student achievement in core academic courses, attendance rates, discipline, school culture and dropout rates when schools move away from the traditional scheduling in high schools and transition to a block schedule.

Block scheduling has grown in popularity for public schools as demonstrated by the large number of schools participating in some form of block scheduling. The hope for block scheduling has been that, as a method of school change and restructuring use of

time, student achievement can be increased. The literature and research on block scheduling, however, is mixed on its impact on student achievement. The impact of block scheduling on a school's culture is more defined. Schools that have transitioned to block schedule tend to cite the school culture as one that expects high achievement for all students (Model School Conference, 2012).

CHAPTER 3
METHODOLOGY

Introduction

This chapter presents the methodology that was used to test the research questions which guided the study. The chapter has been organized to address (a) the purpose of the study, (b) population and sampling, (c) design of study, (d) data collection,; (e) variables, and (f) data analysis.

Purpose of the Study

This study was conducted to compare student performance on Florida's Algebra 1 End-of-Course Examination for students educated in a 4 x 4 (A/B) block schedule to that of students educated in a traditional seven-period day schedule. Spring, 2012 and 2013 Algebra 1 End-of-Course Examination scores of students from two central Florida public high schools served as the source of data. Each high school operated using a different school schedule. One high school operated on a 4 x 4 (A/B) block schedule, and the other operated on a traditional seven-period day schedule. The question for educational leaders was clear. Did the type of schedule significantly impact student achievement on the Algebra 1 End-of-Course Examination?

Research Questions

The research questions which guided the study were as follows:

1. What is the difference between Algebra 1 End-of-Course Examination scores for ninth-grade students who attend high school with a traditional schedule and those who attend high school with a 4 x 4 block schedule?

   H_{01} There is no difference between Algebra 1 End-of-Course Examination scores for ninth-grade students who attend high school with a traditional schedule and those who attend high school with a 4 x 4 block schedule?

2. What is the difference between Algebra 1 End-of-Course Examination scores for ninth-grade male students who attend high school with a traditional schedule and those who attend high school with a 4 x 4 block schedule?

   H_{02} There is no difference between Algebra 1 End-of-Course Examination scores for ninth-grade male students who attend high school with a traditional schedule and those who attend high school with a 4 x 4 block schedule?

3. What is the difference between Algebra 1 End-of-Course Examination scores for ninth-grade female students who attend high school with a traditional schedule and those who attend high school with a 4 x 4 block schedule?

   H_{03} There is no difference between Algebra 1 End-of-Course Examination scores for ninth-grade female students who attend high school with a traditional schedule and those who attend high school with a 4 x 4 block schedule?

4. What is the difference between Algebra 1 End-of-Course Examination scores for Black students who attend high school with a traditional schedule and those who attend high school with a 4 x 4 block schedule?

   H_{04} There is no difference between Algebra 1 End-of-Course Examination scores for Black students who attend high school with a traditional schedule and those who attend high school with a 4 x 4 block schedule?

5. What is the difference Algebra 1 End-of-Course Examination scores for Hispanic students who attend high school with a traditional schedule and those who attend high school with a 4 x 4 block schedule?

   H_{05} There is no difference between Algebra 1 End-of-Course Examination scores for Hispanic students who attend high school with a traditional schedule and those who attend high school with a 4 x 4 block schedule?

Population

Convenience sampling was used to identify the population for the study. The population was comprised of all ninth-grade students who were enrolled in Algebra 1 during the 2012-2013 school year in two rural public high schools in Central Florida. During the 2012-2013 school year, School A students enrolled in Algebra 1 took Algebra 1 on a 4 x 4 (A/B) block schedule, and School B students took the same course on a traditional schedule of 42 minutes every day.

High school A had a student population of 1,747 students. There were 1,008 White students, 229 Black students, 412 Hispanic students, 55 Asian students, and 9

American Indian/Alaskan Native students. High school B had a student population of 1,755 students. There were 1,080 white students, 116 Hispanic students, 484 Black students, 34 Asian students and 9 American Indian/Alaskan Native students. The demographics of the two high schools are contained in Appendix A.

The populations from each school were divided further into four student populations to study; male students, female students, African-American students, and Hispanic students.

Design of Study

This study was a quantitative study to analyze the impact of two different school schedules on student achievement. Differences between the independent variables, block scheduling and traditional scheduling were examined to determine their impact, if any on the dependent variable, student scale scores on the Florida Algebra 1 End-of-Course (EOC) Examination.

Data Collection

Prior to initiating any research, approval was sought and received to conduct the study from the school district's Research and Accountability Department (Appendix B). The University of Central Florida's Institutional Review Board reviewed the proposal and determined there was no need for approval (Appendix C). A list of students was compiled, and students' Algebra 1 EOC Examination scale scores were inputted along with gender, race, FCAT Mathematics Developmental Scale Scores, and type of

schedule. Once the student data were entered into an Excel spread sheet, any unique student identifiers, i.e., names, and student identification numbers, were removed from the data. The Excel spread sheet contained the Algebra 1 EOC Examination scale score, level, race, type of schedule, and gender.

The Florida Algebra 1 EOC Examination has been designed to measure student achievement level of the Next Generation Sunshine State Standards (FLDOE 2012). There are four test forms for the Algebra 1 End-of-Course Examination. Florida's Department of Education uses a process called equating to ensure that the tests are comparable. "The equating process ensures that the interpretation or meaning of student T scores on the different test forms is the same" (FLDOE, 2012 p. 10). Also, for the purpose of test reliability and validity, the four test forms for the Algebra 1 EOC Examination were reviewed by a committee of science and mathematics educators trained in Dr. Norman Webb's alignment criteria. (FLDOE 2012).

Variables

The variables in this study included student schedules, students' gender, students' race, and students' scores on the Algebra 1 EOC Examination. In this study, student schedules served as the independent variable and were being examined to determine how they affected students' Algebra 1 EOC Examination scores (the dependent variable). The independent variable was a nominal variable measured by type of schedule of student. The dependent variable was an interval/ratio variable that measured the students' scores on the Algebra 1 EOC Examination

The two moderator variables were students' gender and students' race. Gender was a nominal variable measured by identifying students as male or female. Race was a nominal variable measured by identifying students as Black, Hispanic/Latino, White, Asian, American Indian or Alaskan Native, or Native Hawaiian or other Pacific Islander. Extraneous variables that may have influenced student achievement were students' attendance, teachers' level of effectiveness, students' class meeting time of day, and prior math courses.

Data Analysis

In this study, student performance on Florida's Algebra 1 EOC Examination for students educated in a 4 x 4 (A/B) block schedule was compared to that of students educated in a traditional seven-period day schedule. The students' Algebra 1 EOC Examination scale scores were analyzed using descriptive statistics. Frequency, mean, median and mode were computed for each variable. A one-way analysis of covariance (ANCOVA) was performed to analyze the subgroups identified in the research questions and determine if there was a difference between the Algebra 1 EOC Examination scale scores of the students on a traditional schedule compared to those of students on an A/B block schedule. ANCOVA was an appropriate method when testing the statistical significance between more than two groups to neutralize the effect of a more powerful, non-interacting variable. (Peascoe, n.d.). The probability of determining a difference was reported using the F statistic. The treatment effect in ANCOVA compares the difference between group variance, not the difference between group means (Steinberg,

2011). The formula for the ANCOVA F test for the null hypothesis is: $F = MS_{bet} / MS_{with}$. MS_{bet} is the variance observed between the groups, and MS_{with} is the variance within the groups.

The F statistic measures the main effect and the interaction effect. The F statistic compares all of the groups at the same time (Steinberg, 2011). When the F statistic is significant, a post-hoc test for pairwise comparison is used (Steinberg, 2011).

Summary

The purpose of this study was to determine what impact, if any, scheduling had on student achievement. This study compared student performance on Florida's Algebra 1 End-of-Course Examination for students educated in a 4 x 4 (A/B) block schedule to that of students educated in a traditional seven-period day schedule.

The purpose of the study, research questions, population and sampling, design of study, data collection, and data analysis have been described in Chapter 3. Chapter 4 contains a summary of the analysis of the data.

CHAPTER 4
ANALYSIS OF THE DATA

Introduction

The purpose of this study was to determine the impact scheduling had on student academic achievement, more specifically whether a significant difference existed between two high schools in Florida, one utilizing the A/B block schedule and the other on a traditional seven-period schedule. The instruments for data collection and analysis for this study included the Florida Comprehensive Achievement Test (FCAT), and Florida's Algebra 1 End-of-Course (EOC) Examination. All data collected for this study remained anonymous and were retrieved from school district records. This chapter contains the analysis of the data organized around each of the five research questions

Quantitative Data Presentation and Analysis

Research Question 1

What is the difference between Algebra 1 End-of-Course Examination scores for ninth-grade students who attend high school with a traditional schedule and those who attend high school with a 4 x 4 block schedule?

H_{01} There is no difference between Algebra 1 End-of-Course Examination scores for ninth-grade students who attend high school with a traditional schedule and those who attend high school with a 4 x 4 block schedule?

A one-way analysis of covariance (ANCOVA) was performed. The independent variable, school schedule, consisted of two levels: traditional schedule and A/B block

schedule. The dependent variable was the spring Algebra 1 End-of-Course Examination score, and the covariate was the FCAT Mathematics eighth-grade developmental scale score. Table 4 shows the descriptive statistics for the two schedules.

Table 4

All Mean Scores: 2011-2012 Algebra 1 End-of-Course Examination

Schedule	Mean	N
Traditional	384.01	381
Block	385.38	410

As shown in Table 4, overall, there was little difference in the unadjusted Algebra 1 End-of-Course Examination mean scores of students on a traditional schedule (M = 384.01, n = 381) and students on an A/B Block schedule school (M = 385.38, n = 410). Students on an A/B Block schedule had a 1.27 higher unadjusted average of the means.

Table 5 indicates that when the ANCOVA was performed, there was no significant difference in the effect of school schedule on students' spring Algebra 1 End-of-Course Examination scores, F(1,788) p = .932. The researcher, therefore, failed to reject the null hypothesis. The Algebra 1 End-of-Course Examination mean scores did not differ significantly for the two instructional groups (traditional and A/B Block) when adjusted for students' prior year mathematics developmental scale scores as measured by the FCAT Mathematics 8. The adjustment, i.e., controlling for students' prior year mathematics developmental scale scores, resulted in no significant difference between the

adjusted Algebra 1 End-of-Course Examination mean scores and the unadjusted Algebra 1 End-of-Course Examination mean scores.

Table 5

Interaction of Schedule With All Students: Tests of Between and Within Subjects Effects

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Between (adjusted)	2.370	1	2.370	.007	.932
Within (adjusted)	253009.589	788	321.078		
Covariate	140845.990	1	140845.990	438.666	.000
Total	394224.812	790			

Research Question 2

What is the difference between Algebra 1 End-of-Course Examination scores for ninth-grade male students who attend high school with a traditional schedule and those who attend high school with a 4 x 4 block schedule?

H_{02} There is no difference between Algebra 1 End-of-Course Examination scores for ninth-grade male students who attend high school with a traditional schedule and those who attend high school with a 4 x 4 block schedule?

A one-way analysis of covariance (ANCOVA) was performed. The independent variable, school schedule, consisted of two levels: traditional schedule and A/B block schedule. The dependent variable was the spring Algebra 1 End-of-Course Examination, and the covariate was the FCAT Mathematics eighth-grade developmental scale score. Table 6 shows the descriptive statistics for male students.

Table 6

Mean Scores for Male Students: 2011-2012 Algebra 1 End-of-Course Examination

Schedule	Mean	N
Traditional	383.44	184
Block	382.55	211

As shown in Table 6, there was little difference in the unadjusted Algebra 1 End-of-Course Examination mean scores of male students on a traditional schedule (M = 383.44, n = 184) and male students on an A/B Block schedule (M = 382.55, n = 211). Male students on a traditional schedule had a .89 higher unadjusted average of the means.

Table 7 indicates that when the ANCOVA was performed, there was no significant difference in the effect of the school schedule on male students' spring Algebra 1 End-of-Course Examination scores, $F(1,392)$ $p = .698$. The researcher, therefore, failed to reject the null hypothesis. The Algebra 1 End-of-Course Examination mean scores for male students did not differ significantly for the two instructional groups (traditional and A/B Block) when adjusted for students' prior year mathematics developmental scale scores as measured by the FCAT Mathematics 8 Examination. The adjustment, i.e., controlling for male students' prior year mathematics developmental scores, resulted in no significant difference between the adjusted Algebra 1 End-of-Course Examination mean scores and the unadjusted Algebra 1 End-of-Course Examination mean scores.

Table 7

Interaction of Schedule With Male Students: Tests of Between and Within Subjects Effects

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Between (adjusted)	51.340	1	51.340	.151	.698
Within (adjusted)	253009.589	392	339.439		
Covariate	86663.728	1	86663.728	255.315	.000
Total	219802.430	394			

Research Question 3

What is the difference between Algebra 1 End-of-Course Examination scores for ninth-grade female students who attend high school with a traditional schedule and those who attend high school with a 4 x 4 block schedule?

H_{03} There is no difference between Algebra 1 End-of-Course Examination scores for ninth-grade female students who attend high school with a traditional schedule and those who attend high school with a 4 x 4 block schedule?

A one-way analysis of covariance (ANCOVA) was performed. The independent variable, school schedule, consisted of two levels: traditional schedule and A/B block schedule. The dependent variable was the spring Algebra 1 End-of-Course Examination, and the covariate was the FCAT Mathematics 8 developmental scale score. Table 8 shows the descriptive statistics for female students.

Table 8

Mean Scores for Female Students: 2011-2012 Algebra 1 End-of-Course Examination

Schedule	Mean	N
Traditional	384.55	197
Block	388.39	199

As shown in Table 8, there was little difference in the unadjusted Algebra 1 End-of-Course Examination mean scores of female students on a traditional schedule (M = 384.55, n = 197) and female students on an A/B Block schedule (M = 388.39, n = 199). Female students on an A/B Block schedule had a 3.84 higher unadjusted average of the means.

Table 9 indicates that when the ANCOVA was performed, there was no significant difference in the effect of school schedule on female students' spring Algebra 1 End-of-Course Examination scores, F(1,393) p = .579. The researcher, therefore, failed to reject the null hypothesis. The Algebra 1 End-of-Course Examination mean scores for female students, did not differ significantly for the two instructional groups (traditional and A/B Block) when adjusted for students' prior year mathematics developmental scale scores as measured by the FCAT Mathematics 8. The adjustment, i.e., controlling for female students' prior year mathematics developmental scale scores, resulted in no significant difference between the adjusted Algebra 1 End-of-Course Examination mean scores and the unadjusted Algebra 1 End-of-Course Examination mean scores

Table 9

Interaction of Schedule With Female Students: Tests of Between and Within Subjects Effects

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Between (adjusted)	92.084	1	92.084	.308	.579
Within (adjusted)	117321.254	393	298.527		
Covariate	53198.744	1	53198.744	178.204	.000
Total	171978.795	395			

Research Question 4

What is the difference between Algebra 1 End-of-Course Examination scores for Black students who attend high school with a traditional schedule and those who attend high school with a 4 x 4 block schedule?

H_{04} There is no difference between Algebra 1 End-of-Course Examination scores for Black students who attend high school with a traditional schedule and those who attend high school with a 4 x 4 block schedule?

A one-way analysis of covariance (ANCOVA) was performed. The independent variable, school schedule, consisted of two levels: traditional schedule and A/B block schedule. The dependent variable was the spring Algebra 1 End-of-Course Examination, and the covariate was the FCAT Mathematics eighth-grade developmental scale score. Table 10 shows the descriptive statistics for Black students.

Table 10

Mean Scores for Black Students: 2011-2012 Algebra 1 End-of-Course Examination

Schedule	Mean	N
Traditional	379.43	133
Block	383.80	56

As shown in Table 10, there was little difference in the unadjusted mean Algebra 1 End-of-Course Examination scores of Black students on a traditional schedule (M = 379.43, n = 133) and Black students on an A/B Block schedule (M = 383.80, n = 56). Black students on an A/B Block schedule had a 4.37 higher unadjusted average of the means.

Table 11 indicates that when the ANCOVA was performed, school schedule was not significantly related to Black students' spring Algebra 1 End-of-Course Examination scores, F(1,186) p = .545. The researcher, therefore, failed to reject the null hypothesis. The Algebra 1 End-of-Course Examination mean scores for Black students did not differ significantly for the two instructional groups (traditional and A/B Block) when adjusted for students' prior year mathematics developmental scale score as measured by the FCAT Mathematics 8. The adjustment, i.e., controlling for Black students' prior year mathematics developmental scale scores, resulted in no significant difference between the adjusted Algebra 1 End-of-Course Examination mean scores and the unadjusted Algebra 1 End-of-Course Examination mean scores.

Table 11

Interaction of Schedule With Black Students: Tests of Between and Within Subjects Effects

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Between (adjusted)	132.208	1	132.208	.367	.545
Within (adjusted)	67023.319	186	30.340		
Covariate	31130.091	1	31130.091	86.391	.000
Total	98907.693	188			

Research Question 5

What is the difference between Algebra 1 End-of-Course Examination scores for Hispanic students who attend high school with a traditional schedule and those who attend high school with a 4 x 4 block schedule?

H_{05} There is no difference between Algebra 1 End-of-Course Examination scores for Hispanic students who attend high school with a traditional schedule and those who attend high school with a 4 x 4 block schedule?

A one-way analysis of covariance (ANCOVA) was performed. The independent variable, school schedule, consisted of two levels: traditional schedule and A/B block schedule. The dependent variable was the spring Algebra 1 End-of-Course Examination, and the covariate was the FCAT Mathematics 8 developmental scale score. Table 12 shows the descriptive statistics for Hispanic students.

Table 12

Mean Scores for Hispanic Students: 2011-2012 Algebra 1 End-of-Course Examination

Schedule	Mean	N
Traditional	387.37	41
Block	384.97	146

As shown in Table 12, there was little difference in the unadjusted mean Algebra 1 End-of-Course Examination scores of Hispanic students on a traditional schedule (M = 387.37, n = 41) and Hispanic students on an A/B Block schedule school (M = 384.97, n = 146). Hispanic students on a traditional schedule had a 2.4 higher unadjusted mean average.

Table 13 indicates that when the ANCOVA was performed, school schedule was not significantly related to Hispanic students' spring Algebra 1 End-of-Course Examination scores, $F(1,184)$ $p = .700$. The researcher failed to reject the null hypothesis. Algebra 1 End-of-Course Examination mean scores for Hispanic students did not differ significantly for the two instructional groups (traditional and A/B Block) when adjusted for students' prior year mathematics developmental scale score as measured by the FCAT Mathematics 8. The adjustment, i.e., controlling for Hispanic students' prior year mathematics developmental scale scores, resulted in no significant difference between the adjusted Algebra 1 End-of-Course Examination mean scores and the unadjusted Algebra 1 End-of-Course Examination mean scores.

Table 13

Interaction of Schedule with Hispanic Students: Tests of Between and Within Subjects Effects

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Between (adjusted)	45.435	1	45.435	.149	.700
Within (adjusted)	56198.605	184	305.427		
Covariate	30568.798	1	30568.798	100.085	.000
Total	86950.749	186			

Summary

This study was conducted to compare student performance on Florida's Algebra 1 End-of-Course Examination for students educated in a 4x4 (A/B) block schedule to those of students educated in a traditional seven-period day schedule. As it related to the five research questions, data revealed slight differences among students' unadjusted mean scores on the Algebra 1 End-of-Course Examination.

- Students on an A/B Block schedule had a 1.27 higher unadjusted mean average.
- Male students on a traditional schedule had a .89 higher unadjusted mean average.
- Female students on an A/B Block schedule had a 3.84 higher unadjusted mean average.
- Black students on an A/B Block schedule had a 4.37 higher unadjusted mean average.

- Hispanic students on a traditional schedule had a 2.4 higher unadjusted mean average.

The adjusted mean scores of the two instructional groups (traditional and A/B Block) did not differ significantly when considered by subgroups or when adjusted for students' prior year mathematics developmental scale score as measured by the FCAT Mathematics 8. No significant difference in the effect of the school schedule on the achievement of students, as measured by Algebra 1 End-of-Course Examination scores, was found.

CHAPTER 5
SUMMARY, DISCUSSION, AND RECOMMENDATIONS

Introduction

This chapter of the study presents a restatement of the problem followed by a summary of the findings of the study. The presentation of the findings of the study have been organized around each of the five research questions and hypotheses which were used to guide the study. The chapter concludes with a discussion of the findings as well as recommendations for policy, practice, and future research.

Statement of the Problem

This study compared student performance on Florida's Algebra 1 End-of-Course Examination for students educated in a 4 x 4 (A/B) block schedule to those of students educated in a traditional seven-period day schedule. Students must pass the Florida Algebra 1 End-of-Course Examination to receive a high school diploma. There have been numerous research studies completed on the impact that school schedules (block schedule and traditional schedule), have on SAT scores (Bennett, 2000). Little research, however, has been conducted to study the effects of student schedules on End-of-Course Examinations (Lawrence & McPherson 2000). Senate Bill 1076 K-20 Education, F.S. 1000.03 (2013) requires End-of-Course Examinations to count as 30% of a student's final grade in Biology and Geometry. Coupled with Senate Bill 4 Educational Accountability, F.S. 1003.413 (2010), educational leaders need to put students and teachers in the best environment for academic success. This study was conducted to compare the Spring

2012-2013, Algebra 1 End-of-Course Examination scores of students in two high schools located in central Florida. One high school operated on a 4 x 4 (A/B) block schedule, and the other operated on a traditional seven-period day schedule.

Summary of the Findings

Five research questions and hypotheses were used to guide the study. The following summary addresses the specific findings for each of these five guiding elements

Research Question 1

What is the difference between Algebra 1 End-of-Course Examination scores for ninth-grade students who attend high school with a traditional schedule and those who attend high school with a 4 x 4 block schedule?

H_{01} There is no difference between Algebra 1 End-of-Course Examination scores for ninth-grade students who attend high school with a traditional schedule and those who attend high school with a 4 x 4 block schedule?

Hypothesis 1 posited that there would be no difference between the 2012-2013 End-of-Course Examination scores of students on an A/B block schedule and those on a seven-period traditional schedule. When the ANCOVA was performed, school schedule was not significantly related to students' Spring Algebra 1 End-of-Course Examination scores. Though students on an A/B schedule showed a slightly higher mean average, it was not significant at the .05 level.

Research Question 2

What is the difference between Algebra 1 End-of-Course Examination scores for ninth-grade male students who attend high school with a traditional schedule and those who attend high school with a 4 x 4 block schedule?

H_{02} There is no difference between Algebra 1 End-of-Course Examination scores for ninth-grade male students who attend high school with a traditional schedule and those who attend high school with a 4 x 4 block schedule?

Hypothesis 2 suggested that there would be no difference in the Algebra 1 End-of-Course Examination scores for ninth-grade male students on an A/B block schedule and ninth-grade male students on a seven-period traditional schedule. When the ANCOVA was performed, school schedule was not significantly related to male students' Spring Algebra 1 End-of-Course Examination scores. Though male students on a traditional schedule showed a slightly higher mean average, it was not significant at the .05 level.

Research Question 3

What is the difference between Algebra 1 End-of-Course Examination scores for ninth-grade female students who attend high school with a traditional schedule and those who attend high school with a 4 x 4 block schedule?

H_{03} There is no difference between Algebra 1 End-of-Course Examination scores for ninth-grade female students who attend high school with a traditional schedule and those who attend high school with a 4 x 4 block schedule?

In hypothesis 3, it was theorized that there would be no difference in the Algebra 1 End-of-Course Examination scores for ninth-grade female students on an A/B block schedule and ninth-grade female students on a seven-period traditional schedule. When the ANCOVA was performed, school schedule was not significantly related to female students' Spring Algebra 1 End-of-Course Examination scores. Though female students on an A/B schedule showed a slightly higher mean average, it was not significant at the .05 level.

Research Question 4

What is the difference between Algebra 1 End-of-Course Examination scores for Black students who attend high school with a traditional schedule and those who attend high school with a 4 x 4 block schedule?

H_{04} There is no difference between Algebra 1 End-of-Course Examination scores for Black students who attend high school with a traditional schedule and those who attend high school with a 4 x 4 block schedule?

Hypothesis 4 conjectured that there would be no difference in the Algebra 1 End-of-Course Examination scores for ninth-grade Black students on an A/B block schedule and Black students on a seven-period traditional schedule. When the ANCOVA was performed, school schedule was not significantly related to Black students' Spring Algebra 1 End-of-Course Examination scores. Though Black students on a traditional schedule showed a slightly higher mean average, it was not significant at the .05 level.

Research Question 5

What is the difference between Algebra 1 End-of-Course Examination scores for Hispanic students who attend high school with a traditional schedule and those who attend high school with a 4 x 4 block schedule?

H_{05} There is no difference between Algebra 1 End-of-Course Examination scores for Hispanic students who attend high school with a traditional schedule and those who attend high school with a 4 x 4 block schedule?

In hypothesis 5, it was speculated that there would be no difference in the Algebra 1 End-of-Course Examination scores for ninth-grade Hispanic students on an A/B block schedule and ninth-grade Hispanic students on a seven-period traditional schedules. When the ANCOVA was performed, school schedule was not significantly related to Hispanic students' Spring Algebra 1 End-of-Course Examination scores. Though Hispanic students on a traditional schedule showed a slightly higher mean average, it was not significant at the .05 level.

Discussion

The 2002 No Child Left Behind Act (NCLB) allowed states and school districts control over "providing greater decision-making authority and flexibility to schools and teachers in exchange for greater responsibility for student performance" (Pub. L. No. 107-110, sec. 1001, 2002). One area that Public Law 107-110 (2002) specifically addressed was the provision for students of "an enriched and accelerated educational program, including the use of school wide programs or additional services that increase

the amount and quality of instructional time" (Pub. L. No. 107-110, sec. 1001, 2002). According to Schott (2008), however, increasing the school year is not the most efficient method to increase instructional time, and Lawrence and McPherson (2000) discussed altering a school's schedule to meet the needs of increased instructional time as one way school districts were restructuring their organizations.

The findings in this study substantiated those of earlier researchers (Creamean & Horvath, 2000), whereby schedule design was determined to have no effect on standardized tests scores (Creamean & Horvath, 2000). The findings in the present study also refuted the findings of Forman (2009) and Lawrence and McPherson (2000) that block scheduling can raise standardized test scores. One possible explanation for this is that many schools studied have been in transition from a traditional to block schedules when they were investigated.

Factors that may have moderated the results in the present study were that (a) two years of data were studied for schools that have been in their respective schedules for several years and (b) the Algebra 1 End-of-Course Examination was a relatively new test in Florida. Student achievement levels may have been affected by the performance of teachers still adapting to the use of the Algebra 1 End-of-Course Examination.

The study revealed that student scores related to the Algebra 1 End-of-Course Examination were similar. The scores were slightly higher for male, Black, and Hispanic students on a traditional schedule but not at a significant level. Female students scored slightly higher on an A/B schedule , but not at a significant level. The data illustrated

that schedule did not impact students' scores on the Algebra 1 End-of-Course Examination significantly.

The two schools studied were located within the same school district, and the mathematics teachers throughout the district receive the same professional development activities. It is possible, therefore, that students preparing to take the Algebra 1 End-of-Course Examination were provided with similar instruction, regardless of schedule. Hackmann (2004) stated that one of the advantages of block scheduling was to "facilitate student-centered learning practices associated with constructivism"(p. 697). Hackmann argued that high school teachers tend to utilize direct instruction, regardless of schedule, due to a concern with curriculum. He explained further that this concern may lead to teachers' resistance to teaching methods perceived as reducing the emphasis on the curriculum. Honeycutt and Friedman (2009) reported that lecture was a common method of delivery for teachers in a block schedule because of fewer days spent in a given course throughout the year. To compensate for this, according to these authors, many teachers tend to rely heavily on lecture to cover the entire curriculum. This study reaffirmed the importance of teaching methodology regardless of a school's schedule.

Recommendations for Policy and Practice

This study reaffirmed the importance of educators thinking beyond the basic structural changes required in the modification of a school schedule. Although structural changes may lead to improved learning for students, they are insufficient by themselves. Increased time in the classroom does not imply increased student achievement.

Leadership strategies to meet the challenges of the changing trends in accountability need to take into account Bolman and Deal's (2008) four frameworks in organizations. This requires a multi-faceted approach utilizing the structural, human resource, political, and symbolic frames.

It is recommended, therefore, that when schools institute a change in the school schedule that a system be in place to evaluate the change using the structural frame. The evaluation should be focused on the impact of the change on student achievement.

The change in school schedule should also be evaluated from a human resource perspective to determine how allocations of resources have changed since the restructuring of the schedule. With the new accountability laws in education, collaborative planning and the sharing of ideas among teachers and administrators becomes essential in establishing effective schools (Owens & Valesky, 2010). This practice fosters two of the five basic needs of an effective school: to accept responsibility for the students' academic performance and to create an ethos of teaching and learning (Owens & Valesky, 2010). Before schools change schedules, they need to evaluate the impact of a schedule change on professional development and collaborative practices.

In any structural change, the political frame must be a consideration. How the very idea of something as dramatic as a change from a traditional to an alternate schedule will be considered by students, teachers and parents must be considered. Bolman and Deal (2008) have advocated for providing information in advance of any change and for assessing the preparedness of the various stakeholders prior to implementation. In particular, knowing the importance of the faculty in such a change, they recommended

that prior to a change in school schedule the faculty be surveyed. (Bolman & Deal, 2008).

To evaluate changes within the political frame, the district should track the resources allocated to meet the needs of the structural changes, e.g., the professional development that has been implemented for teachers to help them adjust to a new schedule and use it in a way that coincides with the research on best instructional practices for a given schedule. Responsibility and accountability are real, and it is important to assess how schools have changed the process of measurement following a structural change to the school schedule.

How a leader uses power to handle conflict and decision making is at the core of the political frame in organizations. According to Owens and Valesky (2010), effective decision making for implementing a schedule change, "requires the interaction of power and influences from two sources" (p. 242): the principal and the faculty. Understanding that schools are built upon coalitions of teachers and departments with each having different values and beliefs regarding a school's schedule, the principal, must build coalitions among the faculty

High schools are full of educational and organizational symbols, ranging from a school's mascot to a school's vision statement. Symbols carry powerful intellectual and emotional messages "that stimulate energy in moments of triumph and offer solace in times of tribulation" (Bolman & Deal, 2008, p. 252). To evaluate changes within the symbolic frame it is recommended that all stakeholders; students, teachers, parents, and community are queried as to their perceptions of instructional strategies and learning after

a change to the school's schedule. The evaluation should examine how the school utilized the symbolic frame to resolve confusion and create vision, how the changes instilled purpose and passion in the school's employees, and finally how the change in schedule accomplish the school's desired goals (Bolman & Deal, 2008). Gruber and Onwuegbuzie (2001) found that students' attitudes toward school were important in ensuring that students were active participants in the teaching-learning process.

School districts, in assessing the merits of a change in a school schedule, must, according to Bolman and Deal (2008), consider the needs of the organization and the employees. Marzano and Waters (2009) spoke to the specific responsibilities of school district leaders as: (a) ensuring collaborative goal setting, (b) establishing nonnegotiable goals for achievement and instruction, (c) creating broad alignment with and in support of district goals, (d) monitoring achievement and instruction goals, and (e) allocating resources to support the goals for achievement and instruction. All of these responsibilities must be considered when a structural change such as occurs when a traditional schedule is abandoned for an alternative school schedule.

Recommendations for Further Research

1. A study could be conducted to compare the pedagogy utilized in the two schools of interest in this study to ascertain if it was similar regardless of schedule type.
2. A study could be conducted to gather the perceptions of teachers and students on schedule types at the two schools.

3. Instructional changes and professional development should be studied at schools with a high academic success on the Algebra 1 End-of-Course Examination.
4. A study could be conducted focused on the allocation of professional development funds and activities conducted at the schools of interest in this study.

Summary

With the new demands on teachers, students, school districts, and communities, it is imperative that students and educators are placed in an appropriate educational environment to ensure maximum educational benefit leading to improved student achievement. School districts as a whole must not only be dedicated and involved in effecting necessary changes within the organization. They must have a strong rationale for instituting changes in the first place and be committed to providing needed professional development for teachers to ensure that the change is implemented with fidelity. After implementation, school districts must follow through as they evaluate the extent to which the changes help them to reach their goals.

APPENDIX A
SCHOOL DEMOGRAPHICS

HIGH SCHOOL A

Racial/Ethnic Group	Number of Students Enrolled in October		School %		District %		State %	
	Female	Male	2011-12	2010-11	2011-12	2010-11	2011-12	2010-11
WHITE	496	512	57.7	59.7	58.1	58.8	42.4	43.2
BLACK OR AFRICAN AMERICAN	117	112	13.1	13.1	15.7	15.5	23.0	22.9
HISPANIC / LATINO	201	211	23.6	21.5	20.0	19.7	28.6	27.9
ASIAN	29	26	3.1	3.2	2.7	2.7	2.5	2.5
NATIVE HAWAIIAN OR OTHER PACIFIC ISLANDER					0.1		0.1	0.1
AMERICAN INDIAN OR ALASKA NATIVE	5	4	0.5	0.6	0.5	0.5	0.4	0.4
TWO OR MORE RACES	19	15	1.9	1.9	3.1	2.8	3.0	3.0
DISABLED	61	143	11.7	12.5	12.3	12.5	13.2	13.7
ECONOMICALLY DISADVANTAGED	381	409	45.2	40.4	56.3	54.3	57.6	56.0
ELL	16	15	1.8	2.6	5.6	6.2	11.9	11.7
MIGRANT		1	0.1		0.1		0.5	0.5
FEMALE	867		49.6	49.1	48.8	48.5	48.7	48.8
MALE		880	50.4	50.9	51.2	51.5	51.4	51.3
TOTAL	1747		100.0	100.0	100.0	100.0	100.0	100.0

Note. Retrieved from http://doeweb-prd.doe.state.fl.us/eds/nclbspar/year1112/nclb1112.cfm?dist_schl=35_701

High School B

Racial/Ethnic Group	Number of Students Enrolled in October		School %		District %		State %	
	Female	Male	2011-12	2010-11	2011-12	2010-11	2011-12	2010-11
WHITE	501	479	58.7	61.1	58.1	58.8	42.4	43.2
BLACK OR AFRICAN AMERICAN	241	244	29.0	27.3	15.7	15.5	23.0	22.9
HISPANIC / LATINO	79	65	8.6	7.4	20.0	19.7	28.6	27.9
ASIAN	10	17	1.6	2.1	2.7	2.7	2.5	2.5
NATIVE HAWAIIAN OR OTHER PACIFIC ISLANDER	2		0.1	0.2	0.1		0.1	0.1
AMERICAN INDIAN OR ALASKA NATIVE	6	1	0.4	0.3	0.5	0.5	0.4	0.4
TWO OR MORE RACES	10	15	1.5	1.6	3.1	2.8	3.0	3.0
DISABLED	89	150	14.3	13.7	12.3	12.5	13.2	13.7
ECONOMICALLY DISADVANTAGED	478	457	56.0	53.7	56.3	54.3	57.6	56.0
ELL	13	16	1.7	1.8	5.6	6.2	11.9	11.7
MIGRANT					0.1		0.5	0.5
FEMALE	849		50.8	50.4	48.8	48.5	48.7	48.8
MALE		821	49.2	49.6	51.2	51.5	51.4	51.3
TOTAL	1670		100.0	100.0	100.0	100.0	100.0	100.0

Note. Retrieved from http://doeweb-prd.doe.state.fl.us/eds/nclbspar/year1112/nclb1112.cfm?dist_schl=35_161

APPENDIX B
SCHOOL DISTRICT APPROVAL TO CONDUCT RESEARCH

November 22, 2013

Mr. Arthur Scott Underwood

Dear Mr. Underwood:

This letter serves as final approval to conduct your research study entitled, "A Comparative Study of Block Scheduling and Traditional Scheduling on Student Achievement for the Florida Algebra End of Course Exam."

Per information submitted in your request, please note/adhere to the following:

- This research will be conducted to fulfill requirements for a doctoral degree through the University of Central Florida.
- All procedures set forth in the approved research request must be followed as approved by Schools.
- The confidentiality of the district, schools, administrators, teachers and students will be maintained at all times.
- The district will be identified as a "district in Central Florida" or a similar identifier.
- The schools will be identified as "high schools in Central Florida," or a similar identifier.
- All requested data is provided by the Department of Evaluation and Accountability. Schools are not to be contacted for data or other information.
- All Florida statutes and district policies and procedures must be followed at all times.
- A copy of the results of the research must be provided to the district upon completion.

Should you have additional questions, please do not hesitate to contact me at 352-483-9207. I wish you much success with this research project.

Yours truly,

APPENDIX C
INSTITUTIONAL REVIEW BOARD APPROVAL

University of Central Florida Institutional Review Board
Office of Research & Commercialization
12201 Research Parkway, Suite 501
Orlando, Florida 32826-3246
Telephone: 407-823-2901, 407-882-2012 or 407-882-2276
www.research.ucf.edu/compliance/irb.html

From : **UCF Institutional Review Board #1**
FWA00000351, IRB00001138

To : **Arthur Underwood**

Date : **October 29, 2013**

Dear Researcher:

On 10/29/2013 the IRB determined that the following proposed activity is not human research as defined by DHHS regulations at 45 CFR 46 or FDA regulations at 21 CFR 50/56:

Type of Review:	Not Human Research Determination
Project Title:	A COMPARATIVE STUDY OF BLOCK SCHEDULING AND TRADITIONAL SCHEDULING ON STUDENT ACHIEVEMENT FOR THE FLORIDA ALGEBRA 1 END OF COURSE EXAM
Investigator:	Arthur Underwood
IRB ID:	SBE-13-09703
Funding Agency:	
Grant Title:	
Research ID:	N/A

University of Central Florida IRB review and approval is not required. This determination applies only to the activities described in the IRB submission and does not apply should any changes be made. If changes are to be made and there are questions about whether these activities are research involving human subjects, please contact the IRB office to discuss the proposed changes.

On behalf of Sophia Dziegielewski, Ph.D., L.C.S.W., UCF IRB Chair, this letter is signed by:

Signature applied by Joanne Muratori on 10/29/2013 05:01:27 PM EST

Joanne Muratori

IRB Coordinator

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