A STUDY OF STANDARDIZED TEST SCORES FOR MIDDLE SCHOOL STUDENTS BEFORE AND AFTER THE BLOCK SCHEDULE WAS INTRODUCED

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ABSTRACT

A STUDY OF STANDARDIZED TEST SCORES FOR MIDDLE SCHOOL STUDENTS BEFORE AND AFTER THE BLOCK SCHEDULE WAS INTRODUCED

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Block scheduling is a newer school scheduling structure, first appearing at the middle school level in the mid-1990's (Juvonen, Le, Kagenoff, Augustine, & Constant, 2004). Middle school advocates have supported block scheduling because research shows it meets the social-emotional and developmental needs of middle school children. Yet, little research on the impact of block scheduling on middle school standardized test scores currently exists. Using a sample of classrooms from a suburban public school in New Jersey, this study sought to compare standardized test scores in math, language arts literacy, and science of 8th grade students before and after the implementation of the block schedule. Twenty-seven one-way ANOVAs (accounting for subject, gender, and special education population) were conducted to assess for significant differences between testing years. Post hoc analyses were also conducted when differences were found. Overall, the study found no significant differences in standardized test scores in the area of science. A planned comparison of pre and post block scheduling standardized test scores revealed statistically significant decreases in mathematics and language arts

literacy scores, but a second planned comparison which used data from fewer years revealed only significant decreases in language arts literacy scores which is believed to be a result of the 50% decrease in language arts literacy class time. Varied results by gender were also found. In contrast, special education students' test scores remained the same in all content areas over the seven years. While there are many limitations to the generalizability of these results, it is clear that further research on block scheduling at the middle school level could inform educational practice in these times of high stakes testing.

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CHAPTER 1

INTRODUCTION

The middle school years are defined as a turbulent time when adolescents struggle between dependence and independence. As schools shape their curriculum, culture, and student schedules to meet the varying needs of these middle years, they must also fulfill the increasing demand for higher standardized test scores. At this time, there is limited research on the effects of block scheduling on standardized test scores at the middle school level. This study seeks to compare the standardized test scores of 8th grade students before and after the implementation of an alternating day block schedule. It is anticipated that the use of block scheduling will positively impact the achievement of middle school students and will improve the standardized test scores of 8th graders taking the New Jersey Grade Eight Proficiency Assessment.

Amidst the educational reform movements of the 1980's and 1990's, the National Middle Schools Association published *This We Believe* in 1995 which made recommendations about sound middle school practices to meet the developmental needs of the middle school student (National Middle Schools Association, 1995). School systems across the country sought to compare currently used educational practices to the recommendations of the study.

In January 1997, the school being studied sought to incorporate recommendations from the National Middle Schools Associations' research to better meet the academic and social-emotional needs of their middle school students. The school being studied organized a committee of district administrators, parents, teachers, and students to

evaluate the recommendations of *This We Believe.* The committee was pleased to find that several of the recommended practices were already in place: students and teachers were organized into small teams which supported multidisciplinary approaches to learning, advisory groups were being explored, and a positive school climate was established. But the committee also recognized the stress experienced by students who were participating in eight forty-minute class periods each day. The quantity of homework, increased student expectations, number of students pulled out of academic class time for specials and remedial help, and the lack of time teachers had to go into depth during a 40-minute period helped the committee and district officials realize that the traditional schedule currently in place was no longer meeting the developmental needs of the middle school child. The traditional schedule required students to participate in seven or eight forty minute class periods each day. The block schedule concept required students to have fewer classes each day (usually 4) for extended periods of time (usually 75-90 minutes). While block scheduling had been well established at the high school level by 1997, little research existed on block scheduling at the middle school level.

During the 1997-1998 school year, the administrators from the school being studied were charged with researching ideas related to moving the middle school to a block schedule. In January 1998, another committee of teachers, parents, students, board members, and community members was organized to continue this research. Over the next year and a half, this *Block Scheduling Research Committee* met regularly to present findings, visit other schools with block schedules, and work to develop a block schedule that would work within the structural and contractual limitations of this school.

The Committee made their recommendations public in April of 1999, with the intention of moving forward with the implementation of the block schedule for the 1999-2000 school year. The teacher's union expressed concern over the preparedness of their membership to adjust their teaching to this format and jointly, the Committee and union agreed to delay implementation for one school year while training would take place for the teaching staff. Block scheduling was fully implemented in the 2000-2001 school year. All students in grades 6-8 would now participate in an alternating A/B day schedule for all subjects.

While the rationale for this school's movement to the block schedule suggested it met the developmental needs of children in the middle school, there was little discussion by district personnel or the *Block Scheduling Research Committee* regarding how this change in schedule might impact academic achievement. Student achievement was always in the minds of the Committee, but the common thought was that if the social-emotional and developmental needs of the middle school student were met, higher student achievement would follow.

When the implementation of the block schedule began, federal legislation helped the school being studied focus back on student achievement. In January of 2002, President Bush made his mark in educational history when he signed the *No Child Left Behind Act of 2001* into law. Its scope enormous, its goal, deliberate; the *No Child Left Behind Act* was the Bush administration's attempt to close the loopholes of educational legislation of yesteryear. Since the inception of the *No Child Left Behind Act (NCLB),* school districts around the country have worked to increase student achievement as the benchmark for satisfactory achievement continues to rise.

The existing research on the impact of block scheduling on student achievement shows varying results. The existing studies vary by types of block schedule, the measure used to assess achievement, subject areas assessed, school level (high school v. middle school), and results.

Some studies have found little academic benefit for block scheduling over traditional schedules. In a study by Sigurdson (1982), a large junior high school in Alberta, Canada, implemented a block schedule plan in which no difference was found between block-scheduled and traditionally-scheduled students in their mathematics achievement scores. Lockwood (1995) reported on block scheduling and student achievement at the high school level in Dothan City, Alabama. A comparison of traditionally and block-scheduled students in algebra and geometry classes were found to have no significant differences in mathematic achievements on end of year tests. Holmberg (1996) studied student achievement at the high school level by comparing grade point average and ACT test scores for those who were and were not in a block schedule. No difference between scores of students who were and were not in a block schedule was found.

There are also high schools that have found positive results in academic achievement as a result of the block schedule. Shortt and Thayer (1998) presented the findings of the Virginia State Assessment Program in which 63% of the high schools were using a block schedule. The analyses concluded that overall scores in both reading and mathematics were higher for students in schools with “A/B” or “4 X 4” schedules than for students in schools with traditional schedules.

A study by Cobb, Abate, and Baker (1999) analyzed both junior and senior high school students and found that mathematics standardized test scores at both the junior and senior high school level favored students participating in the traditional schedule, but standardized test scores were found to be significantly higher in reading and writing for those students participating in a block schedule at both the junior and senior high school level. Schroth and Dixon (1995) reported that the standardized test scores in mathematics were consistently lower for 7th grade students in Texas after the implementation of a block schedule.

Beaver (1998) completed a study comparing the standardized test scores of eighth graders at a middle school in Indiana before and after the implementation of a language arts block and found improved achievement scores. DiRocco (1999) noted improved test scores in Language, Mathematics, and Social Studies standardized test scores after the block schedule was implemented at the middle school level.

It is important to remember that each study is unique and offers limited generalizability to other school settings. Each study varies by the type of block schedule that is used, how the change to a block schedule took place, the assessment tool used to measure achievement, the type of school (high school v. junior high school v. middle school), and the quantity of data across time that was used. The school in the study has seen numerous other benefits to the block schedule. Student discipline referrals were reduced by forty percent. Student attendance rates increased by nine percent and teacher absences have decreased by eleven percent. A statistical analysis of standardized test scores before and after the implementation of the A/B block schedule had never occurred for the school in this study.

Has block scheduling increased middle score standardized test scores in math, science, and language arts/literacy for the school being studied? This study will analyze student achievement data on 8th grade students from before and after this school implemented the A/B block schedule. Student achievement data in the areas of mathematics, language arts/literacy, and science from the New Jersey Grade Eight Proficiency Assessment will be used. Are teachers perceptions about the impact block scheduling has had on student standardized test scores accurate? A survey of teachers' perceptions about block scheduling and its impact on student standardized test scores will be conducted.

CHAPTER 2

LITERATURE REVIEW

Introduction

The purpose of this chapter is to explore the theoretical and empirical investigations that have significantly affected the concepts of middle school scheduling and the impact scheduling has on student achievement. Models of middle school schedules will be presented and theoretical foundations for scheduling will be reviewed. The effects of traditional and block scheduling on both teacher and student will be explored. A primary focus will be a discussion of relevant research examining various models of block scheduling, both at the middle and high school levels, and the impact scheduling has had on student achievement. Each of these studies will show how varied models of block scheduling have influenced student achievement, but no existing study has explored the relationship between an A/B block schedule and achievement in mathematics, language arts literacy, and science at the middle school level.

The Middle School Child

As we attempt to understand scheduling and its impact on the achievement of the middle school child, it is important to first understand what it is to be a middle school child. The middle school child is unique. Changes in physical growth, social skills, language, and cognitive development impact both the classroom and the playground. At the onset of adolescence, when physical changes in females are generally ahead of males, a natural separation between genders occurs. Social changes also take place. Girls are at the height of forming cliques, which can result in a great deal of cruelty, as well as

wonderful friendships. Saving face is very important for the easily embarrassed middle school male (Wood, 1997).

Middle school typically encompasses children who are eleven to fourteen years old. Within this four-year span, great diversity and variance exists. The middle school child is curious and challenges his known assumptions about the world. Fairness and equity are of great importance as the middle school child becomes absorbed in his success as compared to the success of peers in the classroom. The middle school child can be seen as oppositional, self-absorbed, and emotional, as arguing becomes an art form. In the classroom, the middle schooler is interested in testing the limits, loves a challenge, and performs best when real-life applications are presented (Woods, 1997). Most middle school children thrive on being given responsibility in their school and community. When learning, the middle school child can sustain attention for longer periods of time. They enjoy working with younger children and begin to develop an interest in one content area over another. The middle school child craves the recognition of their accomplishments. Celebrations, such as graduations and student award assemblies, are meaningful events that recognize their movement toward adulthood (Woods, 1997).

Teachers of middle school children recognize the importance of allowing for social interaction in the classroom. Peer relationships are especially important, and educators often encourage peer assignments to make learning more meaningful. As the middle schooler matures, he becomes more reasonable and more self-aware (Woods, 1997).

The physical changes that are observed are affecting the middle school child internally as well. The middle school child is sensitive and impulsive. He is physically awkward, fatigued more easily, and does not want to reveal too much about himself to others. As physical changes continue, adult-like skills and personality traits emerge (Woods, 1997).

The middle school child struggles between the desire to be with family, and the desire to be independent. Power struggles between parents and the middle schooler are more pronounced than in the past. Of great importance to the middle school child is privacy, independence, and self-expression (Stevenson, 1992). The unique physical, cognitive, and social-emotional needs of children eleven to fourteen years old has resulted in the evolving concept of middle school.

The Middle School Concept

The middle school years are often defined as a time when young teens struggle between their desire for independence and their dependence on the adults in their lives. As young teens struggle with this growth period, middle schools are charged with protecting, nurturing, counseling, and teaching them (Farmer, Gould, Herring, Linn, & Theobold, 1995).

Middle schools are expected to respond to the varied social-emotional needs of the young adolescent as well as focus on increasing student achievement. The middle school concept evolved as a result of the desire to meet these social-emotional needs, often referred to as developmental responsiveness (Juvonen, Le, Kagenoff, Augustine, & Constant, 2004). The predecessor to the middle school, the junior high school, became less effective because of its resemblance to the senior high school “with its emphasis on

content rather than exploration, departmentalization rather than integration, and an adherence to a rigid schedule" (Brough, 1995, p. 38). Alexander and George (1981) responded to the scholarly writings about the needs of young adolescents in bringing forth a new philosophy of the middle school concept.

> The concept of bridging school is not enough, however, because children of middle school age have their unique characteristics and needs which cannot be subordinated to the impact of the elementary school nor to the demands of the high school. An effective middle school must not only build upon the program of earlier childhood and anticipate the program of secondary education to follow, but it must be directly concerned with the here-and-now problems and interests of its students. Furthermore, the middle school should not be envisioned as a passive link in the chain of education below the college and university, but rather as a dynamic force in improving education (Alexander & George, 1981, p. 2).

Middle school education must be responsive to the needs of the young adolescent. Until the social-emotional needs of a child are met, learning is compromised. Shann (1999) researched social-emotional factors and their impact on student achievement. He found that middle schools with the highest number of disciplinary problems and highest rates of antisocial behavior had the lowest achievement test scores. Roeser, Eccles, and Sameroff (1998) conducted a longitudinal study to see how middle school students who identified themselves as struggling with social-emotional issues fared academically over a 3-year period of time. The results of their study revealed that 7th graders who reported symptoms of emotional distress had lower grades on their report cards than their peers by the end of 8th grade. Each of these studies provides support for the belief that attempts to increase academic achievement must be coupled by a strong effort to address the social-emotional difficulties faced by middle school aged students (Juvonen, Le, Kagenoff, Augustine, & Constant, 2004).

The developmental issues of the young adolescent must be dealt with using a range of instructional practices at the middle school level. Williamson (1998) advocates for the use of organizational factors, including time, as a means of addressing the developmental diversity that exists in the middle school classroom. He believes that examining and refining the way time is used in a school day has a significant impact on how a school responds to the needs of its students. Williamson urges schools to be flexible in their allocation of time to various subjects so that a schedule can vary as new dynamics in the classroom emerge.

Traditional Middle School Schedules

School systems in our country organize time in many different ways. While no set definition of middle school exists, the characteristics of middle schools can be described as having common programmatic features. These features include interdisciplinary team teaching, advisory programs, elective studies, interactive instructional strategies, block classes or periods, a core curriculum, and effective transitions (Queen, 2003).

Interdisciplinary team teaching entails a small number of teachers being responsible for teaching all subjects to the same small group of students. In this arrangement, teachers collaborate and create common assignments, curricula, and experiences that cross disciplines. Advisory programs help with the development of relationships between small groups of students and a school staff member. Staff members at a school are assigned to work with 4-10 students on a weekly basis. A period is built into the schedule that provides a setting to address the concepts of peer and adult relationship development, career exploration, community service, self-awareness, goal setting and social-emotional support (Hoskins, 1999). Elective studies allow students to

explore various disciplines that support the core academic subjects. At the middle school level, courses in world languages, music, art, technology, carpentry, and the family and consumer sciences are samples of offerings that might occur. The exploratory nature of these elective classes exposes students to varied offerings that will help them choose a defined area of interest in later grades. Middle school students will also be exposed to a core curriculum of mathematics, language arts/literacy (reading and writing), social studies, and science, as defined by the state or local board of education.

Putting all the features listed above into place requires scheduling the middle school student. Traditional schedules at the middle school level typically entail six to eight class periods per day ranging in length from 40 to 55 minutes with three to five minutes for changing classes. In the traditional middle school schedule, Carroll (1990) argues that student learning often takes a back seat to content of a course that teachers must "get to" in a school year. Pacing often seems hurried as teachers struggle to meet daily objectives in forty to fifty minute intervals. Teaching strategies, like cooperative learning, which have been proven to be most effective when teaching the middle school child, are often not in practice. Because lecture is the most efficient way in which to provide large quantities of information to students in a short time, teachers teaching in a traditional forty or fifty minute periods don't often have the opportunity to engage learners in the research based practices of cooperative learning, inquiry based activities, role-playing, and simulations (Canady & Rettig, 2000).

In a traditional schedule, students often find themselves stressed by trying to meet the expectations of six to eight different teachers, their assignments, and classes on a daily basis (Carroll, 1990). When students are moving in the halls to new classes

upwards of eight times a day, discipline issues and bullying are more likely to occur. Students are often late to class and time is utilized on a lesson warm up, review, and bringing a lesson to closure.

A traditional schedule has limitations for teachers as well. Teachers are able to focus less on their teaching because they are often engaged in more bureaucratic and administrative functions. Traditional schedules have teachers spending time monitoring student movement through the halls up to eight or nine times a day, recording attendance in as many as eight classes, and recording grades for 150 or more students (Miller, 1997). With this work demand, teachers are less likely to know their students well and relationships between teacher and student are less likely to be established.

A sample traditional middle school schedule is in Table 2.1.

Table 2.1: Traditional Schedule at the Middle School Level

Time	Class
8:30 – 9:15	Math
9:20 – 10:25	Science
10:30 – 11:15	Physical Education
11:20 – 12:25	World Language
12:30 – 1:00	Lunch
1:05 – 1:50	Language Arts Literacy
1:55 – 2:40	Social Studies
2:45 – 3:30	Elective (Computers, Art, etc.)

Hackmann and Valentine (1998) assert, “The creation of an effective schedule is paramount to the development of a well-functioning middle level program” (p. 3). *Turning Points* (Jackson & Davis, 1989) reported on the importance of scheduling options that meet the developmental needs of the middle school child. When reporting

on a typical 40-50 minute class period, *Turning Points* articulates that the "constant shifting creates formidable barriers to the formation of stable peer groups and close, supporting relationships with caring adults. The chances that young people will feel lost are enormous." (Jackson & Davis, 1989, p. 32).

Block Scheduling

Jackson and Davis (1989) assert that the middle school schedule should be flexible and support small learning communities. Small learning communities allow strong relationships to develop among peers and between students and teachers. Small learning communities have been shown to benefit student achievement and self–esteem because of the sense of "belongingness" that a small learning community creates (Cotton, 1996). Because block scheduling is a deviation from the typical 40-50 minute class period, flexibility comes from the varied depth of learning that can occur and the extended period of time that a student is with each teacher. The purpose of a flexible schedule is so that the needs of the learners can be best met. Schedules with the most flexibility allow teachers to make instructional decisions based on the content and learning that is taking place. Block scheduling is said to be the most flexible scheduling option at the middle school level because of the many models that have evolved.

Block scheduling came into existence via many different formats. Vocational schools throughout the United States have used double periods and extensions of time for decades, but it was not until the mid-1980's that high schools began to adopt schedules and adjust teaching strategies to better meet the needs of learners.

The concept of intensive scheduling, or having longer periods of time in certain classes, was the first premise behind block scheduling. While some disciplines naturally

adapted to the extended time periods, like science laboratory and vocational classes, other disciplines have struggled to make the transition as smoothly.

There are many advantages to block scheduling for students. Having a limited number of classes at a time (usually 4) allows students to concentrate on a limited number of subject areas at one time. Students can more easily navigate the expectations of a limited number of teachers and can develop closer relationships with these teachers. In a block schedule, students only have to prepare for assignments or assessments in four classes each day. Block scheduling also help to meet the unique physical and intellectual needs and characteristics of early adolescents. A longer period of time allows teachers to plan lessons in which students are active participants instead of passive learners. The social nature of the middle school student can be incorporated into the class period. Extended periods of time enable the use of skits, role-plays, and debates that "provide a constructive atmosphere for students to act out their moody and erratic behaviors" (Hoskins, p. 4).

Queen (2003) found that block scheduling showed many advantages over a traditional schedule. In his survey of schools that have transitioned to block scheduling, he writes,

> I found the following advantages most often: increased instructional time, smaller classes, fewer classes to prepare for, more in-depth study of concepts, a decrease in the number of discipline problems, increased student-teacher interaction, students and teachers getting to know each other better, students earning more credits per year, increased planning time for teachers, better grades earned by students, and an opportunity for students to take more electives (pp. 49-50).

For teachers and administrators, block scheduling provides numerous advantages. For administrators, block scheduling allows smaller class sizes without the need of hiring

additional teaching staff. Block scheduling provides teaching loads of 3 classes per day, or 6 classes over the course of a year (i.e. 3 on "A" day, 3 on "B" day or 3 classes in fall semester, 3 classes in spring semester). In a traditional schedule, teachers teach only five courses in a year.

Teachers enjoy the benefits of block scheduling in their workload as well. Teachers have fewer classes to prepare for each day and fewer students whom they teach. They have fewer administrative tasks, such as taking attendance, hallway supervision, and collecting paperwork because they see fewer students. Discipline issues are often reduced because there are fewer transitions between classes.

Block scheduling also permits teachers to use more authentic assessment measures. Block scheduling allows teachers to incorporate a greater variety of instructional strategies. When asked to identify changes that occurred in their teaching as a result of block scheduling, a group of high school teachers identified an increase in active inquiry, cooperative learning, discovery learning, hands-on activities, off-campus trips, projects, research, role play, technology use, and writing (McCullough & Tanner, 2001).

Eineder and Bishop (1997) surveyed teachers in a high school in Ohio after the implementation of a block schedule in which 91% of teachers and 77% of students stated that teachers were teaching with more innovative instructional methods than when they taught in a traditional schedule. The prevailing wisdom is that teachers will be unable to teach through teacher-centered methods for an entire block of time (Spellman & Oliver, 2001). But, regardless of whether the teachers use lecture or varied methods of instructional delivery, teachers must teach differently when working in a block schedule.

Training on instructional strategies for teaching in the block is essential for the successful transition to a block schedule (Hackmann & Schmitt, 1997).

Transitioning to a Block Schedule

The success of a new block schedule implementation is dependent on the levels of preparedness of the teachers. In Jim Collins' book, *Good to Great* (2001), he talks about the need to get the right players "on the bus" and all driving in the same direction in order for change to be well received and productive. The decision to move to a block schedule needs to include all the stakeholders and include teachers, students, parents, community members and administrators. Guskey's (1986) research on change in the schools supports the idea of the need for consensus when change is going to take place. He advocates at least two years of preparing and training prior to the implementation of a block schedule. DiRocco (1999) moved his school from a traditional schedule to a block schedule and found that giving teachers direct control and responsibility for the way in which instructional time would be organized empowered them to bring about the positive results in his study.

Teachers need to be schooled in how to structure a block period of time so that instruction is enhanced. Often, the block is erroneously perceived as a way to put two "old" lessons together, or as a time for students to complete homework assignments in class. A high school in Wisconsin invested a great deal of time and money into preparing their teachers for block scheduling. Each teacher was given 40 hours of compensation to revise his or her curriculum and syllabi. Consultants and instructional experts were brought in to train the faculty on teaching in the block. The goal was to ensure that each and every teacher was prepared for this transition (Fitzpatrick & Mowers, 1997)

Models of Block Scheduling

Many variations of block scheduling exist. It is important to understand the variety of block scheduling models that exist because the research that exists on block scheduling is done in schools that use varying models.

The school being studied adopted an "A/B day" schedule in which students have four, 78-minute classes each alternating day. For example, a student would have math, science, physical education and a world language on an "A" day, and the same student would have social studies, language arts, a related arts class, and an exploratory class on a "B" day. This schedule would alternate between an "A" and a "B" day all year. Students have the same number of classes each year, but they are spread out over two days instead of one day.

In the school being studied, there were many perceived advantages to this A/B alternating-day schedule. One of the biggest advantages is that the advisory/exploratory class period was built into every other school day, which allowed the number of "pull-outs" to be limited. Prior to this time, students who needed music lessons, remedial assistance, gifted and talented, and related services such as speech, counseling, and occupational therapy were "pulled out" of classes at random times. This "pull out" model contributed to students missing academic learning time and teachers having to get students "caught up" on what they missed. The block schedule afforded students the opportunity to become involved in programs or receive services during the same period of non-academic time. A sample of the A/B day schedule in the school being studied is provided in Table 2.2.

Table 2.2: Sample A/B Day Schedule

Time	"A" Day	"B" Day
8:35 – 9:51	Science	Social Studies
9:56 – 11:14	Physical Education	Related Arts (Music, Computers, etc)
11:18 – 11:55	Lunch	Lunch
12:00 – 1:15	Math	Language Arts Literacy
1:18 – 2:39	World Language	Advisory/Exploratory

The most pronounced advantage to an A/B block schedule is that students have each class over the entire school year so that there is no gap in time between semesters or school years.

The A/B block schedule chosen by the school in this study has its limitations as well. The alternating day block schedule is sometimes criticized because teachers spend more time reviewing at the beginning of each class because there has been a day since the class last met. In addition, the block schedule affected the amount of time in some of the content areas. The traditional schedule of the school being studied had a 40-minute period for literacy (reading) and a 40-minute period for language arts each day. When the block schedule was implemented, however, students in 7th and 8th grade had one class, language arts literacy, every other day for 78-minutes. This reduced the amount of time students had in this subject by more than half. While the drastic reduction in time was of great concern for the teachers and supervisors of language arts literacy, it resulted in only slight revisions to the language arts literacy curriculum. The movement to the block schedule went forward as planned.

Another model of block scheduling varies by semester, often referred to as a "4 X 4" block schedule. This model is most often used at the high school level. Students have the same four classes each day for a semester and then switch to a new set of four courses

for the second semester. This variation is also done by switching courses each marking period or each trimester. This is a very popular model at the high school level because it allows intensive study of a subject for the marking periods or semester that the class is taught. A sample "4 X 4" schedule is shown in Table 2.3.

Table 2.3: Sample "4 X 4" Schedule by Semester

Time	September - January	February – June
8:35 – 9:51	Science	Social Studies
9:56 – 11:14	Physical Education	Computers
11:18 – 11:55	Lunch	Lunch
12:00 – 1:15	Math	Language Arts
1:18 – 2:39	Tutorial	World Language

The "4 X 4" block schedule is often criticized because of the length of time that can elapse between consecutive courses. Students taking coursework that provides a foundation for future learning may have significant gaps in the time between classes. For example, a student taking Spanish I in the first semester of their freshman year will end Spanish in January of that year and may not be able to take Spanish II until the second semester (February) of their sophomore year, leaving a gap of a full year. There is a concern about student regression in instances like this. Mathematics and world language educators have been especially concerned about how this gap impacts learning of their respective disciplines.

Block scheduling also occurs in what is called a "flexible block". This occurs when a student has a full course load each day (i.e. 6 classes for 45 minutes each), but one of the classes is held for an extended period of time (i.e. 80-90 minutes). Each day the core class that is held for the block period of time alternates so that each class period is exposed to the extended length of time. This type of block schedule allows extended

periods of time in each subject on a weekly basis. Teachers can plan lessons that will be taught about more in depth as well as utilize varied teaching strategies for instructional delivery. A sample "flexible block" schedule is provided in Table 2.4.

Table 2.4: Sample "Flexible Block" Schedule

Time	M	T	W	Th	F
8:30–9:15	Science	Math	Social St.	Spanish	Lang.Arts
9:15–10:00	Math	Social St.	Spanish	Lang.Arts	Science
10:00–10:45	Phys.Ed.	Phys. Ed.	Phys. Ed.	Phys. Ed.	Phys. Ed.
10:45–11:30	Social St.	Spanish	Lang. Arts	Science	Math
11:30–12:00	lunch	lunch	lunch	lunch	lunch
12:00–12:45	Spanish	Lang. Arts	Science	Math	Social Stud.
12:45–2:05	*Lang. Arts*	*Science*	*Math*	*Social Stud.*	*Spanish*
2:05–2:50	Computers	Computers	Computers	Computers	Computers

While a "flexible block" provides for exposure to each discipline in an extended period of time, this schedule still requires teachers and students to prepare for multiple classes each and every school day. Students are unable to narrow their focus to just four or five subjects at a time and teachers must still prepare for a large quantity of classes and students.

A popular model at the middle school level is the "fan block" schedule. Queen and DiBiase (1999) have coined the "fan block" schedule model, which is often implemented as a variation on the A/B alternating schedule. Classes meet every day or every other day for both extended and shortened blocks of time. Students have five to six classes a day that meet for a semester or for a year. Queen (1999) developed eight variations of the fan block-scheduling model, which can be adjusted to meet the varying needs of a specific school. A basic "3 X 2" fan block sample schedule is illustrated in Table 2.5.

Table 2.5: Sample "3 X 2 Fan" Block Schedule

Time	M	T	W	Th	F
A. Basic Model					
8:30 – 10:00	Lang. Arts	Lang. Arts	Lang. Arts	Lang. Arts	Lang. Arts
10:00 – 11:30	Math	Math	Math	Math	Math
11:30 – 12:00	lunch	lunch	lunch	lunch	lunch
12:00 - 1:30	*Social St./ Science*	*Social St./ Science*	*Social St./ Science*	*Social St./ Science*	*Social St./ Science*
1:30 – 2:15	Spanish	Spanish	Spanish	Spanish	Spanish
2:15 – 3:00	Phys. Ed.	Phys. Ed	Phys. Ed	Phys. Ed	Phys. Ed
3:00 – 3:30	Advisory	Advisory	Advisory	Advisory	Advisory
B. Science and Social Studies – Alternating Days					
12:00 – 1:30 Week 1	*Social St.*	*Social St.*	*Social St.*	*Social St.*	*Social St.*
12:00 – 1:30 Week 2	*Science*	*Science*	*Science*	*Science*	*Science*
***C.* Science and Social Studies – Alternating Semester**					
12:00 - 1:30 Semester 1	*Social St.*	*Social St*	*Social St*	*Social St*	*Social St*
12:00 – 1:30 Semester 2	*Science*	*Science*	*Science*	*Science*	*Science*

Each fan block model variation offers lengthened and shortened periods varying in length from 30 to 90 minutes. These periods of time can be rotated, combined and varied to meet the needs of the students. Queen and DiBiase (1999) advocate for the use of the fan block models at the middle school level because it allows for team planning for teachers, an advisory period to be built into the school day, and core and elective classes to vary in length as needed by the students.

The "Fan," "A/B – alternating day," "flexible block," and "4 X 4" models are the basic models of block scheduling, but there are numerous hybrids that can be modified to

meet the needs of a particular school. 'Modified blocks,' 'exploratory blocks,' and 'parallel blocks' are examples of variations on the aforementioned block schedules as well. It is important for the reader to have a basic understanding of the various models of block scheduling because the studies to be presented in this review use a variety of block schedules in their demonstration of how block scheduling impacts student achievement.

Standardized Testing in New Jersey: Historical Context

The school being studied is in a suburban community in Hunterdon County, New Jersey. In this study, achievement of the students is being measured using the state initiated standardized test for 8th grade students called the *Grade Eight Proficiency Assessment (GEPA).* This section provides a detailed history of standardized testing in the State of New Jersey and how the state arrived at the decision to use the GEPA as their achievement assessment tool at the 8th grade level.

From 1978 and to 1982, students in grades three, six, and nine participated in the Minimum Basic Skills (MBS) testing program for reading and mathematics. In 1982, legislators made passing the Minimum Basic Skills Test a requirement for receiving a high school diploma *(State of New Jersey, 2006b).*

As the desire for Americans to remain competitive in a global world heightened, the State of New Jersey kept up with the pace by adopting the Grade 9 High School Proficiency Test (HSPT), a more challenging assessment which measures reading, writing, and mathematics skills which was also used as a graduation requirement beginning in 1983. In 1988, the New Jersey Legislature passed a law that moved the High School Proficiency Test from grade nine to grade eleven and added an earlier

assessment for students in grade eight, the Grade 8 Early Warning Test (EWT). While the HSPT was created to serve as a graduation requirement, the EWT was designed to assist in student placement and programming in the reading, writing, and mathematics content areas *(State of New Jersey, 2006b).*

As the demands for student achievement continued to increase around the country, the New Jersey Board of Education adopted the Core Curriculum Content Standards (CCCS) in 1996. These standards were the state's first step in identifying what all New Jersey students should know and be able to do by the end of the fourth, eighth, and twelfth grades. The Core Curriculum Content Standards also led the way for the development of new assessment measures in the state. These measures include the *Elementary School Proficiency Assessment* (ESPA), which was administered from 1997-2002, and the *Grade Eight Proficiency Assessment* (GEPA), which replaced the EWT in 1998. In addition, the *High School Proficiency Assessment* (HSPA) replaced the HSPT11 as the state's graduation test for all students *(State of New Jersey, 2006b).*

In January 2002, federal legislators enacted the *No Child Left Behind Act of 2001 (NCLB).* New Jersey was required to make further changes in its assessment measures in order for it to align with this new legislation. The NCLB Act mandates that each state administer annual standards-based assessments to students in grades 3 through 8 and at least once in high school. The legislation requires each state to provide tests that are based on the state's curriculum and that students be assessed annually in language arts literacy and mathematics. The legislation also requires that science be assessed in three of those years, once in the elementary years, once in the middle school years, and once in the high school assessment (U.S. Department of Education, 2002).

New Jersey set higher expectations and put forth a more rigorous testing program than federally mandated. In 2003, the state implemented the *New Jersey Assessment of Skills and Knowledge (NJ ASK 3)* for students in grade 3, and the grade 4 ESPA then became the NJ ASK 4. Science was added to the NJ ASK 4 in 2005. The NJ ASK for grades 5, 6, and 7 to assess language arts literacy and mathematics was implemented in 2006, and science was added to the HSPA in 2007 *(State of New Jersey, 2006b).*

For the purposes of this study, scores on the Grade Eight Proficiency Assessment (GEPA) were compared across time in the school being studied. Reliability and validity information on this assessment measure will be discussed further in Chapter 3.

Student Achievement and the Block Schedule

This study seeks to compare the scores of the middle school being studied to the achievement scores of students across the state in the areas of mathematics, language arts literacy, and science over a seven-year period. There is varied existing research of the implications of a block schedule on student achievement. The existing studies vary by types of block schedule, the measure used to assess achievement, subject areas assessed, school level (high school v. middle school), and results.

Some studies have found little academic benefit for block scheduling over traditional schedules. In a study by Sigurdson (1982), a large junior high school in Alberta, Canada, implemented a block schedule in which extended periods of time were linked for language arts/social studies and for mathematics/science. In this study of block scheduling and student achievement, Sigurdson (1982) found no difference between block-scheduled and traditionally-scheduled students in their mathematics achievement scores. In addition, block-scheduled students who were considered to be “average or

better" did less well in language arts then their peers who were schooled with a traditional schedule. While this study showed no improvement in math scores for those who were taught mathematics in an extended block of time, one needs to consider when and where the study took place. In 1982, little research on middle school teaching in the block existed. In addition, the structure of the school was that of a junior high school, not a middle school. One cannot account for the social-emotional preparedness of the teachers and students who participated in a block schedule in this school.

Lockwood (1995) reported on block scheduling and student achievement at the high school level in Dothan City, Alabama. A comparison of traditionally and block-scheduled students in algebra and geometry classes were found to have no significant differences in mathematic achievements on end of year tests. High schools in North Carolina found similar results. With over 55% of high schools in North Carolina participating in a block schedule, T scores from the state standardized tests in the content areas of English, Algebra, Biology, and US History were compared to the high schools not using the block schedule. The data were analyzed and it was concluded that there is no significant difference in scores of students in any content area (North Carolina Department of Public Instruction, 1996). The limitation of the analyses is that the authors did not account for the various models of block scheduling that existed in the hundreds of schools in the study. In addition, both studies assessed data and block scheduling models at the high school level.

Holmberg (1996) studied student achievement at the high school level by comparing grade point average and ACT test scores for those who were and were not in a block schedule. No difference between scores of students who were and were not in a

block schedule was found. This study has limited relevance to the research being conducted because it was only at the high school level and only compared scores in the academic disciplines of reading and writing.

There are also high schools that have found positive results in academic achievement as a result of the block schedule. Shortt and Thayer (1998) presented the findings of the Virginia State Assessment Program in which 63% of the high schools were using a block schedule. Over a two-year period, students in 11th grade were tested in the areas of mathematics and reading using the Iowa Test of Basic Skills–TAP or the Stanford Achievement Test, 9th edition. Student scores were disaggregated into urban, suburban and rural school settings as well as traditional, A/B block, and "4 X 4" block schedules. The analyses concluded that overall students scores in both reading and mathematics were higher for students in schools with "A/B" or "4 X 4" schedules than for students in schools with traditional schedules, but there was one exception. Suburban students in schools with a traditional schedule had higher reading gains than block scheduled students when data from the "A/B" and "4 X 4" schedules were combined. In addition, Shortt and Thayer reported that urban students had a significantly higher gain in scores in the "A/B" schedule than in a "4 X 4" schedule.

A study by Cobb, Abate, and Baker (1999) analyzed both junior and senior high school students to find out if block scheduling would improve student attendance, grade point averages, and standardized test scores. A matched control group who did not have block scheduling was used as a means of comparison. Data from four years prior to the block implementation and three years after the block implementation were used in this study. There were no significant differences found in the grade point averages or

attendance rates of students in the block schedule. And while mathematics standardized test scores at both the junior and senior high school level favored students participating in the traditional schedule, standardized test scores were found to be significantly higher in reading and writing for those students participating in a block schedule at both the junior and senior high school level.

Schroth and Dixon (1995) reported on the achievement of 7th grade students in Texas after the implementation of a block schedule. Results showed that standardized test scores in mathematics were consistently lower with a "3 X 2 Fan" block schedule. The study analyzed test scores in the first two years after the implementation of the block schedule. The authors of the study caution future researchers to compare scores three to five years after the block implementation in order to ensure that valid and justifiable results can be drawn about the effects of student achievement.

Positive results on the impact of block scheduling on student achievement at the middle school level have also been found. Beaver (1998) completed a study comparing the standardized test scores of eighth graders at a middle school in Indiana before and after the implementation of a language arts block. Students in this Indiana middle school had language arts literacy for 45 minutes. In the 1993-1994 school year, the length of time for a language arts block increased to 90 minutes. A t-test was used to analyze the mean scores for both reading and language arts on the state standardized test, the ISTEP. Data from 1993, prior to the block implementation, were compared to scores from the 1995 testing year. Beaver (1998) found significant differences in the scores of students before and after the implementation of the block schedule, therefore supporting the hypothesis that block scheduling will improve the language arts literacy standardized test

scores of middle school students. This study did not publish how the change to 90-minutes of language arts impacted other subject areas which had a decrease in academic time.

Results of the studies being presented indicate that block scheduling and its impact on academic achievement can vary by discipline. The theme emerging suggests that reading and writing favor block scheduling, whereas mathematics does not. But there is great inconsistency in the research findings because of the various types of block schedules that exist.

DiRocco (1999) authored a study of student test scores after the implementation of a block schedule at the Lewisburg Area Middle School in Lewisburg, Pennsylvania. An alternating-day (A/B) block schedule was introduced in this school over a three-year period. Seventh grade teachers piloted the schedule for two years while teachers in the eighth grade maintained a traditional schedule. In the third year the 8th grade teachers transitioned to an A/B block schedule as well. Scores from two years of students were compared. California Achievement Test scores and grade point averages of the graduating middle school class of 1996, who received its academic instruction by way of a traditional schedule in six forty minute periods, was compared to the graduating middle school class of 1997, who received its instruction in alternating-day 82 minute blocks. While controlling for teacher effect, gender, and academic ability, the author concluded that after the second year, the alternating–day block schedule had a positive effect on student academic performance. In this study an analysis of covariance that adjusted for academic ability showed that the means of all the 8th grade final course averages and grade point averages favored the alternating-day block schedule. In addition, the analysis

revealed that the percentile mean scores on the California Achievement Tests in the Language, Mathematics, Social Studies, and Total Battery were significantly higher for students in the alternating-day block schedule than for those in the traditional schedule.

The premise of this study most closely resembles the study that is to be conducted in this dissertation. Both schools are middle schools using an A/B alternating day block schedule. In the Lewisburg Area Middle School, block scheduling was introduced over a three-year period and only two years of data were compared. In the school being studied in this research, however, achievement measures will be reported in the Language Arts Literacy, Mathematics, and Science content areas and are compared across seven years (2 years before block scheduling and 5 years post block scheduling implementation).

Conclusion

While the rationale, as discussed in the introduction, for the movement to the block schedule in the school being studied suggests that it meets the developmental needs of children in the middle school, there was little discussion in the school being studied of how this change in schedule might impact academic achievement. The school being studied has never conducted a statistical analysis of academic achievement scores before and after the implementation of the block schedule. This study seeks to know if block scheduling increased middle school standardized test scores in three areas, math, science, and language arts literacy, for the school being studied over a five-year period.

The existing studies on block scheduling and its impact on student achievement are varied. Much of the research that exists is at the high school level and the research that does occur on middle schools has inconsistent results. In the studies where block scheduling has been shown to have a positive influence on middle school student

achievement, various models of block scheduling are used. In addition, each author defined student achievement differently. In studies where grade point average was used as a measure of student achievement, additional variables such as changes in staff members from year to year and grading policy changes can influence the grades of students.

The biggest limitation in the majority of the studies is that there are limited data across time. Much of the existing analyses compare only two years of data to assess the impact of block scheduling on student achievement. This study, however, seeks to analyze seven years of data: two years of data from before the block schedule was implemented and five years of data from after the block schedule was implemented.

It is important to remember that the block schedule was implemented in the school being studied in all three grades (6^{th}, 7^{th} and 8^{th}) during the same school year. Therefore the data from 2001, the first year of the block schedule, will have the results of students who only experienced block scheduling from September through March of their eighth grade year. Test data from 2002, the second year of block scheduling, will have the results of students who only experienced block scheduling for two years – from September of their 7^{th} grade year through the testing date in March of their 8^{th} grade year. Test data from 2003 through 2005 will have the most purity in that these scores will reflect students who only know their middle school experience in a block schedule. These later data are also important because they reflect the time teachers need to adjust to changing the way in which they deliver instruction. Schroth and Dixon (1995) indicated that the data from three to five years after the implementation of a block schedule would be more valid and reliable indicator of the true impact of the change.

This study provides a unique contribution to the existing research on the impact of block scheduling on student achievement. Data available span a period of seven years, five of which are post the implementation of block scheduling. The student achievement data in this study is in the content areas of mathematics, language arts, and unique to this study, in the area of science. The school being studied has statistically reviewed student and faculty attendance rates and disciplinary referrals rates as a result of changing to the block schedule. Both analyses have demonstrated results favorable to block scheduling. But statistical analyses of how the block schedule has affected student achievement in the areas of mathematics, language arts literacy, and science have yet to be conducted. This study conducted such an analysis. In addition, this study will analyze teacher perception of block scheduling and its impact on student achievement.

CHAPTER 3

METHODOLOGY

Participants

The school being studied is a 6th- 8th grade middle school in suburban Hunterdon County, New Jersey. Eighth grade students enrolled at this middle school were included as participants in this study (See Table 3.1). Students who were categorized as English Language Learners were excluded from the analyses because the definition of English Language Learner, as articulated by the State of New Jersey, changed several times between 1999 and 2005. Due to these changes, scores from English Language Learners could not be statistically compared with accuracy. In addition, students who received "VOIDED" scores on any test section were also excluded. A "VOIDED" test score was issued on any sub-section of a test to any student who did not follow the standardized instructions (starting or stopping on time, for example) or who cheated in some capacity (worked on the wrong section of the test, was seen using unauthorized aids, or was copying from a peer). All other students, including those with special needs, who were administered the Grade Eight Proficiency Assessment (GEPA) were included in this study.

Existing data from the school archives were used for this study. GEPA scores from 1999 through 2005 were used for analyses. The number of students in each testing year was dependent on enrollment at the middle school (See Table 3.1):

Table 3.1: Eighth Grade Students Administered the GEPA

Year	Total Number of Students (N)	Gender	
		Male	Female
1999	341	186	155
2000	360	187	173
	(Implementation of the Block Schedule)		
2001	346	173	173
2002	368	185	183
2003	402	200	202
2004	393	200	193
2005	373	195	178

The students in the participating school are, on average, 87% Caucasian, 4.9% Hispanic, 3% Black, and 5.1% Asian. The District Factor Group (DFG) ranking system was introduced by the New Jersey Department of Education in 1975 as a means of comparing the socio-economic status of school districts. The DFG system is an index of factors from decennial Census data. Seven indices are used from the census to determine DFG:

1. Percent of population with no high school diploma
2. Percent with some college
3. Occupation
4. Population density
5. Income
6. Unemployment
7. Poverty

A principal components analysis was conducted using these seven indices to produce a statistical score which was used to rank the districts. The State of New Jersey then grouped districts into deciles. Letters are assigned to these factor groups, the lowest scores being DFG ‘A’ and the highest DFG being ‘J’ (New Jersey Department of

Education, 2006). The school is considered to be in an affluent district and was categorized as a District Factor Group 'GH' during the 1999-2005 school years.

Although accurate numbers on middle schools using the block schedule during the 1999-2005 school years were not available, the school being studied was one of the first middle schools in the state of New Jersey to implement a block schedule. When the block schedule was researched during the 1998-1999 school year, only two other middle schools in the State of New Jersey were known to be using a model of block schedule. In 2005, the New Jersey Principals and Supervisors Association reported 18 middle schools using some type of block schedule. In comparing this school to the state averages, we can assume that these few middle schools using block scheduling during the analyzed years is not significant.

Procedures

Standardized Test Administration. The GEPA was administered in March of each school year over four consecutive days that are determined by the State Board of Education. Make-up exams for absent students were administered the week following the standard administration. The State of New Jersey developed a standardized protocol for the administration of the GEPA. Students throughout the state took the same subsection of the test on the same day. School principals and assistant principals must attend a daylong training session with officials from the State of New Jersey Department of Education on the protocols related to test administration. Principals and assistant principals must then develop site-specific training sessions for teachers on how to proctor the exam in a standardized fashion. State monitors visit school testing sites unannounced to enforce strict adherence to the protocols. The school being studied had an official,

unannounced site visit during the 2003 administration of the GEPA and was found to be in compliance with all issues related to standardized test administration.

The New Jersey State Department of Education developed very specific protocols for the administration of the GEPA. On Day 1 of testing, students were assessed in the area of Science. Life, Physical, and Earth Science were assessed over a 2-hour period. Timing of each subsection of the test is specifically detailed and followed by test proctors. On Day 2 of testing, students were assessed in the area of Mathematics. Number sense, spatial sense and geometry, data analysis, probability, statistics, discrete mathematics, patterns, functions, and algebra were assessed over a 3-hour period of time. Days 3 and 4 are used to assess Language Arts Literacy. Testing time was approximately 2 hours each day and students were assessed in reading, writing, persuasive writing, revising, and editing.

Total testing time (including time for distributing and collecting materials, reading directions and taking breaks) was approximately nine hours over four successive days. The GEPA test administration was required to be administered in the morning. The New Jersey Department of Education prepares a *Test Manual* and *Examiner's Manual* that must be used as a training guide for all those involved in the administration of the GEPA exam.

At the conclusion of the standard and make-up week GEPA administration, GEPA materials were shipped back to the state via a secure carrier where they were analyzed and scored by a state appointed contractor. Resulting scores for each test administration were sent back to school districts in mid-June. In 2006, the New Jersey Department of Education built a database that districts can use to access their scores

online. In addition, this database allows schools to compare their data over time as well as to state averages.

Reliability and Validity of the GEPA. The New Jersey Department of Education publishes a technical report that is distributed to local school districts with their score reports. Currently, technical reports are only available for the 2003, 2004, and 2005 test administration dates.

The GEPA technical manual summarizes the reliability estimates for each of the content areas. The 2004 Technical Report provides a sample of reliability reporting data on the GEPA. The technical manual reports the reliability coefficients based on Cronbach's coefficient alpha measure of internal consistency. The reliability estimates are using scaled scores ranging from 100 to 300 and are reported below:

Table 3.2: Reliability Estimates and Standard Errors of Measurement for Content Areas - 2004

GEPA Test Section	Number of Points	Reliability Cronbach's	SEM Raw Score	SEM Scale Score
Lang. Arts/Lit	62	.89	3.07	12.29
Mathematics	48	.91	3.30	12.80
Science	54	.89	3.29	10.57

(NJ Department of Education, 2006c)

The technical report also addresses issues of validity for the GEPA. Issues related to content and curricular validity, construct validity, and criterion-related validity are detailed in these technical reports.

Teacher Survey. Teachers who taught at the school being studied both before and after the implementation of the block schedule were also surveyed to ask for their

perceptions on the block schedule, its impact on their teaching, and its impact on student achievement. A copy of the survey is available in Appendix A.

Thirty teachers were eligible to complete the survey; eighteen teachers did complete the survey for a 60% response rate. These staff members represent the science, math, and language arts literacy disciplines, as well as the physical education, art, family and consumer science, music, gifted and talented, social studies, world language, and special education departments. The purpose of the survey was to seek qualitative data on the perceptions of block scheduling and its impact on student achievement.

Permission to access these teachers was granted by the superintendent of the school district. Teachers were given a copy of the informational letter and survey at a school staff meeting and asked to complete the survey within two weeks. Participation in the study by teachers was voluntary and surveys were completed anonymously. Email reminders were sent out to these teachers two times over the two-week period in hopes of encouraging the completion of the survey.

Data Analysis Procedures

Research Questions: How similar are the scores of students in the school being studied to the average scores in the State of New Jersey? Has block scheduling increased middle score standardized test scores in three areas (math, science, and language arts literacy) for the school being studied? Are teachers perceptions about the impact block scheduling has had on student standardized test scores accurate?

To evaluate the first question, a one sample z-score was conducted to compare the difference between average scores for the target school and the state average. Scores of students in the school being studied and at the state level were compared for the time

periods both before and after the block schedule was implemented. Scores in each of the three content areas, math, science, and language arts literacy, were compared independently across seven years (two years before the implementation of the block schedule and five years after the implementation of the block schedule).

The one sample z-score method of data analysis was chosen because it is an excellent statistic for testing the significance of the difference between a sample and a given population. A z-test helped to determine whether differences between the school average and state average is due to the independent variable (block scheduling) and greater than chance, thus ruling out the null hypothesis. If the resulting z-scores are high enough, it can be said with 95% certainty that the difference between the two sets of scores is significant and not due to chance.

To assess whether there were differences in the test scores across years, a one-way ANOVA was used to compare the mean scores over the seven-year period. In addition to comparing the entire population over the seven-year period in each of the three subject areas, analyses of sub-groups were conducted on data that both included and excluded the special education population and included only the special education population. Each of these sub-groups was analyzed by gender as well. A total of twenty-seven one-way ANOVAs were conducted. Table 3.3 shows the ANOVAs that were conducted.

Table 3.3: One–Way ANOVA Analyses Conducted

Subject	Group	Sub Group
Science	Total Population with Special Education	All
		Males
		Females
	Total Population without Special Education	All
		Males
		Females
	Special Education Scores Only	All
		Males
		Females
Math	Total Population with Special Education	All
		Males
		Females
	Total Population without Special Education	All
		Males
		Females
	Special Education Scores Only	All
		Males
		Females
Language Arts/Literacy	Total Population with Special Education	All
		Males
		Females
	Total Population without Special Education	All
		Males
		Females
	Special Education Scores Only	All
		Males
		Females

A Bonferroni correction within each category was conducted to correct for the multiple analyses. The alpha number used as a means of comparison was $p < .006$. If a significant difference was found in mean scores over the seven-year period the researcher conducted a post hoc analysis using a Fisher's LSD (multiple t tests) to determine in

which years a significant difference in mean score existed. A pattern of significant differences between the 1999-2000 scores and the 2001-2005 scores would demonstrate the impact block scheduling had on student achievement. A planned comparison was also conducted to see if there were significant differences between average scores before and after the block schedule implementation.

Are teachers perceptions about the impact block scheduling has had on student standardized test scores accurate? Teacher surveys were administered to staff members who taught in the school being studied both before and after the implementation of the block schedule. Survey responses were analyzed for content patterns when assessing teachers' perceptions of the block schedule. Emerging themes were presented and common responses were calculated. In the survey, teachers were asked to respond to fourteen questions relating to their experiences before the block schedule implementation, how the block schedule impacted what they teach and how they teach it, the pros and cons of block scheduling, their opinion on how block scheduling impacts student achievement in the classroom and on standardized tests, and their schedule-type preference for teaching. Teachers who teach in the content areas being assessed on the standardized tests as well as teachers who teach in other content areas were included in this analysis.

CHAPTER 4

RESULTS

In this chapter, the results of the data analyses used to assess the hypotheses of the present study are presented. In order to assess whether the average scores for the school being studied were significantly different from the state average, a z-score comparison test was conducted. Then, to assess whether there were differences between the scores received before and after the implementation of the block schedule, several analyses were conducted. Several ANOVAs were conducted to assess differences across the seven-years of data in GEPA test scores. If significant differences were found, a post hoc Fisher's LSD was conducted to assess which years had significant differences between them. The objective of these analyses was to determine whether student achievement was impacted by the change to block scheduling during the 2000-2001 academic year. A planned comparison of average mean scores from before and after the block schedule was also conducted.

Descriptive statistics on the students in the sample and their scores on the GEPA exam are followed by results of the one sample z test, ANOVAs, post hoc Fisher's LSD, and comparisons. Finally, results of the teacher survey aimed at assessing the perceptions of how block scheduling has affected student achievement are presented.

Descriptive Statistics

In this section, descriptive statistics on the sample that was used for the analyses are presented. Data from the 1999 testing year through the 2005 testing year were used. Demographic variables used in these analyses were gender and special or regular

education designation. Analyses were conducted both including and excluding students identified as receiving special education services. Each analysis was also conducted by gender. Tables 4.1 and 4.2 show the number of students, by gender, considered to be in the regular or special education population in this sample.

Table 4.1: Number of Students in Regular Education

Year	Number of Regular Education Students	Regular Education Males	Regular Education Females
1999	292	150	142
2000	321	156	165
	(Implementation of the Block Schedule)		
2001	313	157	156
2002	329	162	167
2003	351	168	183
2004	347	174	173
2005	327	159	168

Table 4.2: Number of Students in Special Education

Year	Number of Special Education Students	Special Education Males	Special Education Females
1999	49	36	13
2000	39	31	8
	(Implementation of the Block Schedule)		
2001	33	16	17
2002	39	23	16
2003	51	32	19
2004	46	26	20
2005	46	36	10

Research Question 1: How similar were the scores of students in the school being studied to the average scores in the State of New Jersey?

Initially, the school being studied was compared to the scores of all students taking the GEPA in the State of New Jersey in hopes of seeing a difference in the scores when the block schedule implementation occurred. Summary data were accessed to conduct the analysis. Scores for all students in the State of New Jersey are summarized in Table 4.3.

Table 4.3: Scores for all Students in the State of New Jersey

	Science			Math			LA/Literacy		
Year	Population	Mean	SD	Population	Mean	SD	Population	Mean	SD
1999	n/a	n/a	n/a	89488	213	34.6	89279	216.2	26.0
2000	92113	220.1	30.4	92761	210.7	35.0	91557	214.1	26.7
				(Implementation of the Block Schedule)					
2001	95603	220.8	29.2	95613	212.4	35.2	95091	213.8	27.8
2002	101103	221.5	29.3	101223	209.3	33.9	100543	215.0	26.9
2003	107005	219.2	29.8	107070	209.2	34.2	106479	212.8	28.3
2004	108841	222.2	29.9	108965	212.6	35.0	108427	211.9	28.2
2005	108512	223.6	30.4	108519	212.9	34.8	107410	212.8	28.0

Initially, a one sample z score was to be calculated. However, upon comparing the mean scores of both the state average and the school being studied, a z-score analysis was deemed unnecessary. The school being studied consistently had higher scores than the state average, as seen in Figures 1-3 below.

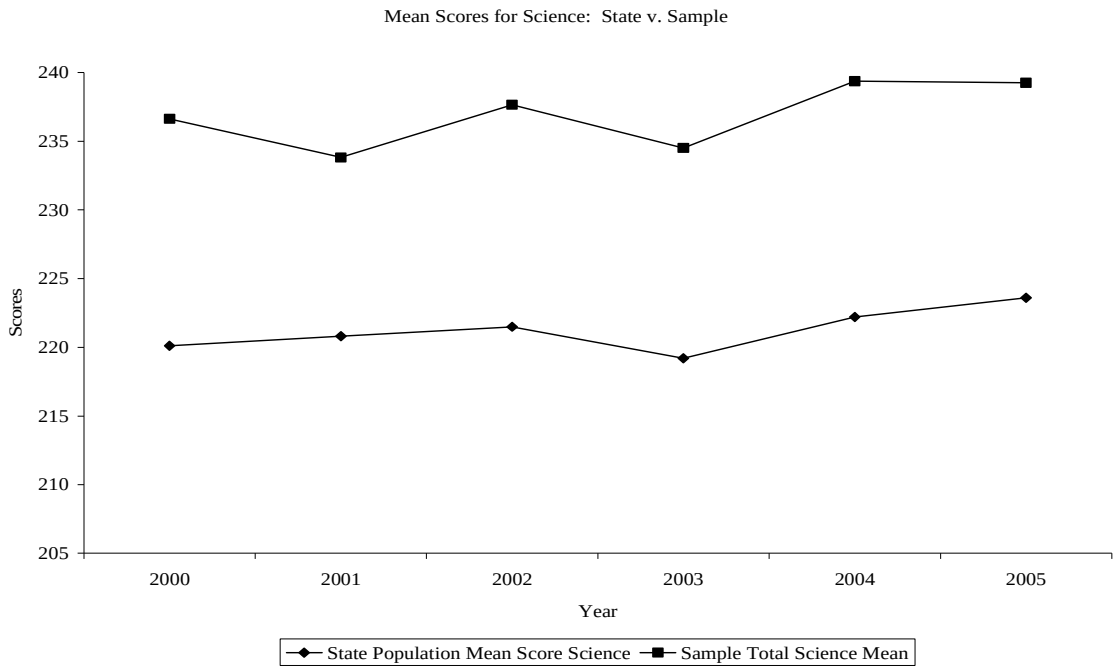

Figure 1. Mean Scores for Science: State v. Sample

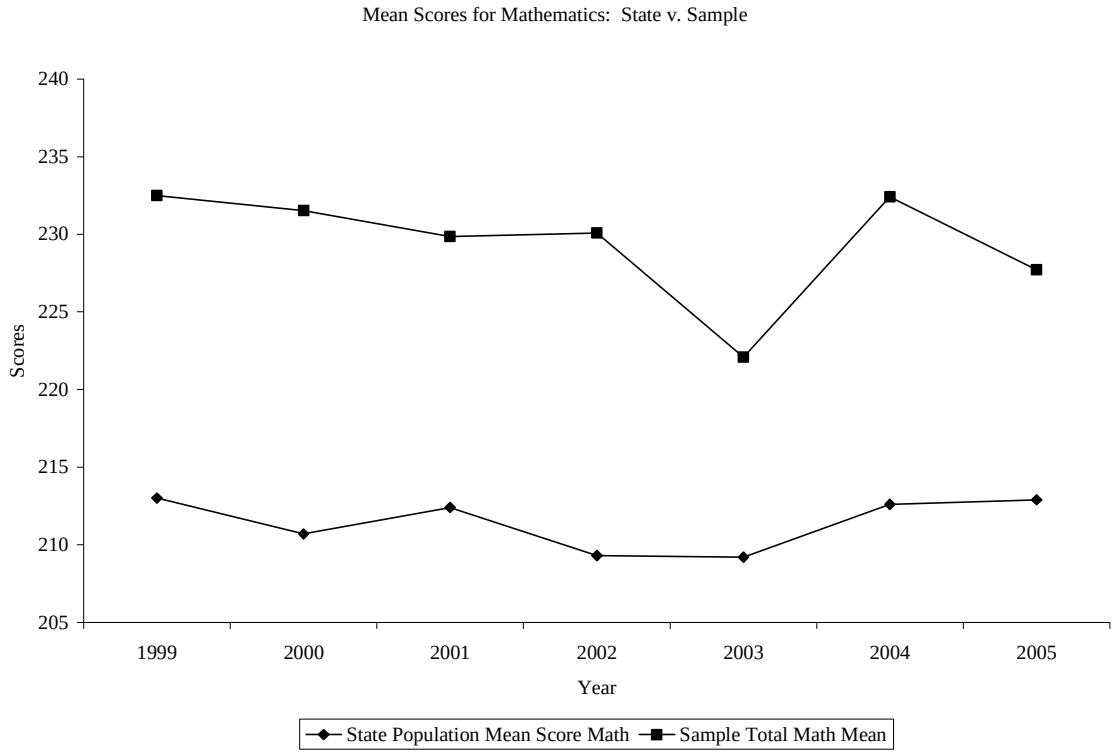

Figure 2. Mean Scores for Mathematics: State v. Sample

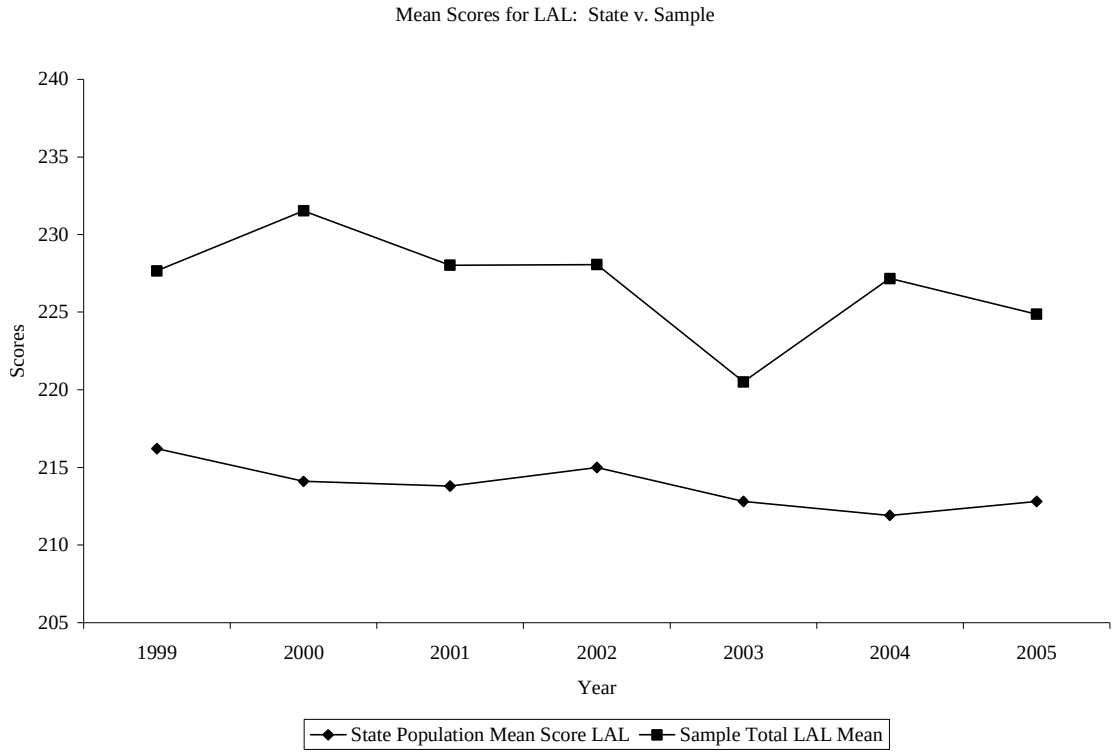

Figure 3. Mean Scores for Language Arts Literacy: State v. Sample

In the content area of science, for example, the school being studied yielded scores that averaged 15.65 points higher than the state. In the content area of mathematics, the school being studied yielded scores that averaged 18.01 points higher than the state. And in the area of language arts literacy, the school being studied yielded scores that averaged 13.03 points higher than the state. Therefore a z-score analysis comparing the school in the study to the state average score would not yield valuable information in relation to the affect block scheduling had on standardized achievement testing in the areas of science, mathematics, and language arts literacy.

Research Question 2: Has block scheduling increased middle score standardized test scores in three areas (math, science, and language arts literacy) for the school being studied over a five- year period?

To evaluate this question, a one-way ANOVA was used to compare the mean scores over the seven-year period. In addition to comparing the entire population over the seven-year period in each of the three subject areas, analyses of sub-groups were conducted on data that both included and excluded the special education population and included only the special education population. Each of these sub groups was analyzed by gender as well. A total of twenty-seven one-way ANOVAs were conducted.

Table 4.4: One–Way ANOVA Results

Subject	Group	Sub Group	Significance (p)	Fisher F-value
Science	Total Pop.w/ Sp. Ed.	All	0.005*	3.356
		Males	0.001*	4.274
		Females	0.000*	4.648
	Total Pop.w/o Sp. Ed	All	0.000*	6.039
		Males	0.005*	3.414
		Females	0.002*	3.828
	Sp. Ed. Only	All	0.080	1.992
		Males	0.206	1.460
		Females	0.442	0.969
Math	Total Pop.w/ Sp. Ed.	All	0.000*	5.486
		Males	0.001*	4.004
		Females	0.000*	10.938
	Total Pop.w/o Sp. Ed	All	0.000*	5.058
		Males	0.233	1.347
		Females	0.000*	6.731
	Sp. Ed. Only	All	0.154	1.576
		Males	0.404	1.034
		Females	0.522	0.867

Table 4.4: (Continued)

Subject	Group	Sub Group	Significance (p)	Fisher F-value
Language Arts/Literacy	Total Pop.w/Sp. Ed.	All	0.000*	8.445
		Males	0.001*	3.616
		Females	0.000*	10.364
	Total Pop.w/o Sp. Ed	All	0.000*	10.332
		Males	0.000*	11.672
		Females	0.000*	10.278
	Sp. Ed. Only	All	0.249	1.317
		Males	0.715	0.619
		Females	0.146	1.634

Table 4.4 reveals the results of the one-way ANOVAs that were conducted. In each content area, scores across the seven-years were significantly different from each other. This was found when the entire population was analyzed both with and without the special education population. When scores were analyzed by gender, both with and without the special education population, significant differences were also found. This pattern of significant differences remained the same for all three content areas with the exception of males in the content area of mathematics.

In contrast, male regular education students' scores in math were not statistically different than one another across the seven-year span. In addition, when special education scores were analyzed unto themselves, both as a whole and by gender, significant differences in test scores over the seven-years were not found.

When significant differences in scores over the seven years were found, a post hoc Fisher's LSD was conducted to see in which year's differences existed. Results of these analyses for all students, both regular and special education is found in Table 4.5.

Table 4.5: Post Hoc Fisher's LSD

Subject	Group	Sub Group								
SCIENCE	Totals w/ Special Education	All		1999	2000	2001	2002	2003	2004	2005
			1999							
			2000							
			2001							
			2002			*				
			2003							
			2004			*		*		
			2005			*		*		
	Totals w/ Special Education Excluded	All		1999	2000	2001	2002	2003	2004	2005
			1999							
			2000							
			2001							
			2002			*				
			2003		*		*			
			2004			*		*		
			2005			*		*		
MATH	Totals w/ Special Education	All		1999	2000	2001	2002	2003	2004	2005
			1999							
			2000							
			2001							
			2002							
			2003	*	*	*	*			
			2004					*		
			2005	*				*	*	
	Totals w/ Special Education Excluded	All		1999	2000	2001	2002	2003	2004	2005
			1999							
			2000							
			2001	*	*					
			2002	*						
			2003	*	*	*	*			
			2004					*		
			2005	*	*			*		

Table 4.5: (Continued)

Subject	Group	Sub Group								
LAL	Totals w/ Special Education	All		1999	2000	2001	2002	2003	2004	2005
			1999							
			2000	*						
			2001		*					
			2002		*					
			2003	*	*	*				
			2004		*			*		
			2005		*			*		
	Totals w/ Special Education Excluded	All		1999	2000	2001	2002	2003	2004	2005
			1999							
			2000	*						
			2001		*					
			2002		*					
			2003	*	*	*	*			
			2004		*			*		
			2005	*	*			*		

* Indicates a significant difference ($p < .05$) between the mean score of the two years compared

At first glance, the table above appears to establish no clear patterns of differences among the seven years of test scores. In the content area of science, when all students were included in the analysis, it appears that the 2001 testing year was most significantly different from any other testing year as it yielded scores significantly different than the 2002, 2004, and 2005 testing years. When special education students were excluded, however, the 2003 test scores are shown to be significantly different from the 2000, 2002, 2004, and 2005 test scores. No pattern of differences in science test scores from before and after the block schedule implementation was found.

In the content area of mathematics, the 2003 test scores were statistically different from every other year for all students as well as when special education students were excluded. When special education students were excluded, the 1999 test scores were also different from the scores in 2001, 2002, 2003, and 2005. No clear pattern of differences in mathematics test scores from before and after the block schedule implementation was found.

In the content area of language arts literacy, the 2000 and 2003 test scores for all students were statistically different from each other and statistically different from every other year. The same results were found when special education students test scores were excluded from the analysis. No clear pattern of differences in language arts literacy test scores from before and after the block schedule implementation was found.

Additional analyses were conducted on the subgroups by gender. In the content areas of science, mathematics, and language arts literacy no clear pattern of differences in scores from before and after the implementation of the block schedule was revealed. A table displaying these results is available in Appendix D.

A planned comparison was also conducted to evaluate the differences in mean scores before and after the block schedule implementation. Table 4.6 shows the result of this comparison.

Table 4.6: A Planned Comparison of Test Scores

			Average Score Before Block Scheduling	Average Score After Block Scheduling	Overall Change	Significant P<.05
Science						
	Total Population	All	236.64	236.928	0.288	
		Males	237.58	240.424	2.844	
		Females	235.62	231.86	-3.76	
	Total W/O Spec. Ed.	All	239.4	239.018	-0.382	
		Males	242.03	243.744	1.714	
		Females	236.93	234.426	-2.504	
	Spec. Ed. Only	All	213.87	214.254	0.384	
		Males	215.23	219.594	4.364	
		Females	208.62	204.532	-4.088	
Math						
	Total Population	All	232	228.426	-3.574	*
		Males	227.64	231.06	3.42	*
		Females	236.73	225.778	-10.952	*
	Total W/O Spec. Ed.	All	238.855	233.12	-5.735	*
		Males	240.015	236.836	-3.179	
		Females	237.605	229.506	-8.099	*
	Spec. Ed. Only	All	193.195	192.006	-1.189	
		Males	194.235	195.528	1.293	
		Females	190.155	185.77	-4.385	
LAL						
	Total Population	All	229.595	225.724	-3.871	*
		Males	223.78	221.576	-2.204	*
		Females	236.03	230.022	-6.008	*
	Total W/O Spec. Ed.	All	234.44	229.574	-4.866	*
		Males	230.27	226.244	-4.026	*
		Females	238.435	233.15	-5.285	*
	Spec. Ed. Only	All	195.455	194.368	-1.087	
		Males	193.985	191.81	-2.175	
		Females	201.085	196.75	-4.335	

The planned comparison resulted in significantly different average scores from before and after the implementation of the block schedule in the areas of both mathematics and language arts literacy. In the area of mathematics, while the scores of males significantly improved, the scores for females significantly decreased, resulting in a statistically significant decrease in average score for the entire population. In the area

of language arts literacy, all score comparisons for the total population, both with and without the special education population, resulted in a statistically significant decrease in achievement. It is interesting to note that when special education scores were analyzed unto themselves in all three content areas, the change in scores fluctuated between increases and decreases, and was never statistically significant.

Teacher Survey. Surveys were given to teachers who were teaching in the school in this study both prior to the implementation of the block and presently. A copy of the survey administered is available in Appendix A. Of the 30 teachers eligible to participate in the survey, eighteen teachers returned completed surveys, for a return rate of 60%.

Table 4.7: Data on Teachers Who Participated in Survey

Demographic	Category	Number of Teachers
Certification	Regular Education	14
	Special Education	2
	Dual Certification	2
Teaching Content Area	Science	3
	Mathematics	2
	LAL	2
	Social Studies	2
	Health/PE	1
	Spanish	2
	Special Ed.	3
	Other	3
Gender	Male	2
	Female	16

Table 4.7: (Continued)

Demographic	Category	Number of Teachers
Total Number	1	0
of Years	2-5	0
Teaching	6-10	0
	11-15	4
	16-20	3
	21+	11
Number of	1	0
Years Teaching	2-5	0
In District	6-10	2
	11-15	4
	16-20	6
	21+	6

On average, the eighteen teachers who completed the survey had 11.5 years of teaching experience prior to the implementation of the block schedule. Teachers surveyed were asked their feelings about block scheduling when it was initially proposed. Of the eighteen teachers who completed the survey, only three acknowledged that they originally supported the idea. Three other teachers admitted they were adamantly opposed to the schedule change. But the large majority of teachers completing the survey expressed that they were concerned about the change in scheduling. Teachers shared that they were nervous about their ability to teach for a longer period of time while sustaining the attention of their students. In addition, they were concerned about the impact scheduling changes might have on their curriculum as well as students' ability to retain information between classes. One teacher wrote, "I felt like it was a done deal before we

even investigated it, it didn't leave all of us feeling like moving to a block schedule was a joint decision."

Surveyed teachers were also asked if they felt adequately prepared to transition to teaching in the block. Eighty-nine percent of the teachers reported feeling prepared to transition into a block schedule. "Trainings were offered by the district that highlighted potential pitfalls we would encounter," one teacher wrote. "We had trainings with our supervisors, we were given books to read, we met teachers from schools already teaching in the block, and committee members got to visit schools who already had a block schedule – it was a lot of training," another teacher reported. But apprehension was still present as the transition to the block took place. A math teacher shared, "I felt somewhat overwhelmed; in my discipline, our text book did not lend itself to being integrated into the block – it was really difficult to adapt."

Teachers were asked what they would have liked to happen to make the transition to block scheduling easier. While the majority of teachers were unable to suggest any improvements, three teachers commented that they would have liked to go out and observe teaching in schools that were using a block schedule. The only teachers who were able to observe block schedule teaching were those on the actual committee.

Teachers surveyed indicated that block scheduling resulted in many changes to how they teach their content area. "I have to have more activities and more variety in each class," a teacher commented. A clear theme of teacher responses indicated that they had to change the format in which instruction was delivered. Numerous teachers commented on their use of a variety of activities that allow students to move around during the block. Teachers also commented on their use of "prime and down" learning

time in which the block period is divided into five periods of time. Three, twenty – minute periods of prime learning time is built in to the block period; one at the beginning, one in the middle and one at the end of the block. In prime learning time, new learning is occurring, student engagement levels are high, and the thrust is the acquisition of new skills. Teachers introduce new concepts, use direct instruction, or create activities that promote the learning of new concepts and ideas. Periods of "down time" are interspersed between periods of "prime time." These periods of down time, usually 8-10 minutes, are used for the reinforcement of concepts, brain breaks, and the transition between activities (Canady & Rettig, 1996). Table 4.8 shows a sample of how a block period can be broken down using a "prime and down" time teaching model.

Table 4.8: Sample Prime and Down Time in the Block

Time	Prime/Down	Sample Activities
8:00 – 8:20 AM	Prime	Direct instruction on new concept
8:20 – 8:29 AM	Down	Journal entry
8:29 – 8:49 AM	Prime	Cooperative Learning Activity
8:49 – 8:58 AM	Down	Independent Student Work to Reinforce Concept
8:58 – 9:18 AM	Prime	Whole class discussion/activity stations/ Checking for Understanding

Teachers also commented about how they can't lecture as much because the students need to "do" instead of "listen."

When asked about how block scheduling has affected what they teach, it became clear that this is an area of concern for the teachers who were surveyed.

Overwhelmingly, the comments from teachers indicated that they teach in more depth, but much less overall content then they did in the traditional schedule. "I must be selective and creative in what I choose to teach because time is more precious,"a teacher commented. "You need to plan more carefully for essential questions to determine what you can omit and still ensure that students are taught what they need to know by the end of a unit," another teacher commented. Ninety – four percent of the teachers surveyed believe that they teach less content now that they teach in the block schedule then they did when they were teaching in a traditional schedule.

Language Arts Literacy and Special Education Teachers vocalized the most concern because of the impact the block schedule had on the Language Arts Literacy schedule. Prior to the implementation of the block schedule, students had forty minutes of reading and forty minutes of language arts every day in grades 6, 7, and 8. When the block schedule was implemented, this changed for students in grades 7 and 8. Reading and language arts were combined into one 78 minute language arts literacy block every other day. Students in grade 6 continued to have both a reading and language arts class for a total of 78 minutes daily, thereby keeping the amount of time essentially the same. This change cut the time for 7th and 8th grade Language Arts Literacy in half.

When asked about the way in which they teach in the block, teachers overwhelmingly commented about their ability to be more creative with their lessons because of the extended period of time. Teachers explained that they can do more with their students and the extended time enables them to complete labs, activities, and projects in one block. World Language teachers shared that the block has adversly impacted what they teach in some ways. "Just because I have double the time in a block,

doesn't mean I can teach twice the content. I can't teach the students 30 new vocabulary words in a block; they won't remember them. But I could teach them 15 new vocabulary words in a 40 minute class," a world langauge teacher commented.

Teachers were asked their perceptions of how the block schedule has impacted student achievement and grades. Six teachers indicated that they think student achievement has improved with the block schedule. "I think many of our kids thrive in this environment," a teacher commented. Five teachers indicated that they think student achievement has decreased since the implementation of the block. "Students are getting less information now, student achievement has definitely decreased," a Language Arts Literacy teacher responded. Yet others were unsure if the block schedule has had any impact on student achievement.

Teachers were also asked how they perceived block scheduling to have impacted student performance on standardized tests. Six teachers reported that they believed that the block schedule has resulted in lower student performance on standardized tests. A language arts literacy teacher commented, "We got rid of reading, curriculum has changed, the kids have changed – I originally thought we were performing better, but I just don't think we have." Only three teachers believed that student performance on standardized tests had improved. Still others were unsure of how the block may have impacted student performance on standardized tests. "I would like to think that our great scores in science in our district are at least partly the effect of the better teaching and happier teachers using the block schedule."

Teachers surveyed were also asked to evaluate the pros and cons of block scheduling. Critiques of block scheduling pointed out that limited content is being taught

because of the revised schedule. In addition, teachers critiqued block scheduling by saying that more time is spent reviewing during each block because of the day between class meetings. This theme of retention spanned all content areas. Teachers commented about retention and its impact on classroom discussions because students forget the prior class period or the homework they had done two nights before. Teachers shared that homework can be an issue in the block schedule because students forget to bring it in because of the alternating day schedule. "Students can have real trouble with the A/B schedule and homework – if they don't stick to the schedule, it can really mess them up," a teacher commented. But another indicated, "I know that a typical answer is the forgetting factor, but I have not found that to be any different that it was when we taught in the traditional schedule."

Perhaps the concern expressed most by teachers was how absences or missed days impact student learning. "If a student misses school on a Thursday, then you don't see them for six days (Tuesday until Monday); this is a long time and it is hard to get them caught up," a teacher shared. "If I am going to be absent, it is more imperative to make detailed lesson plans that are of quality; meaningful plans are essential or you will spend the year playing catch-up," a teacher shared. Snow days impact this as well. The school being studied opts to "skip" the day that is missed in event that school is canceled. For example, if there is a snow day on a Tuesday, and Tuesday is an "A" day, they will return to school on Wednesday and it will be a "B" day just as it was scheduled ; the "A" day would be made up, in theory, at the end of the school year when the days were added on.

Still others commented that a seventy-eight minute block of time might be too long for students this age. "They socialize more with their peers then they used to," a

teacher shared. Two other teachers commented about the productivity of the exploratory block. "Exploratory can be used more effectively to work and help special education students, and all students - it is not being used to its fullest capacity," a teacher shared.

But positive comments about the block schedule were shared as well. Teachers indicated that they like the block because they do not feel as rushed. "There are less stops and starts per unit and all that it entails – there are fewer set ups and breaking down of lessons – there is less clerical work in a day," a teacher commented. Another shared, "I don't have to "gear up" mentally for as many classes in a day – it helps that I also see less students in a day." Teacher prep is reduced in the block schedule as well. "The block gives me more time to collaborate with my content colleagues and more time to talk about kids with my teammates – it is very "middle school" in orientation," a teacher shared. "Teaching is different in the block, I can assess student understanding, use more technology, and do better projects with my students," shared a language arts literacy teacher. "I don't have to teach the same thing five times in a row – this is a huge difference for me. I can do more activities and more real life projects," a science teacher commented. Another teacher shared, "I have more time to broaden the scope of a topic, many students are more productive for longer periods of time, and by offering varying activities in the same block, students feel a sense of accomplishment when they leave."

Teachers commented on the benefits of block scheduling for students as well. "My students are more relaxed with only four classes in a day; they aren't as rushed and are not as overwhelmed," a special education teacher commented. Another added, "Having only four subjects in a day reduces the amount of homework in a night for most students – they are able to be kids again."

Teachers surveyed were asked if they would prefer to teach in the block schedule or in the traditional schedule. Four teachers indicated that they would prefer to return to the traditional schedule because they would see students every day and it is better for their content area. Four other teachers indicated that they feel the benefits of the extended teaching period are good, but would like to see a compromise in the schedule. One teacher indicated that she would like to see her Language Arts Literacy students every day in a modified block. Another teacher suggested that a 60 minute class period could possibly work to reap the benefits of the extended time, but allow some teachers to see their students every day. The remaining ten teachers indicated that they are happy with the block schedule and think that it is the better of the two scheduling options. "I was not an advocate for change, in fact, I made the change very difficult for the administration and for myself – I did not want to go to a block schedule. But now that I am teaching in the block, I can say with certainty that this is what is best for kids, I would never want to go back to a traditional schedule," a teacher shared. "In the block schedule, it is easier, there is less tension in the school day, it is more fulfilling, and better teaching occurs," another teacher added.

CHAPTER 5

DISCUSSION

In this chapter, a summary of the methods and results of the study is presented, as well as the implications of these results, limitations, and recommendations for future research.

Summary of the Study

The objective of the present study was to examine whether the implementation of a block schedule at the middle school being studied affected the science, mathematics, and language arts literacy achievement test scores of 8th grade students. Moreover, teacher opinions about the transition to and teaching in the block schedule were also assessed.

Several different analyses were carried out in order to assess the hypotheses of the present study. First, scores of students in the school being studied were compared to the average scores throughout the State of New Jersey to assess if a change in test scores was a direct result of the block schedule. Originally a z-score analysis was to be conducted. But upon receiving and reviewing the data, it was clear that the school being studied consistently had higher test scores than the state average; therefore, further analysis was not conducted as it would not yield valuable information as related to the impact of block scheduling on student achievement test scores.

A series of ANOVAs were then conducted to assess whether there were significant differences among the scores across the seven years of test score data. Twenty-seven ANOVAs were conducted. Each of the three content areas was analyzed

by gender, with and without the special education population included in the general population, and with the special education population as its own entity. When significant differences were found, a post hoc Fisher's LSD (multiple t tests) was conducted to assess which years had significant differences between them. The objective of these analyses was to determine whether student achievement was impacted by the change to block scheduling during the 2000-2001 academic year. In addition, a planned comparison was conducted to see if the average scores from before the block schedule were statistically different from the average scores after the block schedule implementation. Finally, a teacher survey was administered to assess perceptions of the transition to, implementation of, and teaching in the block scheduling.

Overall Effects of Block Scheduling on Student Standardized Test Scores

Numerous analyses were conducted to look for patterns in score results from both before and after the block schedule implementation. Twenty-seven one-way ANOVAs were conducted to assess differences in scores across the seven years of test data. Statistically significant differences were found in all areas except regular education males in the area of mathematics and when special education students' scores were analyzed unto themselves in all three content areas. The Fisher's LSD post hoc analyses revealed no clear pattern of statistically significant differences in scores when the block schedule was implemented. A post hoc planned comparison was also conducted. This analysis compared the average scores from before the implementation of the block schedule to the average scores after the implementation of the block schedule. Results of these analyses showed that overall, the average score in mathematics and langauge arts literacy were statistically lower after the implementation of the block schedule. This held true for the

total population, both with and without the special education population included. In contrast, science scores, when compared, were not significantly different. And the pre/post average scores for the special education students in mathematics, language arts literacy, and science, both as a total group and by gender, were not significantly different.

It is important to interpret these results with caution, however. A planned comparison uses the average score for a test year. As was evidenced in this study, great variability in scores exist with each testing year. Because this research used data from two years before the implementation of the block schedule and five years after the block schedule, long-term trends have not been analyzed.

Most of the literature on block scheduling and student achievement has focused on two to five years of data. While this study used seven years of data, there was still great variability in test scores among years. Upon reviewing the data in this study, it was found that the scores for the 2003 year were significantly lower than any other test year. It was during this school year that the principal was on a leave of absence and an acting principal was in the leadership position. There was also a new math supervisor. In addition to these leadership changes, an 8th grade student and her family were killed in an automobile accident 8 weeks before the 2003 test dates. This tragedy greatly impacted the school community. It is not known if and how these events affected test scores, but it is clear that the 2003 test scores were lower than any other test year.

To see if the 2003 test scores impacted the results of this study, an additional planned comparison was conducted which excluded the data from 2003. The results of this planned comparison revealed that the decrease in math score for the total population was not significant when the 2003 data were excluded. In addition, the decrease in

language arts literacy scores for males was not significant when the 2003 data were excluded. The results of this planned comparison are displayed in Appendix E. These results suggests that overall, the observed math score decrease was not statistically significant and that other variables may impact yearly test scores. The overall decrease in language arts literacy scores that was found supports the hypothesis that the reduction in class time by 50% may be a major factor in the decreased test scores.

In this study, great variability was found among test scores across the seven years. Caution should be used when interpreting the results of studies which use data from only a few years. This second planned comparison provides support for the need to use longitudinal data when making large-scale programmatic decisions in schools.

In addition to recognizing that score fluctuations exist, it is important to consider other factors that are specific to this study. The results from this school are not generalizable. The school being studied is from an affluent area and is consistently performing well above the state average. They may be statistically topping out on their scores. The question must be asked: how much can the school being studied realistically improve? If, for example, an analysis of scores before and after the implementation of a block schedule in a school which was consistently performing below the state average was conducted, significantly different results may occur. Growth in student test scores may be seen, in this example, whereas the students in the school being studied may have statistically reached their ceiling.

It is important to compare the results of the study to the teacher's perceptions of the block schedule. Teachers of different subject areas had very different feelings about the block schedule. It was interesting to see that all of the science teachers surveyed

showed favoritism for the block schedule. They believed that the extended period of time allowed for expanded inquiry and the completion of more hands-on science activities. The three science teachers completing the survey believed that science achievement scores had increased. Overall, the science achievement scores for the total population increased, but the increase was not statistically significant. The science achievement scores fluctuated among the subgroups, but no scores were statistically different after the implementation of the block schedule.

Teachers of mathematics felt somewhat differently. The two teachers who completed the survey asserted that not having mathematics every day resulted in decreased student achievement. In addition, they voiced concerns that the mathematics textbook did not lend itself to teaching for an extended period every other day. While scores increased overall for male students, scores for females and for the overall total population, showed a decrease in student achievement. A discussion of the varied gender scores occurs later in this chapter.

The teachers of language arts literacy were the most vocal about their concerns. They believed the reduction in class time would impact student achievement. While only two langauge arts literacy teachers participated in the survey, it was clear they believed student achievement had decreased because of the reduction in class time. These teacher's assertions were correct. A decrease in student achievement is evident in the content area of language arts literacy across the total population assessed, both with and without the special education population. The reduction in language arts literacy class time by nearly half is a variable that was not accounted for in this research. The

combination of block scheduling and the reduction in class time by 50% did lead to a decrease in scores, but how much of that effect was due to each variable is unknown.

One of the most interesting findings of this study was in the area of special education. Students identified as being in special education achieved similar test scores both before and after the implementation of the block schedule. No changes were found in scores, regardless of the content area.

There are several reasons that this could have occurred. First, the number of special education students was proportionally smaller and therefore less variability in scores was found overall. The small sample size also presents an issue when calculating statistical significance. Another reason why this could have occurred is because statistically, special education students could be reaching the ceiling of their scoring ability. This conclusion highlights a concern for educators who are expected to meet the demands of the *No Child Left Behind* legislation. This legislation mandates that 100% of all students, regular or special education, pass all testing requirements by the year 2014.

No change in the scores of special education students could mean that the type of schedule a special education student has will not impact his or her performance on standardized tests. Special education students received the same services in the block schedule as they did in the traditional schedule. The only difference was the services were delivered every other day for 78 minutes, instead of every day for 40 minutes.

It is interesting to note that the special education students also received the reduction in language arts literacy class time by 50% when moving to the block schedule. Yet, the scores of special education students did not significantly decrease. In fact, there is only an average decrease of 1 point in Language Arts Literacy scores for special

education students. This lends support to the idea that the special education students may be reaching their statistical ceiling.

Gender differences were noted as well. Overall, standardized test scores in all content areas decreased more for females than for males after the implementation of the block schedule. While some of these changes were not statistically significant by subgroup, overall scores decreased less for males than females after the block schedule. There are several possible reasons why these gender differences could exist. Developmentally, the female middle school student is learning and thriving as a social being. Female students may benefit from the socialization that exists in a traditional schedule. The numerous class changes may provide more opportunities for unstructured peer socialization. Female students may also benefit from the shorter, more frequent exposure to new concepts offered by a traditional schedule. It is recommended that further research be conducted on the gender differences in student achievement scores and block scheduling.

Implications for School Psychologists

School psychologists fill a multitude of roles in the school setting. As advocates for children with special needs, it is a school psychologists' primary responsibility to ensure that programming and placement are appropriate. School psychologists are often called upon by teachers and administrators for their expertise in understanding the needs and abilities of the special needs child. However, school psychologists are also responsibile for promoting programming options for both regular and special needs students.

The findings of this research will be valuable to school psychologists who are forming opinions on scheduling options which promote academic achievement. In an era of evaluating RtI and ensuring that schools make Annual Yearly Progress (AYP), schools will be looking at creative ways in which to increase student achievement. Schools across the county may need to meet the social and emotional needs of their students with creative scheduling options. School psychologists can provide insight and a knowledge base to promote learning for all students. School psychologists can consider the results of this study when making recommendations as to the appropriateness of block scheduling for the middle school child.

Limitations of the Study

A limitation of the present study is that it focused on classrooms within a single suburban middle school in Hunterdon County, New Jersey. This could limit the generalizability of the obtained results to other school districts with a different socioeconomic status or ethnic compositions. For example, the ethnic composition of the present sample included a Caucasian majority (87%), which may not be representative of many other school settings.

Another major limitation of this study is the uniqueness that each scheduling option presents. Schools choosing an A/B block schedule model or a 4 X 4 model may yield different achievement results. The school in this study had a traditional schedule and implemented a block schedule that was unique to its needs. The school in this study had traditional 40-minute periods and moved to a 78-minute A/B day schedule. While all middle school schedules have many of the same components, the multiple variables present in each schedule could, in fact, have an impact on standardized test score results.

Other schools might be looking at an alternating semester block or a rotating block, for example.

The extent to which other variables impacted student achievement was also not known. For instance, the leadership of the school (principals and vice-principals) changed during the seven years in the study. One member of the three-person leadership team was consistent for the seven years. The second member of the leadership team changed after the first year of the block schedule and the third member of the leadership team was changed after the second year of the block schedule. In addition, there were also changes in teaching staff during the seven years being studied. In the area of science, two of the nine teachers changed in the seven years. In the area of language arts literacy, six of the twelve teachers changed in the seven years, and in the area of mathematics, six of the nine teachers changed. Furthermore, changes in curriculum that occurred over the seven-year period were also not accounted for in this study. The extent to which these changes in personnel and curriculum affected student achievement is not known. As such, the results of this study must be interpreted with caution.

Recommendations for Future Research

Most of the literature on block scheduling and student achievement focuses on two to five years of data. Each of the previous studies yielded different results. The current study uses seven years of student test data. Even with the more extensive data set, varied results were found. It is recommended that those moving to a block schedule seriously consider the accuracy of research in studies that use data from so few years. Future researchers are encouraged to expand upon the current study by conducting

longitudinal research to see if the patterns of achievement continue to be demonstrated over time.

In addition, a more comprehensive sample may increase the populations to which to results can be generalized. Future research should look at student samples from across the entire United States rather than focusing on one school district. The samples should represent urban, suburban, and rural schools. Moreover, an added benefit of such comprehensive study would be to account for different socio-economic and ethnic population differences. It is possible that scheduling practices have different effects depending on the ethnic composition of the school in which it is applied. Therefore, examining students from schools with ethnic diversity could help determine if block-scheduling practices are always appropriate, or if it depends on ethnic composition.

Future studies might also consider looking solely at the affect block scheduling has on the special education student. No other study reported data on the special education student, achievement, and the block schedule. The number of special education students in this sample was statistically sufficient to draw conclusions in this study, but because the numbers of special education students is always proportionately less than the entire population, it would be interesting to see how this population was affected on a larger scale. In addition, data from the State of NJ of the scores of only special education students were not available. A future study might be able to combine this large-scale data with more qualitative data from student interviews to yield information that will be beneficial to making scheduling options that work for the special needs student.

An additional suggestion for future research is to look more closely at the gender differences in student performance on standardized test scores during a block schedule. Future researchers might consider looking specifically at differences between scores achieved by males and females. These data, if available, could be analyzed by a two-way, repeated measures ANOVA. Future researchers should consider obtaining data to do this more specific type of analysis.

This study only used achievement data in the areas of language arts literacy, mathematics and science. Yet teachers of social studies, the world languages, physical education, and other related arts areas have strong opinions about how the block schedule affected their content area. A study of student achievement in these areas before and after the implementation of a block schedule would also yield critical results.

Future research might also examine any relationships that may exist between teacher attitudes about the implementation of a block schedule and the success of such an implementation. The author hypothesizes that while the teachers in this survey felt prepared for the transition, teachers who feel less prepared or who are adamantly opposed to the change could undermine the success of a block schedule implementation and impact student success in a block schedule. Further research in this area is recommended.

Summary

The school being studied moved to a block schedule to meet the social-emotional needs of their students. Hopeful that fewer transitions during the day, fewer teachers in a day, and less homework at night would reduce the stress of the middle school child, the

school being studied moved to a block schedule in the 2000-2001 school year. The school in the study has seen numerous benefits to the block schedule. Student discipline referrals were reduced by forty percent. Student attendance rates increased by nine percent and teacher absences have decreased by eleven percent. The transition to a block schedule and its impact on student achievement, however, had not been studied until now.

The objective of the present study was to examine whether the implementation of a block schedule at the middle school being studied impacted the science, mathematics and language arts literacy standardized achievement test scores of 8th grade students. While no significant difference between scores from before and after the implementation of the block schedule were found in the content area of science, significant decreases in overall average scores from before and after the block schedule implementation were found in the areas of mathematics and language arts literacy. Moreover, the average scores for special education students remained the same through the move to a block schedule. Gender differences were also found; females showed more of a decrease in average scores in the block schedule then did males.

A second planned comparison was conducted that excluded data from the 2003 testing year. The scores from this year were much lower than any other year and there were variables (changes in leadership and the death of a student) that could not be accounted for. This planned comparison revealed that overall scores in math were not significantly lower after the block schedule implementation. Overall language arts literacy scores became significantly lower, and science scores remained the same. These

findings support the idea that analyses should be conducted using longitudinal data, as the results of too few years of data could skew the findings of any study.

Teacher opinions about the transition to and teaching in the block schedule were mixed. However, teachers overwhelmingly prefer to teach in a block schedule. While teachers do believe that there are social-emotional benefits for students in a block schedule, they are unsure if the change has improved student achievement on standardized tests. Teachers in the content areas of mathematics and language arts literacy correctly believed that student achievement has decreased in these areas. Teachers of science believed that student's science achievement scores increased. While increases in subgroups were noted, no statistical change in science scores were found after the implementation of the block schedule.

Conclusion. A/B block scheduling impacted standardized test scores in the area of language arts literacy. Scores in this area were significantly lower after the implementation of the block schedule. The author of this study hypothesizes that the reduction in language arts literacy class time by 50% when the block schedule was implemented has contributed to this decline in test scores. Test scores in mathematics and science were not significantly different after the implementation of the block schedule. Teacher perceptions of student performance on standardized test scores were largely accurate. It is recommended that the school in this study consider evaluating the reduction in language arts literacy class time and find ways in which creative scheduling options can again increase that class time.

The school in this study moved to a block schedule to meet the social-emotional needs of their students. And while student achievement, with the exception of language

arts literacy test scores, remains relatively stable, the block schedule has reduced discipline, increased teacher and student attendance, and by teacher account, has produced an environment that is less stressful on students and teachers.

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APPENDIX A

TEACHER SURVEY ON BLOCK SCHEDULING

December 7, 2007

Dear Teacher,

I am conducting a study for my dissertation research that looks at the impact of block scheduling on standardized test scores of 8th graders in the _____ School District. I am asking current teachers who were teaching prior to the implementation of the block schedule to complete that attached survey and demographic information. If you would like to help, please complete the demographic sheet and the survey, and return them in the enclosed envelope. It should take you only 10 -15 minutes to do.

If you would like a copy of my results, include your email address on the slip below. Your email address will be used only to send out the results after we are done, and will be discarded afterward. Your response to the survey will be completely anonymous.

Returning the survey implies your consent to participate in the study. If you choose not to participate, simply discard the forms. Feel free to contact us if you have any questions about the research. Thank you for your help!

Erin Bauersachs Falk, MA
Student Investigator, Temple University
ebauers@temple.edu

Catherine A. Fiorello, Ph. D.
Associate Professor, School Psychology
catherine.fiorello@temple.edu

I would like to receive a copy of the results.

Here is my email address: _____

Implications of Block Scheduling – Teacher Survey
Erin Bauersachs Falk and Catherine Fiorello

Demographic Questionnaire:

Name: (optional)_____
_____

Please check all that apply:

_____ I am a certified teacher – general/regular education
_____ I am a certified teacher – special education

Content Area Taught:

_____ Math
_____ Language Arts/Literacy
_____ Science
_____ Special Education
_____ Other, please specify: _____
_____

You are:

_____ Male
_____ Female

How many years of teaching experience do you have (including this year)?

_____ 1
_____ 2-5
_____ 6-10
_____ 11-15
_____ 16-20
_____ 21 or more

How many years have you taught in _____ School District?

_____ 1
_____ 2-5
_____ 6-10
_____ 11-15
_____ 16-20
_____ 21 or more

Implications of Block Scheduling – Teacher Survey
Erin Bauersachs Falk and Catherine Fiorello

Please complete the survey below about your opinions on block scheduling at the middle school level. Feel free to expand on any question in the space provided, or if, desired, attach additional pages.

1. **How long did you teach in _____ prior to the block schedule (it went into effect in September 2000)?**

2. **When the block schedule was proposed, what were your initial feelings about it?**

3. **Did you feel adequately prepared to transition to teaching in the block?**

4. **What would you have liked to happen to make that transition easier?**

5. **How has block scheduling <u>impacted how</u> you teach in your content area?**

6. **How has block scheduling <u>impacted what</u> you teach in your content area?**

7. **Are you able to cover more or less content in the school year?**

8. **How has block scheduling impacted the way in which you teach?**

9. **In your opinion, how has block scheduling impacted student achievement?**

10. **In your opinion, how has block scheduling changed the way students perform on standardized tests?**

11. **What are the pros to block scheduling?**

12. **What are the cons to block scheduling?**

13. **Would you prefer to teach in the block schedule or the traditional schedule if you had your choice? Explain your answer.**

14. **What else would you like me to know about your opinion on block scheduling?**

Other comments:

APPENDIX B

IRB APPROVAL FORM FOR ORIGINAL SUBMISSION

Office for Human Subjects Protections
Institutional Review Board
Medical Intervention Committees A1 & A2
Social and Behavioral Committee B

3400 North Broad Street
Philadelphia, Pennsylvania 19140
Phone:215.707.3390 Fax:215.707.8387
e-mail: richard.throm@temple.edu

MEMORANDUM

To: **FIORELLO, CATHERINE**
PSYCH STUDIES IN EDUC (1904)

From: Richard C. Throm
Director, Office for Human Subjects Protection
Institutional Review Board Coordinator

Date: 11-Oct-2007

Re: Exempt Request Status for IRB Protocol:
11333: A Study of Standardized Test Scores for Middle School Students Before and After the Block Schedule Was Introduced

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It has been determined by Expedited Review that this study qualifies for exemption status as follows:

45 CFR 46 Protection of Human Subjects

Section 101 (b): Unless otherwise required by department or agency heads, research activities in which the only involvement of human subjects will be in one or more of the following categories are exempt from this policy:

Exemption 4: Collection or Study of Existing Data. Research involving the collection or study of existing data, documents, records, pathological specimens, or diagnostic specimens, if these sources are publicly available or if the information is recorded by the investigator in such a manner that subjects cannot be identified, directly or through identifiers linked to the subject.

Nothing further is required from you at this time; however, if anything in your research design should change, you must notify the Institutional Review Board immediately.

If you should have any questions, please feel free to contact me at 215-707-8757.

Thank you for keeping the IRB informed of your clinical research.

APPENDIX C

IRB APPROVAL FORM FOR ADDENDUM TEACHER SURVEY SUBMISSION AND PROTOCOL CERTIFICATION

Office for Human Subjects Protections
Institutional Review Board
Medical Intervention Committees A1 & A2
Social and Behavioral Committee B

3400 North Broad Street
Philadelphia, Pennsylvania 19140
Phone:215.707.3390 Fax:215.707.8387
e-mail: richard.throm@temple.edu

MEMORANDUM

To: **FIORELLO, CATHERINE**
PSYCH STUDIES IN EDUC (1904)

From: Richard C. Throm
Institutional Review Board

Date: 14-Dec-2007

Re: Expedited Request Status for IRB Protocol:
11460: A Study of Standardized Test Scores for Middle School Students Before and After the Block Schedule Was Implemented

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This addendum is to be affixed to the IRB Approval Certificate

45 CFR 46 Protection of Human Subjects.

Expedited review is a type of review that can be conducted by the IRB Chair, other IRB members designated by the Chair, or a subcommittee of the IRB. A major criterion for research that can initially (initial review) reviewed through expedited process is that it must involve no more that minimal risk. The DHHS regulations and FDA regulations define minimal risk to mean that "the probability and magnitude of harm or discomfort anticipated in the research are not greater in and of themselves than those ordinarily encountered in the daily life or during performance of routine physical or psychological examinations or tests."

This research protocol was reviewed under the following Expedited Review Category:

Expedited Category #4: Collection of data through noninvasive procedures (not involving general anesthesia or sedation) routinely employed in clinical practice, excluding procedures involving x-rays or microwaves. When medical devices are employed, they must be cleared/approved for marketing. (Studies intended to evaluate the safety and effectiveness of the medical device are not generally eligible for expedited review, including studies of cleared medical devices for new indications.) Examples: (a) physical sensors that are applied either to the surface of the body or at a distance and do not involve input of significant amounts of energy into the subject or an invasion of the subject's privacy. (b) weighing or testing sensory acuity; (c) magnetic resonance imaging; (d) electrocardiography, electroencephalography, thermography, detection of naturally occurring radioactivity, electroretinoraphy, ultrasound, diagnostic infrared imaging, Doppler blood flow, and echocardiography; (e) moderate exercise, muscular strength testing, body composition assessment, and flexibility testing where appropriate given the age, weight and health of the individual.

Office for Human Subjects Protections
Institutional Review Board
Medical Intervention Committees A1 & A2
Social and Behavioral Committee B

3400 North Broad Street
Philadelphia, Pennsylvania 19140
Phone:215.707.3390 Fax:215.707.8387
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Research Review Committee B

Certification of Approval for a Project Involving Human Subjects

Protocol Number:	**11460**
PI:	**FIORELLO, CATHERINE**
Approved On:	11-Dec-2007
Review Date:	14-Dec-2007
Committee:	B BEHAVIORAL AND SOCIAL SCIENCES
Department:	PSYCH STUDIES IN EDUC (1904)
Project Title:	A Study of Standardized Test Scores for Middle School Students Before and After the Block Schedule Was Implemented

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In accordance with the policy of the Department of Health and Human Services on protection of human subjects in research, it is hereby certified that protocol number 11460, having received preliminary review and approval by the department of PSYCH STUDIES IN EDUC (1904) was subsequently reviewed by the Institutional Review Board in its present form and approved on 11-Dec-2007 with respect to the rights and welfare of the subjects involved; appropriateness and adequacy of the methods used to obtain informed consent; and risks to the individual and potential benefits of the project.

In conforming with the criteria set forth in the DHHS regulations for the protection of human research subjects, and in exercise of the power granted to the Committee, and subject to execution of the consent form(s), if required, and such other requirements as the Committee may have ordered, such orders, if any, being stated hereon or appended hereto.

It is understood that it is the investigator's responsibility to notify the Committee immediately of any untoward results of this study to permit review of the matter. In such case, the investigator should call Richard Throm at 707-8757.

ZEBULON KENDRICK, Ph.D.
CHAIRMAN, IRB

APPENDIX D

POST HOC ANALYSES OF SUB GROUPS BY GENDER

Post Hoc Analyses of Sub Groups by Gender

Subject	Group	Sub Group							
SCIENCE	Totals w/ Special Education	Males		1999	2000	2001	2002	2003	2004	2005
			1999							
			2000							
			2001							
			2002		*					
			2003			*	*			
			2004		*			*		
			2005		*			*		
		Females		1999	2000	2001	2002	2003	2004	2005
			1999							
			2000							
			2001		*					
			2002			*				
			2003		*		*			
			2004					*		
			2005			*		*		
	Totals with Special Education Excluded	Males		1999	2000	2001	2002	2003	2004	2005
			1999							
			2000							
			2001							
			2002							
			2003				*			
			2004		*	*		*		
			2005					*		
		Females		1999	2000	2001	2002	2003	2004	2005
			1999							
			2000							
			2001		*					
			2002			*				
			2003		*		*			
			2004			*		*		
			2005			*		*		

MATH	Totals w/	Males		1999	2000	2001	2002	2003	2004	2005
	Special		1999							
	Education		2000	*						
			2001		*					
			2002		*					
			2003							
			2004		*			*		
			2005						*	
		Females		1999	2000	2001	2002	2003	2004	2005
			1999							
			2000	*						
			2001		*					
			2002		*					
			2003	*	*	*	*			
			2004		*			*		
			2005		8			*		
	Totals with	Females		1999	2000	2001	2002	2003	2004	2005
	Special		1999							
	Education		2000							
	Excluded		2001		*					
			2002		*					
			2003	*	*	*	*			
			2004		*			*		
			2005		*			*		
LAL	Totals w/	Males		1999	2000	2001	2002	2003	2004	2005
	Special		1999							
	Education		2000							
			2001							
			2002							
			2003	*	*	*	*			
			2004					*		
			2005	*	*	*	*		*	
		Females		1999	2000	2001	2002	2003	2004	2005
			1999							
			2000	*						
			2001		*					
			2002		*					
			2003	*	*	*	*			

		2004		*			*		
		2005		*			*		
Totals with	Males		1999	2000	2001	2002	2003	2004	2005
Special		1999							
Education		2000							
Excluded		2001	*						
		2002	*						
		2003	*	*	*				
		2004	*				*		
		2005	*	*	*			*	
	Females		1999	2000	2001	2002	2003	2004	2005
		1999							
		2000	*						
		2001		*					
		2002		*					
		2003	*	*	*	*			
		2004		*			*		
		2005		*			*		

APPENDIX E

RESULTS OF THE PLANNED COMPARISON WHEN THE 2003 SCORES WERE EXCLUDED

Results of the Planned Comparison When the 2003 Scores Were Excluded

			Average Score Before Block Scheduling	Average Score After Block Scheduling Without 2003 Scores	Overall Change	Significant
Science						
	Total Population	All	236.64	237.5325	0.8925	
		Males	237.58	241.865	4.285	
		Females	235.62	233.0725	-2.5475	
	Total W/O Spec. Ed.	All	239.4	240.145	0.745	
		Males	242.03	244.97	2.94	
		Females	236.93	235.3975	-1.5325	
	Spec. Ed. Only	All	213.87	216.465	2.595	
		Males	215.23	221.305	6.075	
		Females	208.62	207.4025	-1.2175	
Math						
	Total Population	All	232	230.0125	-1.9875	
		Males	227.64	232.025	4.385	*
		Females	236.73	227.845	-8.885	*
	Total W/O Spec. Ed.	All	238.855	234.51	-4.345	*
		Males	240.015	237.4225	-2.5925	
		Females	237.605	231.645	-5.96	*
	Spec. Ed. Only	All	193.195	193.91	0.715	
		Males	194.235	197.1675	2.9325	
		Females	190.155	188.0425	-2.1125	
LAL						
	Total Population	All	229.595	227.03	-2.565	*
		Males	223.78	222.695	-1.085	
		Females	236.03	231.56	-4.47	*
	Total W/O Spec. Ed.	All	234.44	230.8325	-3.6075	*
		Males	230.27	227.1575	-3.1125	*
		Females	238.435	234.42	-4.015	*
	Spec. Ed. Only	All	195.455	196.3375	0.8825	
		Males	193.985	192.685	-1.3	
		Females	201.085	200.0825	-1.0025	