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EFFECT OF BLOCK SCHEDULING ON STUDENT ACHIEVEMENT SCORES ON THE PENNSYLVANIA SYSTEM OF ASSESSMENT ELEVENTH GRADE MATH AND READING EXAMS

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ABSTRACT

This study quantitatively examined the effect of block scheduling on student achievement. Specifically, the study compared student achievement as measured by the Pennsylvania System of School Assessments (PSSA) Reading and Math exams between students in block scheduled schools and traditionally scheduled schools. The sample for this study included over 53,000 individual student scores from public high schools in the south central region of Pennsylvania. The data sets used for analysis included individual student test results from the 2003, 2004 and 2005 administrations of the 11th grade PSSA Math and Reading Exams. This study utilized a hierarchical linear model analysis to examine the effects of school schedule type while attempting to control for student and school level variables. The dependent variables for level one were: IEP status, LEP status, economically disadvantaged status, gender and ethnicity. The dependent variables for level two were: school setting, percentage of economically disadvantaged students, and schedule type. Analysis of the data indicated that school schedules had no statistically significant impact on student achievement scores after controlling for student and school level variables. The study included an extensive literature review and implications for further research both nationally and in Pennsylvania. Contains 90 references.

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CHAPTER I

THE PROBLEM

As the need for accountability in schools has increased, school reformers have explored ways to raise student achievement, implement new teaching methods, infuse emerging technologies, and utilize different schedules to facilitate teaching and learning (Zepeda & Mayers, 2006). In the wake of large-scale reform efforts in the early 1990s, researchers started to look at high school schedules across the nation. High school schedules in America had changed little since the turn of twentieth century and the traditional six hour, eight-period school day was considered by some to be a "design flaw" in the American education system. Fragmentation, impersonal, factory-like atmospheres, discipline problems, and limited time for a variety of instructional techniques seemed to be weakness of traditional schedules (Canady & Rettig, 1995a).

The1983 report of the National Commission on Excellence in Education*, A Nation at Risk*, set in motion one of the largest reform efforts in the history of American education. Recommendations from the report included measures to utilize time in schools in different ways. These measures included a lengthening of the school day, a lengthening of the school year, and providing expanded times for learning to meet the educational demands of special needs students, the gifted, and others who required more instructional diversity. Block or intensive schedules were designed to have students meeting for only three or four classes of longer duration per day. Canady and Rettig (1995b) believed that altering the high school scheduling would become a "catalyst" for instructional change and that this innovation would encourage teachers and administrators to adapt curriculum and methods of instruction to improve student

learning. Canady and Rettig also believed that adoption of block scheduling could lead to fewer discipline problems, better student-teacher relationships, and increased focus by students having to deal with fewer classes at one time.

According to Lammel (1996), larger blocks of time would allow for the creation of a more positive climate by improving the relationship between students and teachers. Longer classes would decrease the time between classes and the opportunity for off-task behavior thus improving student discipline. Given larger periods of time teachers would be able to employ a wider variety of instructional techniques that would more fully engage students and eventually have an impact on student achievement.

In the late 1980s and early 1990s, many high schools across America began to adopt some type of block or intensive schedule. This type of schedule configuration offered students and teachers longer periods for instruction and learning. In 1992, Kosanovic indicated that only four percent of high schools in America were using some type of block scheduling. By 1995, this figure had risen to over forty percent of schools using some type of block scheduling configuration (Hackman, 1995; O'Neill, 1995). In North Carolina, the percentage of high schools using block scheduling rose from nine percent in 1993 to thirty four percent in 1995 (North Carolina, 1997). In 1996-97, forty-three percent of the high schools in Texas were utilizing some form of block scheduling (Texas, 1999). During the 1996 school year fifty eight percent of high schools in Virginia employed some type of block scheduling (Rettig, 1996). By 1997, nearly half of all high schools in America were using or exploring some type of block schedule (Winans, 1997).

It seems clear that many educators have looked to retool the way time is used in high schools by instituting some type of alternative scheduling. Today, questions remain

about the effect of block scheduling on school processes and outcomes. Many of the studies conducted in the past have focused on the effect block scheduling has had on non-instructional issues such as discipline, graduation rates, attendance rates and overall stake holder satisfaction (Chesapeake, 1996; Davis-Wiley, 1995; McCoy, 1998; Pisapia & Westfall, 1997; Thomas & O'Connell, 1997).

However, the impact on student achievement has become of greater importance to educational researchers with the introduction of "high stakes" testing programs. Several research studies have explored the effect of block scheduling on student achievement (Arnold, 1998; Georgia, 2005; Griffin & Nicholson, 2002; Guskey & Kifer, 1995; Hackman, Harmston, Pliska, & Ziomek, 2001; Hess, Wronkovich & Robinson, 1999; Lewis, Winokur, Cobb, Gliner, & Schmidt, 2005; McCreary & Hausman, 2001; North Carolina, 1997; Rice, Croninger & Roelke, 2002; Shockey, 1997; Texas, 1999; Trenta & Newman, 2001; Veal & Schreiber, 1999; Walker, 2000; Williams, 1999). Although a few of these studies show a positive association between a move to block scheduling and an increase in teachers' use of multiple instructional strategies, the effect on student achievement is not clear for several reasons. Many of the studies do not control for other factors that impact student achievement. During the early 1990s, several studies were conducted, but these studies looked at student achievement in schools that recently had made a move to block scheduling. In most of these schools, the change was part of a larger reform and the long-term effects of a move to block and the impact on student achievement was not explored.

Between 1994 and 2003, many high schools in south-central Pennsylvania made the switch to block scheduling. Many of these changes were met with skepticism and

debate (Barton, 1997a; Buss, 2000; Gemmell, 1996; Miller, 1998). Local newspapers often covered these issues and included the pros and cons of the debate. In several cases, schools districts deliberated over the switch to intensive schedules over a period of several years (Grubb, 2003). School officials in these schools cited many reasons for the move to an alternative schedule.

Academic opportunities for students and teachers were a major reason school officials presented as a rationale for the move to block scheduling in south-central Pennsylvania. Many schools sought to offer more elective and Advanced Placement courses to make up for the fact that there would no longer be study halls (Barton, 1997b; Bernhard-Bubb, 2003; Grubb, 2003). Other opportunities included the chance for students to earn more credits and in turn, schools would raise the credit requirements for graduation ("Block Scheduling," 2000; Deinlein, 2001; Robert, 1997).

Many school officials in this area viewed the move to block scheduling as a way to set the stage for implementing instructional change. These changes included allowing for longer class periods in which teachers could use a wider variety of instructional techniques that would foster critical thinking skills, explore content more in depth, and create more student centered classrooms (Barton, 1997b; Buss, 1999; Buss, 2000). Administrators also envisioned students doing remedial work during the flex periods some schools had developed for the end of each day (Gemmell, 1996).

Many high school administrators in this area of Pennsylvania looked at a move to block scheduling as a way to have an impact on some student behaviors. Administrators believed that a move to block scheduling would have a positive influence on student behavior especially since behavior problems often occurred during the time in between

classes. High school administrators felt that moving large groups of students around the buildings less often would decrease the number of opportunities for students to misbehave. Administrators also surmised that the move to block scheduling would have a positive impact on student attendance. Students who missed classes in the block ran the risk of missing more information then in a traditionally scheduled school (Robert, 1997).

Some schools in the south-central Pennsylvania area did not move to any type of alternate schedule. A few schools considered the move but abandoned the plan after pressure from parents and school board members mounted. Reasons for not going to an alternative schedule focused on learning gaps, student attention spans, and less overall time for subject matter. Some constituents cited the fact there was no real data that pointed to higher student performance in block-scheduled settings (Barton, 1997a; Gemmell, 1996; "Block Scheduling," 2000).

Several studies have been conducted on the effect of block scheduling on student achievement. Small-scale studies of the effect of block scheduling on student achievement have included analysis of student achievement on national standardized tests (Hess et al., 1999; McCreary & Hausman, 2001), and state tests in Indiana (Veal & Schreiber, 1999) and Ohio (Trenta & Newman, 2001). Large-scale studies have explored the effect of block scheduling on student achievement on the ACT (Hackman et al., 2001), end of course exams (North Carolina, 1996), and state tests in Virginia (Arnold, 1998). Some of these studies attempted to include student level characteristics, i.e. gender, socio-economic status, ethnicity, limited English proficiency, and special education identification, or school level variables, i.e. average ethnicity, percentage of low SES, school location, and school size. Few of these studies attempted to control for

student level variables at the same time controlling for school level variables that effected student achievement.

Statement of the Problem

Continued research is important to determine if the choice of block scheduling in schools is effecting student achievement when controlling for other variables. It is also important to explore long term effects of a move to block scheduling. The question of the effect of block scheduling on student achievement is of considerable importance today given the nature of high stakes testing and the public outcry for more rigor in the curriculum and higher expectations in the outcomes. The "No Child Left Behind Act" holds all states and schools accountable for student achievement in math and reading.

Purpose of the Study

Research on block scheduling in Pennsylvania is almost non-existent. In the early 1990s several area schools made the move to block scheduling. Since that time, the Pennsylvania Department of Education has changed the PSSA testing program to align with the national requirements of the No Child Left Behind (NCLB) Legislation. The NCLB guidelines allow states to create their own state test to determine if students are attaining the goals of the law. This means that every state test is different and each test is administered at slightly different times during the academic year. Block scheduling research from one state may or may not reflect the effect of block scheduling on students in Pennsylvania taking the PSSA math and reading tests in eleventh grade. Because of a lack of empirical data on block scheduling in Pennsylvania, school leaders have few resources on which to base decisions about scheduling and the implication on required state tests.

This study will utilize hierarchical linear modeling (HLM) techniques to examine the effects of school schedule type while controlling for student and school level variables. HLM will provide further insight into the effect of block scheduling on student achievement. Using this methodology will provide the opportunity to delineate between and control for student level characteristics and school level effects that have an impact on student achievement. Using this method will provide a more accurate look at the possible effect of school schedule on student achievement. Using HLM will give this study a unique look at the state of block scheduling in the schools studied.

This study will attempt to discover how the context of school schedule effects students in those schools as it relates to student achievement. The concept of school context effecting the individual student has been shown to be a sociological phenomenon in studies of academic press (Shouse, 1994) and schools as communities (Bryk & Driscoll, 1988). Rather than just focusing on the student level variables, this study will look at the student level variables in the context of school level variables known to have an effect on student achievement.

This study will also discuss research findings regarding some of the non-academic reasons school systems adopted block scheduling. The literature review portion of this study will examine a wide look at the effects of block scheduling on a wide variety of school and student effects. The final analysis will present the achievement findings in the context of overall school reform. School officials considering a change in schedule will undoubtedly be looking at areas of student achievement and student behavior beyond test scores. This study will attempt to contextualize the effect of school schedule with other factors school leaders consider when looking at school reform. An executive summary of

the findings will be provided for high school administrators that will provide a shorter and more concise look at the status of block scheduling in this area of Pennsylvania. This summary will be sent to all administrators at the schools in this study.

This study will explore the effect of block scheduling on student achievement in the south central region of Pennsylvania. This study will include: a) an examination of the benefits and possible drawbacks of block scheduling; b) a comparison of the academic performance of students in block-scheduled schools with traditionally scheduled schools as measured by scores on the PSSA test in both reading and math over a three-year period from 2003-2005; and c) suggestions for further research both nationally and in Pennsylvania.

Research Question

This study attempts to answer the following research question:

Was there a measurable difference in the achievement scores of students in schools adopting block scheduling considering differences in individual students gender, race, economic disadvantage status, IEP status, LEP status, school location, and school average economic disadvantaged student population compared to schools using a traditional schedule during the 2003, 2004 and 2005 school years as measured by PSSA eleventh grade reading and math tests?

Limitations of the Study

As with any research study, limitations exist. The fact that this study is confined to one region of one state in the United States, the results can be valid for only those schools studied. The study only included results on the PSSA eleventh grade reading and math exams for the years 2003, 2004 and 2005. To be representative of national results

the study would have had to include a cross section of the different and diverse schools and state tests throughout the United States.

The study looks at a large sample of student test data from three consecutive years. The large sample size tends to minimize the influence of "outliers" in the data. A small difference between means with a large sample size may give a statistically significant result without translating into a large effect size.

Another limitation that can result in an underestimation of the effect of block scheduling on student achievement is the inherent psychometric weakness of most standardized achievement tests used for state testing. Most state tests are oriented to measure student knowledge of facts instead of critical thinking abilities. This focus on facts creates incongruence between one of the goals of block scheduling, "setting the stage for deeper thinking", and the full representation of its effect (Lewis et al, 2005). However, the mandate on high-stakes testing required by the NCLB legislation makes analysis of this type of data important for school leaders.

Another limitation to this type of post-hoc analysis is the inability to account for many presage, process and context variables that can effect student achievement. Presage variables such as teacher training experiences, teaching skills and other teacher level factors are not accounted for in this study. This study does not include various process variables that would include the types of classroom activities that can have an effect on student achievement (Cruickshank, 1979). Student context variables such as individual student motivation, parent level of education, and family dynamics are not explored in this study. This study attempts to account for various student level and school context

variables but the researcher is limited to the measures of such variables as found in the available data set provided by the PDE for research purposes.

Finally, block scheduling as a reform mechanism was targeted to accomplish instructional, curricular and organizational changes not specifically as an "educational intervention" (Lewis et al., 2005). Specifically "the adoption of a block schedule typically is part of a large school improvement effort with many other programs or policies being simultaneously implemented" (Rettig & Canady, 2001, p.82). This makes the specific effect of block scheduling on student achievement more difficult to ascertain. According to Lewis et al., the particular limitations lend foundation to conducting research on block scheduling after the block schedule has been set up in schools for many years and has had a chance to permeate the "fabric and culture" of a school or classroom.

CHAPTER II

REVIEW OF THE LITERATURE

High school schedules changed very little since the beginning of the twentieth century. In 1893, the National Education Association's Committee of Ten outlined which subjects should be taught in school and the length of time for each class. The Committee believed that students at the high school level should take four or five, fifty-minute courses each day. The Committee encouraged this type of concurrent, segmented education (Powell, 1976).

In 1909, the Carnegie Unit was adopted as the one of the measures of school effectiveness (Canady & Rettig, 1995a). The Carnegie Foundation for the Advancement of Teaching established a standard unit of measure for high school credits. Courses that met for five periods a week for forty-five to fifty-five minutes per period for the entire year would earn a student one credit or Carnegie Unit. The Carnegie Foundation set the standard at fourteen Carnegie Units of secondary course work to qualify a student for admission to college (Powell, 1976). Through most of the 20th century, secondary school requirements were based on the Carnegie Unit as a function of a class period of forty-five to fifty minutes for 180 school days (National Education Commission of Time and Learning, 1993).

This measure set the stage for nearly eighty years of 6, 7, 8 and even 9 period per day schedules. Students had to adapt to the teaching styles of 6-8 different teachers and encounter the material from several different courses every day. The average teacher would teach five classes per day, teaching 125-150 students with several preparations.

Reformers such as Carroll & Rettig (1994b) argued that this harried pace produced impersonal classrooms where the mere lack of time prevented the possibility for teachers and students to delve deep into their subject matter or to utilize a wide variety of effective instructional methods.

During the 1960s and 1970s, schools began to experiment with flexible modular scheduling (FMS). This plan sought to divide the school day into several short but equal units or modules. Some classes met for one, two or even three modules, depending on the discipline and perceived instructional needs of the students (Goldman, 1983). Through the 1960s and 1970s nearly 15 percent of America's secondary schools adopted some form of FMS. However, most high schools abandoned these schedules due to discipline problems caused by large blocks of unstructured time and unmotivated learners (Canady & Rettig, 1995a).

The next wave of secondary school schedule reform took place in the late 1980s and early 1990s as part of the restructuring efforts of schools across America. Joseph Carroll instituted his Copernican Plan at the Masconomet Regional High School in Massachusetts in 1989. This plan included classes that met for three to four hours, five days a week for six weeks. During the two-year study, Carroll reported that students retained information under the Copernican Plan as well as other students did under a traditional schedule. He also reported that students developed better problem solving skills under the Copernican Plan (Carroll, 1994a). Critics questioned the validity of Carroll's experiment given the short length of the study (two years) and the fact that Masconomet Regional High School returned to a full traditional schedule shortly after the end of the two-year experimental period (Lindsay, 1996).

In 1991 the National Education Commission of Time and Learning was established as part of Public Law 102-62 (The Education Council Act of 1991). The commission was tasked to investigate the impact of time on learning. In a 1993 public hearing, Theodore Sizer, Chairman of the Coalition of Essential Schools, questioned the form and function of American schools. He believed that students would only learn when they are "engaged." He indicated that students needed to be known and respected to motivate them to engage in learning. Sizer claimed that in many secondary schools in America students were not known or respected but had become simply another number to process (National Education Commission on Time and Learning Public Hearing, 1993). In 1994, the National Education Commission on Time and Learning likened time in American schools as the "warden" of learning. The commission pointed out that the use of time in American schools had changed very little in over one hundred and fifty years. Students were required to learn all that they could in the time provided. Many bright hard-working students did well while many other students ran into trouble.

This report again, focused the educational community on the use of time in American high schools. School reformers used the findings of the Commission of Time and Learning to retool high school schedules. In the early 1990s, Kasonovic (1992) suggested that less than 5 percent of all high schools in America utilized some type of block scheduling. By 1995, this number had grown to over 40 percent (Cawelti, 1994; O'Neill, 1995; Rettig, 1996). This experimentation with new schedules grew out of a national trend to "restructure" the way secondary schools operated. This trend had its roots in a 1984 report published by The National Commission on Excellence in Education titled *The Nation at Risk*. In the recommendation section of the report, the

commission suggested that "time available for learning be expanded through better…organization of the school day" (National Commission on Excellence in Education, 1983). Building on suggestions from this report, reformers in the early 1990s sought to make high schools more effective by fundamentally changing the way school schedules were organized.

The *Breaking Ranks* report from the National Association of Secondary School Principals (1996) criticized schools for holding on to the notion that all teaching and learning can fit into forty to fifty minute segments. The report suggested that high school schedules should evolve to include flexible time to enhance the teaching and learning environment. The report encouraged high school officials to create schedules that allowed for more creative uses of time to help all students meet the requirements of the core curriculum.

By 1996, nearly fifty percent of all high school in America had adopted some form or alternative or block schedule. Block scheduling became a way to re-design schools in an attempt to better utilize time. A move to block scheduling was a move away from a fragmented, traditional schedule in which students had to manage six to eight different courses and teachers every day (Lammel, 1996). Longer periods were also considered a way to provide teachers the opportunity to use a variety of teaching techniques, and reduce the number of classes students had each semester (Canady & Rettig, 1995b; Chesapeake, 1996; McCoy, 1998). Reformers believed that block scheduling would allow teachers to build more personalized relationships with their students. This was seen as a particularly important goal in many of the large, urban

schools where teachers regularly saw upwards of 150-180 students per day (Chesapeake, 1996; Pisapia & Westfall, 1997; Texas, 1999).

Block Scheduling Models

Block scheduling began to take on various schemes as individual schools explored this new reform. Four major types of block scheduling emerged as schools adapted schedules to meet their needs. The most common type of block schedule was called the "four by four" (4X4) or semester block schedule. In this system, students would have four, 80-90 minute classes per semester. At the semester break, students would have four new 80-90 minute courses (Canady & Rettig, 1995a). This was the purist form of block scheduling but many schools tried other configurations for a variety of reasons.

The A/B Block or Alternating Day Schedule sought to maintain the benefits of longer instructional periods but allow students and teachers to have courses that would run all year long. In this scheme students have four, 80-90 minute courses that would meet on day "A." The next day, students would have their other four, 80-90 minute courses. This would be day "B." This cycle would alternate every other day. Proponents of this system preferred students to have all classes year round. Many teachers of math, foreign language, and AP courses found the benefit in meeting with their students all year (Wisconsin, 1995; Blocher, 2000). Opponents to this system were also vocal. They saw the benefit of only having to prep for three classes per semester not part of this system. Teachers would still have to deal with 150-180 students on a regular basis, albeit, only every other day. Teachers and student alike realized that missing days in this system presented a major problem because the rotating day schedule magnified the missing days

and could even prolong the time when teacher and student would meet to tackle the prospect of make-up work (North Carolina, 1996).

The Modified Block or Hybrid Block was devised to provide teachers and students a combination of 80-90 minute classes that ran for a semester with a mix of 40-45 minute classes that would run for a full year. This schedule provided at least one "modified" block during the day. During this block, full year courses are offered. These courses usually meet for half the time of a regular full block. Under this system, students must select two short classes to fill one block of time. Music educators seem to be in favor of this scheme since it allowed music students the opportunity to have performing groups all year long (Chesapeake, 1996; Cree, 1997; Patterson, 1997). Often this period was held over the lunchtime to accommodate schools that supported large musical groups.

The fourth type of block schedule is the Trimester Plan. In this scheme students take two or three core courses on a rotating 60-day schedule. Students earn up to nine credits per year under this type of system. A typical block under this system lasts for approximately 120 minutes (Canady & Rettig, 1996). Elective courses are usually offered in 60-minute blocks that run for a 60-day period. Proponents of the trimester system advocate that this type of scheduling allows extra time for special learners. This type of schedule also provides flexibility for students who need extra time to cover course content.

Block Scheduling Advantages

Proponents of block scheduling cite many advantages in moving to longer periods. Much of the research on block scheduling includes survey and questionnaire data

regarding stakeholders' perceptions of the advantages of moving to a block schedule (Chesapeake, 1996; Davis-Wiley, 1995; Irmsher, 1996; McCoy, 1998; Pisapia & Westfall, 1997; Thomas & O'Connell, 1997). Advantages of block scheduling as reported by stakeholders include instructional advantages, workload reduction, and the ability to manage large numbers of students more effectively.

Schools that chose semester block plans divided the yearlong workloads for students and teachers into semester blocks. Many reformers recognized the opportunity for teachers and students to concentrate on a small number of classes in a given semester. In semester blocked schools, teachers would usually teach three classes each term. This reduced their class loads from 130-150 students to about half this number allowing teachers to get to know their students better and provide more personalized instruction. Although students would still need to complete the same amount of coursework per year, students would only need to concentrate on four classes per semester (Canady & Rettig, 1995a).

In a block-scheduled school, students could take a failed class in the same year. This was an opportunity not available in schools with classes that met for a full year. Additionally, with the elimination of study halls, students were forced to sign up for more classes which created the opportunity to enroll in more elective classes (Cawelti, 1994).

Block Scheduling Disadvantages

The wave of block scheduling initiatives in the early 1990s was not without its critics. Opponents of block scheduling movement believed that school administrators and school boards had jumped into this educational reform without gathering or demanding data regarding its effectiveness (Lindsay, 1996). Critics claimed that high school

students' attention spans were not able to handle the longer blocks of time and that teachers had to water-down the curriculum or cut curriculum to meet the time constraints of semester classes (Chesapeake, 1996). They also believed that learning in some subjects, especially math and science, was not as effective in the block and the long gaps of time between some courses would effect retention and learning. Others were concerned that transfer students would have trouble fitting into a different course schedule (Texas, 1999). Many music teachers feared that some elective areas, especially music, would suffer under a block schedule (Cree, 1997) while other educators indicated that there was little hard data to support an improvement in academic performance under the block (Lindsay, 1996).

Other critics believed that slower learners and inclusion students would face increased challenges in longer class periods. They also believed that teacher and student absenteeism was exacerbated in a block-scheduled school. Other concerns included make-up work and making the transition from a traditional schedule (Czaja & McGee, 1995).

Effects of Block Scheduling

As schools started to implement different types of block schedules, many educators and researchers debated over the actual benefits. The mid 1990s through the early 2000s saw many large-scale and small-scale studies that looked into the actual effects block scheduling had on schools and students. The results of these studies can be broken down into several major categories including student attendance, graduation/drop out rates, course completion and requirements, and student achievement.

Student attendance data appeared in several studies. A study by Trenta & Newman (2001) looked at attendance data collected in a small Midwestern high school over a seven-year period. The initial attendance figures were taken for students in the school before the implementation of block scheduling before the 1997-1998 school year. The researchers then compared this attendance data to attendance data taken after the school had been on the block schedule for the 2001-2003 school years. The resulting patterns of attendance did not lead the researchers to believe that the type of schedule had a significant impact on student attendance.

A large-scale study of rural, suburban and urban schools in Virginia looked at attendance in schools by gauging teacher satisfaction of student attendance in their classes through qualitative data (Pisapia & Westfall, 1997). This study included some schools that switched to a block schedule with other schools that remained in a traditional schedule. Teachers in schools moving to a block schedule expressed much greater satisfaction regarding student attendance in their classes than teachers in traditional settings. This study did not include quantitative evidence that student attendance had actually improved.

Another large study, conducted by the Texas Education Agency Office of Policy Planning and Research, found higher attendance rates in schools using the A/B or Alternating block using attendance records over a three year period (Texas, 1999). This study, while large in scope, failed to account for possible differences between schools that might have existed before the implementation of a block schedule. Studies by Shore (1995) and the Chesapeake Public School System (1996) also indicated slight improvements in student attendance in schools using some type of block schedule but

failed to include data about the attendance patterns before the implementation of a block schedule.

In a 1995 study, Thomas and O'Connell approached the attendance issue in a slightly different way as compared to other studies. This study asked students if they based their decisions about coming to school on the amount of work they might miss. When students were in schools operating under a traditional schedule, only twenty percent of students considered the amount of work missed when deciding whether or not to go to school. Seventy percent of students in block-scheduled schools indicated that they considered the amount of worked missed when they made decisions about attending school. This study did not include any quantitative analysis of the actual attendance rates in the schools studied. In other words, it was not clear if the positive student attitudes toward "attending school" due to homework concerns in the block scheduled school actually equated into improved attendance.

In a similar study of two Cleveland high schools in the Mississippi School District, increases in student attendance were discovered in the quantitative data analysis. However, this finding was not valid since it was unclear if the increase in average daily attendance was an effect of block scheduling or changes in district policy and administrative enforcement (Griffin & Nicholson, 2002).

Overall, the studies on attendance seem to point toward a concern on the part of some students about attendance, but the pattern of actual attendance improvement or decline was not substantiated.

Drop out rates and graduation rates were a major concern in many of the schools and studies focused on block scheduling. Irmsher (1996) studied the effectiveness of

block scheduling in fifteen Oregon schools and found a decrease in the dropout rate for most schools. Griffin & Nicholson (2002) also found a significant decrease in the drop out rate during the initial four-year implementation of block scheduling. Both studies lacked the quantitative data to establish the type of schedule implemented as the cause for a decrease in dropout rates. Researchers surmised that some of the reduction in drop out rates were tied to some of the benefits of block scheduling, i.e. relaxed atmosphere, ability of students to make up classes, and more time for learning, but neither study provided concrete proof that block scheduling was the reason for students remaining in school.

In a study of a large Maryland high school, researchers noted a slight increase in the drop out rate during the initial year of implementation of a four by four block schedule (Guskey & Kifer, 1995). Researchers believed this was in a reaction to the increased course requirements that were part of the overall reform effort in this school.

Many school administrators equated a move to block scheduling with an opportunity to increase graduation requirements. Often, the schools were moving from a schedule that required students to select at least five or six classes and fill the remaining periods of their day with study halls. Nearly all block-scheduled schools require students to select eight classes with no study halls. Most schools coupled this change in schedule with an increase in the number of credits students needed to attain to receive a high school diploma. According to the U.S. Department of Education's National Center for Education Statistics, 1982 high school graduates earned an average of twenty-one Carnegie units as indicated in the "High School and Beyond" study and subsequent follow-up studies (US Department of Education, 2002). By 2000 the average number of

Carnegie units earned by high school graduates had risen to twenty-six. Many block-scheduled schools increased the number of credit requirements for major subjects including math, English, social studies and sciences. In 1982, the average high school graduate earned eleven credits in the four major subjects. By 2002, most high school graduates were earning fourteen or more credits in the major subjects (US Department of Education, 2002).

Block Scheduling and Student Achievement

Student achievement was the focus of many studies of block scheduling efforts. Educators and researchers tried to measure the positive and negative effects that "intensive scheduling" had on student learning and achievement as measured on end-of course tests, the Scholastic Aptitude Test (SAT), the ACT, Advanced Placement course exams and state tests.

Studies on student achievement as measured by end of course exams was the focus of a large scale study in North Carolina (North Carolina, 1996) and a small study at the Thomas Jefferson High School in Frederic, Maryland (Guskey & Kifer, 1995). In both studies, there was little difference in the end of course test scores between students in traditional settings compared to students in block scheduled schools. In the North Carolina study, researchers did notice a slight increase in scores during the first year of implementation of a block schedule with a leveling off after the implementation was complete. The research did not determine if the increases were a direct benefit of block scheduling or the resulting "Hawthorne Effect" (Lunenburg & Ornstein, 2008) students encountered in the first year of a "new" experience at school. The researchers in both studies encouraged future work to look at student achievement in schools after block

scheduling had been in force for many years to eliminate the Hawthorne Effect on the results.

Several studies also looked at student performance on college entrance admissions tests. SAT and ACT scores provide indicators that establish ability levels of college bound students. One study looked at ACT scores from over 120 high schools in two mid-western states that implemented 4X4 and alternating day block schedules. This longitudinal study compared scores from these schools to over three hundred schools that used a traditional 8-period day over the span of the study. The study inspected trends in ACT scores 2 years before implementation of alternative schedules to 3 years after implementation. Researchers found a decline in ACT Composite scores in the year before implementation of block scheduling followed by two years of slightly increased scores. A decline in scores was observed in the third year after implementation. Researchers surmised that the drop in achievement in the year before implementation could have resulted from the "turmoil" experienced by many of the schools leading up to the transition. The increase in scores followed by falling scores was attributed to the enthusiasm often associated with a major change with the resulting drop in motivation and enthusiasm after a few years (Hackman et al., 2001). Again, the researchers suggested that student achievement scores be examined after a school has been on a block schedule for a longer period.

The Georgia Department of Education tracked information on student achievement as measured by SAT results starting in 1998. In an annual report released in the spring of 2005 researchers found that students in non-blocked schools had higher average SAT combined scores each of the past six years. During the six years of the

study students' average verbal scores in non-blocked schools were 8-15 points higher than students' average verbal score in blocked schools. Similarly, students' in non-blocked schools scored 13 to 22 points higher on the Mathematics section of the SAT as compared to student in blocked schools (Georgia, 2005). While this study included demographic information about the samples, these variables were not integrated into the final statistical analysis in determining the effect of school schedule type on individual student achievement.

Several studies have also looked at student achievement on Advanced Placement (AP) exams. Many researchers, educators, parents and students have expressed concern over the ability of block-scheduled schools to accommodate the demands and scheduling of AP exams. In the Guskey & Kifer study (1995), researchers tracked Advanced Placement program participation in the Governor Thomas Jefferson High School, during the 1991-1992 school year and compared these findings to the results to the results for the 1992-1993 school year. The Governor Thomas Jefferson High School restructured its school schedule for the 1992-93 school year by moving from a seven period, forty-eight minute class period day, to four, ninety-minute periods per day. Classes were offered on a semester basis in which each semester consisted of eighteen weeks. Students could take eight credits per year. In the 1991-92 school year, students took two hundred and twelve Advanced Placement tests. Of the two hundred and twelve tests taken, one hundred and twenty four students (fifty eight percent) scored a three or better on their tests. After moving to the block schedule in the 1992-1993 school year, two hundred and ninety two Advanced Placement tests were taken and one hundred forty seven students (fifty percent) scored a three or better on their tests. The researchers pointed out that the

increase in students taking AP courses and the increased number of students scoring a "3" of better indicate a significant benefit of block scheduling.

A 1999 Texas study found that statewide sixty two percent of examinees earned a score of three or better on the AP examinations. Schools using six-period days had the highest average percentages (sixty percent) while schools using eight-period days had the lowest average percentage (forty percent). Block scheduled schools fell in the middle with average percentages ranging from forty four percent to forty six percent. In no instance was difference in performance on a particular test statistically significant when school context was held constant and multiple performance measures examined at the same time (Texas, 1999).

A Georgia study tracked AP test results for six years starting in the 1998-1999 school year through the 2003-2004 school year. Statistical analysis of the data indicated that, on average, a higher percentage of students in non-blocked schools took AP exams during the time of the study. Results on the AP exams also indicates that a higher percentage of students in non-blocked schools score a three or higher on AP exams (Georgia, 2005).

All states have statewide tests that are given to students in high school. Several studies have looked at the effects of block scheduling on statewide tests. The Texas Assessment of Academic Skills (TAAS) was given to all tenth grade students in Texas public schools during the 1996-1997 school year. This battery of tests included exams in reading, mathematics and writing. Researchers concluded that there were slight variations in test results but in no case were the variations in test performance on any single test

statistically significant when "school context was held constant and multiple performance measures were examined at the same time" (Texas, 1999).

To fully examine the possible effect of a high school schedule, it is necessary to explore other variables that influence individual student achievement. In this study, these variables will include student gender, ethnicity, economically disadvantaged status, IEP status and LEP status. Their inclusion protects the study against the possibility that differences between student achievement in traditional and block-scheduled schools actually results from differences in school affluency, school locale, demographic patterns, etc.

Research shows the academic achievement of blacks and Hispanics has been significantly below that of white students (Brookover, 1985). Reasons cited for this lower achievement include family background, socioeconomic status of the under privileged and unequal educational opportunities associated with schools having a high percentage of minority students. A greater number of minority children come from families that have lower educational experiences. This often means that minority students are afforded less learning opportunities and less support for educational activities at home. Given a higher rate of single-parent families among minority students, these children get less support from parents in regards to learning activities (Entwisle & Alexander, 1992; Parks, 2003).

Socioeconomic status is another factor that has an impact on student achievement. Often, students from lower-class backgrounds are treated based on their social status not on their abilities. Working class students are often encouraged to follow vocational career paths instead of taking a more academic curriculum. This "status" carries with it a

"stigma" that often perpetuates the attitude in these students that they cannot achieve at the same level as their more affluent peers (Faunce, 1984).

Parental involvement in the educational process is also a factor that influences students along socioeconomic status lines. Research has shown that lower class or working class parents tend to be less involved in their child's education in part because of their own educational background. Working class parents seem to be content to put faith in the teachers and the schools to take care of the education of their child. Upper class parents tend to put a higher value on education and are more likely to be engaged in the educational process of their students. This translates into greater support and higher expectations for higher-class students (Lareau, 1987).

Researchers often look for demographic data to indicate socioeconomic status of individual students in studies. Most states track this statistic by looking at the eligibility of students to receive free and reduced lunches. Although this designation does not indicate the level of poverty of families, it is often used as a proxy to identify students of low socioeconomic status for research purposes (Lareau, 1987).

Research of the academic achievement differences between genders has been widespread. Overall, research indicates that girls out perform boys in academic areas that require higher verbal competencies (Maccoby & Jacklin, 1974) but boys excel in more analytical subjects such as mathematics and science (Marsh, 1898). Factors that have been explored to explain these differences include self-concept (Campbell, 1965), sex role identification and expectations (Nicholson, 1973), and fear of academic success (Ishiyama & Chabassol, 1985). Other research points to the differential treatment of the

sexes by teachers in school settings that could also account for differences in academic achievement between the genders (Burke, 1989).

Summary

Many high schools across America made the move to some type of block schedule in the 1990s. Certainly not all plans to move to block scheduling met with success (Bruckner, 1996). In many cases, a move to block scheduling was not always based on scientific research. Often, reformers looked to block scheduling to set the stage for more effective use of time for learning and to produce systemic change to improve instructional and non-instructional goals. Since the early 1990s, there has been few empirical studies on block scheduling. Many of the existing studies look at attitudinal data or small samples of quantitative research (Kramer, 1997). Studies that employed quantitative methodologies to examine student achievement often looked at smaller populations of students (Hess et al., 1999; Howard, 1997; Lawrence & McPherson, 2000; Nichols, 2000; Spencer & Lowe, 1994). Very few studies have looked at large data sets with achievement results of a large number of students.

During the early 1990s, many Pennsylvania high schools made the move to some type of block scheduling. These reform efforts were based on little or no quantitative data. Since that time, no large-scale study has been conducted comparing student achievement in block-scheduled schools versus student achievement in traditionally scheduled schools in Pennsylvania. In 2003, the Pennsylvania Department of Education (PDE) began to track student achievement as measured by the PSSA exams given in the spring of the year. Tests in math and reading were given to all students in Pennsylvania public schools in grades five, eight and eleven. Following the guidelines set forth in the

"No Child Left Behind" (NCLB) legislation, student scores on the PSSA exams were scored on a four level scale. Students could score Advanced, Proficient, Basic, or Below Basic depending on the cut scores set for each test. PDE gathers testing results disaggregating the data by state, district, and school levels. The state also disseminates information regarding the achievement of many sub groups. Information regarding the achievement of students in block-scheduled schools compared to traditional scheduled schools in these tests does not exist.

For more then a decade, many schools in Pennsylvania have operated under a block schedule system. With the advent of the new PSSA exams and the NCLB targets, it is important for school leaders to know if students in block-scheduled schools are keeping pace with students in traditional settings. Schools in Pennsylvania that adopted block schedules near the end of the twentieth century are now faced with new accountability measures. Some research about block scheduling and student achievement on state exams exists from a few states, but none exists on the status of student achievement on the PSSA exams. As school leaders in Pennsylvania continue to look for ways to improve student achievement, quantitative data on the effects of block scheduling is needed to make informed decisions.

Chapter III

Methodology

Description of the data set

The data used in this analysis comes from the 2003, 2004 and 2005 PSSA eleventh grade Math and Reading data sets provided by the Pennsylvania Department of Education (PDE) Assessment Office. The PDE Assessment Office creates large data sets each year to disseminate results of the state testing exams to schools and researchers. The subset of data used in this study contained student level scores from the seventy-three schools in this study. This means that there are three different cohorts of eleventh grade scores. It is important to note that this is not longitudinal data but three separate groups of students. Included in the data set are individual student scaled scores for reading and math and individual student coding for gender, ethnicity, IEP status, LEP status, free and reduced lunch status. Information regarding school locale was gathered from the National Center for Education Statistics website (2008) and added to the data sets before analysis. The subset of data used in this thesis consists of 55,047 students who are nested in seventy-three high schools in the south central area of Pennsylvania. Of these high schools, forty-two utilized a traditional schedule and thirty-one utilized some type of block schedule during the 2003, 2004 and 2005 school years During the school years from 2003-2005 ninety percent of the block scheduled schools utilized a 4X4 schedule, seven percent utilized an A/B schedule, and three percent employed a trimester schedule.

Description of the Dependent Variables

The dependent variables are the mathematics and reading achievement scores of the students in the seventy-three high schools. Mathematics and reading are the two areas

that are tracked by states to determine if schools are meeting the Acceptable Yearly Progress (AYP) targets as established by the No Child Left Behind law. Results on the eleventh grade PSSA Math and Reading exams are also used to determine if individual students are attaining proficiency in these areas. The Pennsylvania Board of Education had determined that students must show proficiency in both reading and math to gain a high school diploma.

Description of Independent Variables

Table 1 displays the eight independent variables that are included in this study. Some of the variables are measured at the individual student level, and others are measured at the school level.

Table 1

Description and Coding Scheme of Variables

Variable	Description of Variable and Coding
FEMALE	0=Male; 1=Female
MINORITY	0=non-minority; 1=African American, Hispanic or Multi-Racial student
IEP	0=non-IEP; 1=IEP student
LEP	0=non-LEP; 1=LEP student
ECONDIS	0=non-economically disadvantaged; 1=economically disadvantaged student
SUBURB	0=non-Suburban; 1=Suburban
PERECDIS	Percentage of ECONDIS identified in each school
SCHTYPE	0=traditional schedule, 1=block schedule

The data set for this study included eleventh grade PSSA scores from the seventy-three schools selected. Descriptive statistics for 2003, 2004 and 2005 samples are displayed in tables 2, 3 and 4 respectively.

Table 2

Descriptive Statistics for 2003 Data Set

Variable	Traditional Schedule	Block Schedule
FEMALE	.50	.49
MINORITY	.12	.07
IEP	.11	.11
LEP	.02	.01
ECONDIS	.12	.12

Table 3

Descriptive Statistics for 2004 Data Set

Variable	Traditional Schedule	Block Schedule
FEMALE	.49	.48
MINORITY	.12	.09
IEP	.13	.13
LEP	.01	.01
ECONDIS	.12	.13

Table 4

Descriptive Statistics for 2005 Data Set

Variable	Traditional Schedule	Block Schedule
FEMALE	.50	.51
MINORITY	.14	.08

IEP	.13	.12
LEP	.02	.01
ECONDIS	.15	.14

The schools in this study included all public high schools in the south-central Pennsylvania area. These schools were chosen because this area of Pennsylvania contains a mix of rural, suburban and urban schools that will provide a broad look at schools of different sizes and settings who chose to move to the block as compared to schools that remained on a traditional schedule. In all, there are seventy-three public high schools in this area of Pennsylvania. By 2003, forty-two schools or fifty-eight percent of the schools in this study utilized a traditional schedule during the 2003, 2004 and 2005 school years. The other thirty-one or forty-two percent of the schools utilized some type of block schedule during the 2003, 2004 and 2005 school years. In all, forty percent of the students in this sample were on a block schedule.

In looking at the setting of schools in this sample, there were also similarities in the frequency of schools of different settings using a blocked schedule compared to traditional schedules. Over the three-year period beginning in 2003, thirty-five percent of the traditional schools were in a rural setting, fifty-three percent in a suburban setting and twelve percent in an urban setting. During the same time-period, thirty-nine percent of the blocked schools were in a rural setting, fifty-five percent in a suburban setting and six percent in an urban setting. The similarities between the settings and school schedules seemed to indicate a level playing field in which to analyze schools in this area. Table 5,

6 and 7 displays the descriptive statistics for school settings by schedule type for 2003, 2004 and 2005 respectively.

Table 5

Percentage of schools by setting for 2003

Schedule Type	Rural	Suburban	Urban
Traditional	35%	53%	13%
Block	32%	61%	7%
All Schools	34%	56%	10%

Table 6

Percentage of schools by setting for 2004

Schedule Type	Rural	Suburban	Urban
Traditional	35%	54%	11%
Block	32%	61%	7%
All Schools	34%	58%	8%

Table 7

Percentage of schools by setting for 2005

Schedule Type	Rural	Suburban	Urban
Traditional	36%	52%	13%
Block	31%	62%	7%
All Schools	34%	56%	10%

After completing some analysis of the data using all three levels of school setting, it was determined that the small number of urban schools in the total sample was not

yielding valid results within the HLM model. For the purposes of this study, the school setting variables were recoded to create a "dummy" variable (SUBURB); equals 1 if yes, 0 if no. This variable combined the rural and urban settings, and the coefficient represents the difference between suburban schools and the other schools.

Information about individual school schedules was collected directly from district websites when available or from phone calls to high school principals. Of the seventy-three schools in the study, forty-two schools (fifty-eight percent) utilized a traditional schedule and thirty-one schools (forty-two percent) utilized a block schedule during the schools years 2003-2005.

Description of Hierarchical Linear Model

The effects of block scheduling on student achievement in this study were explored by using a hierarchical linear model (HLM). Hierarchical or nested systems are common in social science research. Hierarchical structures tend to exist within many institutions including families, businesses, schools, churches, towns and states. In educational settings, students can be nested within a peer group, classroom, grade level, school, school district, state, and country.

In studying data that is nested in hierarchical structures analysis is often difficult. When examining, for example, students that exist in one of the afore mentioned configurations, students tend to be more homogeneous to other students within their groupings than students randomly sampled from a larger populations. Students in a particular classroom at a particular school tend to be more similar than to students from a random sample because students in the same classroom are not randomly assigned to a classroom. Students are assigned to classrooms based on were they live. As a result,

students from a particular school or classroom have a tendency to come from localities that share commonalities in terms of ethics and mores, family backgrounds, socio-economic status, race or ethnicity, religion and educational experiences. In addition, students nested within particular classrooms partake in similar experiences in the classroom environment including the same teacher, curriculum, and instructional strategies which tend to make the students more alike over time (Osborne, 2000).

HLM allows researchers to separate variation in student achievement into student level and school level components to more accurately determine the effects of variables at each level. Prior to the use of HLM researchers focused on students as the key unit of analysis without accounting for school level effects which later proved to have a homogenous effect on student behavior and achievement (Alexander & Pallas, 1983; Barr & Dresden, 1983; Willms, 1984). In the HLM analysis, the average level of individual achievement is calculated for all students after controlling for the student level variables. This result is then used to determine the average achievement level in each school. Each school will have a different adjusted average. These adjusted averages then become the dependent variable for the level two model. For this study, the school level variable of schedule type was of interest. The use of HLM would allow other factors that effect student achievement to be filtered out and help the researcher determine the effect of school schedule type on student achievement.

In this study, the student level independent variables included gender, minority status, IEP status, LEP status and economically disadvantaged status. The school level variables included percentage of economically disadvantage students in the school, school locale and schedule type. The dependent variables were eleventh grade reading

and mathematics achievement scores on the 2003, 2004 and 2005 PSSA exams. The data set used for this study contained scaled scores for reading and math. For the purposes of this study, the scaled scores were centered so that the results can be discussed in terms of variation from the mean. The statistical analysis utilized HLM to control for student and school level variables that effect student achievement to determine the overall effect of school schedule type on student PSSA eleventh grade reading and math scores.

Research Question

The research attempted in this study answered the following question:

After controlling for elements of gender, ethnicity, socio-economic status, IEP status, LEP status, percentage of economically disadvantaged students and school location, what is the effect of school schedule type on student achievement as measured by the 2003, 2004 and 2005 eleventh-grade PSSA Math and Reading Tests?

To examine the research question an HLM model will be devised to take into account the student-level variables of gender, ethnicity, socio-economic status, IEP status, and LEP status and school level variables of location, percentage of economically disadvantaged students and schedule type will be added as predictors. Reading and math scores for each year (2003, 2004, 2005) served as the criterion variables.

CHAPTER IV

ANALYSIS OF DATA

During the 1990s, many high schools moved away from the traditional high school schedule to some type of block or intensive schedule. This restructuring effort created schools that utilized longer class periods but these classes only met for one semester. By the turn to the century, it was estimated that more than forty of the high schools in the United States were using some type of intensive schedule.

Statement of the Problem

Since the mid-1990s, several high schools in Pennsylvania have employed some type of intensive or block schedule. In 2003, the Pennsylvania Department of Education changed the PSSA exams to align with the NCLB targets. Today, it is important for school leaders to know if block or intensive schedules are having a negative or positive effect on student achievement. This study examined a large population of students in the south-central region of Pennsylvania to compare the achievement scores of students in traditional and blocked scheduled schools on the 2003, 2004, and 2005 eleventh grade PSSA Math and Reading Exams. The study attempted to answer the following research question:

After controlling for elements of gender, ethnicity, socio-economic status, IEP status, LEP status, percentage of economically disadvantaged students and school location, what is the effect of school schedule type on student achievement as measured by the 2003, 2004 and 2005 eleventh grade PSSA Math and Reading Tests.

Description of the Sample

As mentioned earlier, data for this study comes from the Pennsylvania Department of Education. Test data from the 2003, 2004 and 2005 eleventh grade PSSA Math and Reading Exams was gathered for the seventy-three schools located in the south-central Pennsylvania region. The descriptive statistics for each data set are shown in tables 8, 9 and 10.

Table 8

Descriptive Statistics of 2003 Sample

Variables	N	MEAN	SD	MIN	MAX
FEMALE	17391	.50	.50	0	1
MINORITY	17391	.10	.30	0	1
IEP	17391	.11	.32	0	1
LEP	17391	.01	.12	0	1
ECONDIS	17391	.12	.32	0	1
SUBURB	17391	.52	.50	0	1
SCHEDTYPE	17391	.40	.50	0	1
SSR	17391	.00	1.00	-2.74	4.47
SSM	17391	.00	1.00	-2.85	4.29

Table 9

Descriptive Statistics of 2004 Sample

Variables	N	MEAN	SD	MIN	MAX
FEMALE	17340	.49	.50	0	1

MINORITY	17340	.10	.30	0	1
IEP	17340	.13	.34	0	1
LEP	17340	.01	.11	0	1
ECONDIS	17340	.12	.33	0	1
SUBURB	17340	.52	.50	0	1
SCHEDTYPE	17340	.40	.50	0	1
SSR	17340	0	1	-2.47	5.09
SSM	17340	0	1	-2.73	4.73

Table 10

Descriptive Statistics of 2005 Sample (73 Schools Represented)

Variables	N	MEAN	SD	MIN	MAX
FEMALE	18547	.50	.50	0	1
MINORITY	18547	.12	.32	0	1
IEP	18547	.13	.34	0	1
LEP	18547	.01	.11	0	1
ECONDIS	18547	.14	.35	0	1
SUBURB	18547	.52	.50	0	1
SCHEDTYPE	18547	.4	.5	0	1
SSR	18547	0	1	-2.22	3.54
SSM	18547	0	1	-2.34	3.85

Analysis of HLM Results

Using the data sets from PDE for 2003, 2004 and 2005 an HLM model was devised to analyze the effect of student and school level variables on student achievement as measured on the eleventh grade PSSA Reading and Math exams. Math and reading scaled scores were standardized for each student. In the HLM model the reading and math standardized scores were set as the outcome variable for the level one (student) and level two (school). The dependent variables for level one were: IEP status, LEP status, economically disadvantaged status, gender and ethnicity. The dependent variables for level two were: school setting, percentage of economically disadvantaged students, and schedule type. For each data set, two HLM models were run; one to examine the effects on reading scores and one to examine the effects on math scores.

Each data set included a very large population of students from the south-central Pennsylvania area. For the purposes of this study, all of the scaled scores were centered around the grand mean for all students and group mean for the schools. This allowed the results to be standardized and viewed in terms of differences in achievement associated with a difference of one standard deviation.

Finally, the HLM for this study used a fixed-effects analysis. The population used for this study was not a random sample of the students in the south-central region of Pennsylvania, it was the entire population in these schools. Given this fact, it is important to note that the results can make certain inferences for the students and schools in this area but drawing conclusions about student populations and results in other areas must be done with caution.

What follows is an explanation of each table and the table with the actual data resulting from the model. The tables provide the coefficient value, amount of standards error (SE), and the p-value.

Table 11 displays the coefficients that correspond to student and school level variables contained in the HLM model of standardized reading scores. In this model, all of the student level coefficients are negative. The largest coefficient is associated with students who have an individualized education plan. This coefficient denotes that students with an IEP score 1.18 standard deviations lower in reading than do other students. Limited English students, economically disadvantaged students, females, and minority students also scored significantly lower on the 2003 reading exam. An examination of the school level section of Table 11 reveals that suburban school reading scores are about eleven percent of a standard deviation higher than other schools, even after controlling for the effect of having higher percentages of economically disadvantaged students. In the same analysis, schools using a block schedule have average reading scores that are eleven percent of a standard deviation lower than school with traditional schedules.

Table 11

Model for Level One and Level Two Effects on Standardized 2003 Reading Scores

Student Level 1	Description	Coefficient	SE	p-Value
IEP	Student has an IEP	-1.18	.03	0.00
LEP	Student has Limited English Proficiency	-.47	.08	0.00
ECONDIS	Student is	-.32	.03	0.00

	Economically Disadvantaged			
FEMALE	Student is Female	-.14	.01	0.00
MINORITY	Student is Black or Hispanic	-.49	.03	0.00
School Level 2	Description	Coefficient	SE	p-Value
SUBURB	Suburban	.11	.05	0.02
PERECDIS	Percentage of Economically Disadvantaged student in the school	-.02	.003	0.00
SCHTYPE	Value is 1 if school uses a block schedule	-.11	.05	0.02

*Not statistically significant (p-Value is greater then .05)

Table 12 shows similar data associated with the 2003 PSSA Mathematics Exam. This model shows consistent results at the student level when compared to the results found in Table 11. Again, all of the student coefficients are negative. The coefficient associated with students who have individualized education plans is the largest and indicates that a student with an IEP scores 1.05 standard deviations lower in math than non-IEP students. This coefficient is slightly smaller then the coefficient for IEP students in Table 11 but still represents the largest coefficient. The coefficients associated with the LEP, ECONDIS, FEMALE, and MINORITY variables all show that students in these sub groups scored significantly lower on the 2003 math test. Looking at the school level section of Table 12 reveals that suburban school math scores are about fifteen percent of a standard deviation higher than other schools, after controlling for percentage of economically disadvantaged students. The coefficient representing schools using a block

schedule is negative but in this model the result is not statistically significant because the p-Value is greater then .05.

Table 12

Model for Level One and Level Two Effects on Standardized 2003 Math Scores

Student Level 1	Description	Coefficient	SE	p-Value
IEP	Student has an IEP	-1.05	.04	0.00
LEP	Student has Limited English Proficiency	-.43	.06	0.00
ECONDIS	Student is Economically Disadvantaged	-.26	.03	0.00
FEMALE	Student is Female	-.14	.01	0.00
MINORITY	Student is Black or Hispanic	-.50	.03	0.00
School Level 2	**Description**	**Coefficient**	**SE**	**p-Value**
SUBURB	Suburban	.15	.05	0.005
PERECDIS	Percentage of Economically Disadvantaged student in the school	-.02	.003	0.00
SCHTYPE	Value is 1 if school uses a block schedule	-.07	.05	0.15*

*Not statistically significant (p-Value is greater then .05)

Table 13 presents the HLM results for the 2004 reading test. The results of this analysis yield similar results to the reading results in 2003. The coefficient for students with an IEP again represents the largest association with reading scores. This coefficient indicates that in 2004 IEP students scored 1.28 standard deviations lower on the reading exam than regular education students. The coefficients for LEP, ECONDIS, FEMALE,

and MINORITY all indicate that students in these groups scored significantly lower on the 2004 reading test. The school level coefficients for the suburban schools and block scheduled schools were not statistically significant in this model. The coefficient for PERECDIS was significant but only indicated that schools with higher percentages of economically disadvantaged students scored about two percent of a standard deviation on the 2004 reading test when compared to schools with lower SES populations.

Table 13

Model for Level One and Level Two Effects on Standardized 2004 Reading Scores

Student Level 1	Description	Coefficient	SE	p-Value
IEP	Student has an IEP	-1.28	.02	0.00
LEP	Student has Limited English Proficiency	-.99	.06	0.00
ECONDIS	Student is Economically Disadvantaged	-.27	.03	0.00
FEMALE	Student is Female	-.09	.02	0.00
MINORITY	Student is Black or Hispanic	-.42	.04	0.00
School Level 2	Description	Coefficient	SE	p-Value
SUBURB	Suburban	.08	.04	0.08*
PERECDIS	Percentage of Economically Disadvantaged student in the school	-.02	.002	0.00
SCHTYPE	Value is 1 if school uses a block schedule	-.08	.04	0.05*

*Not statistically significant (p-Value is greater then .05)

Table 14 displays the coefficients that relate the results for the student and school level variables for the standardized math scores in 2004. In this model, all of the student level coefficients are again negative. The largest coefficient is associated with students who have and IEP and this coefficient indicates that IEP students score 1.16 standard deviations lower in math than non-IEP students. Limited English students, economically disadvantaged students, females, and minority students all scored significantly lower on the 2004 math test. A scan of the school level results in Table 14 reveals that suburban schools math scores are approximately eleven percent of a standard deviation higher than other schools. The coefficient for block schedule schools is again negative this result does not meet the criteria for statistical significance since the p-Value is .06.

Table 14

Model for Level One and Level Two Effects on Standardized 2004 Math Scores

Student Level 1	Description	Coefficient	SE	p-Value
IEP	Student has an IEP	-1.16	.03	0.00
LEP	Student has Limited English Proficiency	-.48	.04	0.00
ECONDIS	Student is Economically Disadvantaged	-.27	.03	0.00
FEMALE	Student is Female	-.16	.01	0.00
MINORITY	Student is Black or Hispanic	-.50	.03	0.00
School Level 2	Description	Coefficient	SE	p-Value
SUBURB	Suburban	. 11	.05	0.03
PERECDIS	Percentage of Economically Disadvantaged	-.02	.003	0.00

	student in the school			
SCHTYPE	Value is 1 if school uses a block schedule	-.08	.05	0.06*

*Not statistically significant (p-Value is greater then .05)

Table 15 exhibits the coefficients for the HLM model of standardized reading scores for 2005. The results for reading in 2005 are very similar to the reading results in 2003 and 2004. IEP is associated with the largest coefficient and indicates that IEP students scored 1.22 standard deviations lower on the 2005 reading test compared to the rest of the population. Students in the LEP, ECONDIS, FEMALE, and MINORITY groups scored significantly lower than other students on the 2005 reading exam. The school level results for reading in 2005 indicate that the coefficients associated with suburban schools and schools using a block schedule are not statistically significant because the p-Values are greater than .05. The coefficient for schools with higher percentages of economically disadvantaged students is -.02. This coefficient indicates that schools with higher concentrations of economically disadvantaged students scores are approximately two percent of a standard deviation lower than scores from schools with lower levels of economically disadvantaged students. This result is consistent for all tests and all years of the study.

Table 15

Model for Level One and Level Two Effects on Standardized 2005 Reading Scores

Student Level 1	Description	Coefficient	SE	p-Value
IEP	Student has an IEP	-1.22	.03	0.00
LEP	Student has	-.85	.09	0.00

	Limited English Proficiency			
ECONDIS	Student is Economically Disadvantaged	-.33	.02	0.00
FEMALE	Student is Female	-.12	.01	0.00
MINORITY	Student is Black or Hispanic	-.38	.03	0.00
School Level 2	Description	Coefficient	SE	p-Value
SUBURB	Suburban	.04	.04	0.29*
PERECDIS	Percentage of Economically Disadvantaged student in the school	-.02	.001	0.00
SCHTYPE	Value is 1 if school uses a block schedule	-.06	.04	0.16*

*Not statistically significant (p-Value is greater then .05)

Table 16 shows the HLM results for the 2005 math test. This model is consistent with the previous results. In this evaluation, the largest coefficient (-1.16) is associated with students who have an IEP. This coefficient indicates that IEP students score 1.16 standard deviations lower than other students. Limited English students, economically disadvantaged students, females, and minority students all scored significantly lower on the 2005 math exams. In this model, the coefficient for suburban school and school using a block schedule are again, not statistically significant. The coefficient associated with math scores of schools with concentrations of economically disadvantaged students is the same as previous years (-.02).

Table 16

Model for Level One and Level Two Effects on Standardized 2005 Math Scores

Student Level 1	Description	Coefficient	SE	p-Value
IEP	Student has an IEP	-1.16	.04	0.00
LEP	Student has Limited English Proficiency	-.33	.06	0.00
ECONDIS	Student is Economically Disadvantaged	-.30	.02	0.00
FEMALE	Student is Female	-.12	.01	0.00
MINORITY	Student is Black or Hispanic	-.44	.02	0.00
School Level 2	**Description**	**Coefficient**	**SE**	**p-Value**
SUBURB	Suburban	.09	.06	0.11*
PERECDIS	Percentage of Economically Disadvantaged student in the school	-.02	.002	0.00
SCHTYPE	Value is 1 if school uses a block schedule	-.09	.05	0.08*

*Not statistically significant (p-Value is greater then .05)

Summary of Data Analysis

Examination of the six HLM analyses of the data reveals several patterns. In each HLM model, the variable of IEP shows a strong, negative relationship with the outcome variable of reading or math scores. This result is not inconsistent with the skill level of eleventh grade IEP students and the demands of the eleventh grade PSSA Math and Reading Exams. IEP students often have learning disabilities that prohibit them from achieving at their grade level. This means that for most of the school year these students

received specialized instruction at a grade level lower then their age or school grade level. In the spring of each school year, these eleventh grade students are required to take the eleventh grade PSSA Reading and Math Exams. Most, if not all, of these students not do score well on these exams since they do not have the skills, background and sometimes capacity to accomplish the tasks demanded by these tests.

It is also interesting to note that the results for LEP in reading showed larger coefficients then the results for math for each school year. This is also consistent given the nature of the reading tests compared to the math tests. Students with limited English proficiency would certainly have more difficulty with a reading test compared to a math test.

In all six HLM models, the student level variables are associated with coefficients that show students in these sub groups scored significantly lower on the reading and math tests respectively. Overall, the HLM model used for this study indicates that variance in test scores is most accounted for by the student level variables used for this analysis.

At the school level, suburban schools show slightly higher scores when controlling for percentage of disadvantaged students and schedule type. In general, the effect of block scheduling is not statistically significant. The only significant effect on test scores by the variable SCHETYPE was found in the 2003 reading result.

In the final chapter a discussion of the results and limitations, future recommendations for research on block scheduling will be provided. In addition, chapter five will discuss the practical application of this data for administrators considering the use of block scheduling

CHAPTER V

CONCLUSIONS

Near the end of the twentieth century, nearly half of all high schools across America had implemented some type of block or intensive schedule. Many researchers, administrators and teacher perceived that this schedule configuration would set the stage for benefits in many areas. In the early 1990s, little research was available to guide these decisions and many school leaders implemented this reform on perceptions with little evidence to support their redesign efforts. Researchers have suggested that examinations of the effect of block scheduling on schools should be conducted after the schedules have been in place for longer period of time so that reform of a different schedule can become part of the "fabric and culture" of a school (Lewis et al., 2005). Many schools in the south central region of Pennsylvania adopted some type of block schedule in the early 1990s. This study examined the effect of block scheduling in these schools as measured by student achievement on the eleventh grade PSSA Reading and Math Exams.

Purpose of the Study

The purpose of this study was to examine the effect of block scheduling while controlling for other variables known to have an influence on student achievement. This study attempted to answer the following research question:

Was there a measurable difference in the achievement scores of students in schools adopting block scheduling considering differences in individual students gender,

race, economic disadvantage status, IEP status, LEP status, school location, and school average economic disadvantaged student population compared to schools using a traditional schedule during the 2003, 2004 and 2005 school years as measured by PSSA eleventh grade reading and math tests?

Summary of Methodology

The study included data from all public high schools in the south central region of Pennsylvania. The data sets used for analysis included three different cohorts of student level results on the 2003, 2004, and 2005 eleventh grade PSSA Reading and Math Exams. The data sets obtained from the PDE Assessment Office included student level data from all seventy-three schools in this study. Each data set consisted of individual student level data and the researcher added the school level data before analysis. This study utilized a HLM method to examine the effects of school schedule type while attempting to control for student and school level variables.

The dependent variables for this study were the student scores on the 2003, 2004, and 2005 PSSA Reading and Math Exams. The independent variables for this study included the student level variables of gender, ethnicity, IEP status, LEP status, and free and reduced lunch status, and the school level variables of locale, percentage of economically disadvantaged and schedule type.

Summary of Findings

The data analysis in this study revealed consistent results for each data set examined. The results were also consistent between the disciplines of math and reading. In all but one analysis, 2003 PSSA Reading, the effect of schedule type on student achievement was not statistically significant after controlling for other school level variables. In the 2003 reading analysis, schools using a block schedule have average reading scores that are eleven percent of a standard deviation lower than schools with traditional schedules. These findings indicate that the reform of block scheduling has not had a positive impact on student achievement as measure by the PSSA Reading and Math Exams in the south central area of Pennsylvania from 2003-2005. The findings also indicate that the reform of block scheduling has had little or no significant negative effect on student achievement in the same target schools. Both of these findings create promise and concern for school professionals who will need to make decisions for the future.

Caution must be observed when extrapolating the results of this study to indicate a net gain or lose in overall student achievement. The eleventh grade PSSA Reading and Math exams are but one measure of student achievement in south central Pennsylvania school. Certainly many other factors will play into the overall picture of individual student achievement including courses of study, grades, academic growth, rigor of curriculum and a myriad of other factors. This study looks at the achievement of students on these two exams in the context of type of schedule and several other factors. Researchers and school administrators must be prudent to not overreact to the results of this study given the narrow band of student achievement data included for analysis.

Given the findings in this study it is clear that any promise of improving student scores on the state reading and math exams, simply by moving to a block schedule has not been realized in south central Pennsylvania. If these were the motives and understandings of the school leaders who moved their systems in this direction, the findings of this study indicate that this was a hollow promise. In contrast, it is possible that the findings in this study support other reasons for schools and school leaders to adopt this type of schedule. Many of the studies that were reviewed in chapter two of this study indicated measurable benefits of a change to block scheduling. If high schools can alter the schedule to have a positive impact on certain outcomes while not producing a negative effect on certain measures of student achievement, there might be some promise for the implementation of a block schedule.

Much of the literature surrounding block scheduling in the early 1990s promoted this reform effort as a way to improve teaching and learning, coupled with improvements in school climate. Many of these studies seemed to indicate a realization of improved climate but, as found in this study, improved student learning has not been attained through a move to block scheduling. Studies that examined teacher instructional practices were inconclusive at best (Jenkins, Queen, & Algozzine, 2002; Moore, G., Kirby, B., & Becton, L. K., 1997; Rice, et al., 2002; Williams, 1999). Again, if block scheduling was implemented as the way to change teacher behavior to effect teaching and learning in the classroom to improve student achievement, this effect is not being seen in the literature, research, and not in this present study.

The challenge for school leaders will be to determine if some of the negative effects of block scheduling are countered with the perceived positive outcomes. These negative effects include concerns over AP testing and course schedules (Chesapeake, 1996; Hess, Wronkovich & Robinson; Veal & Schreiber, 1999), student transfers (Guskey & Kifer, 1995; Pisapia & Westfall, 1997; Thomas & O'Connell, 1997), and a decrease in content coverage (Chesapeake, 1996). School leaders will need to look at these drawbacks in the context of possible benefits that some researchers have found occur in a move to a block schedule.

It is clear from the literature that many students and teachers prefer the semester system a block schedule affords to the yearlong structure of a traditional schedule. Many students preferred the ability to focus on fewer subjects at any given time and many teachers favored the opportunity to deal with smaller class loads in any given semester (Griffin & Nicholson, 2002; Guskey & Kifer, 1995). This semester effect seems to be a positive effect of the block scheduling structure that is enjoyed by many of the stakeholders within the block scheduled schools.

Another positive effect that many stakeholders share in block schedules schools is the sense of a more relaxed school day as opposed to a more chaotic day in traditionally scheduled schools (Irmsher, 1996; Rettig & Canady, 1999; Thomas & O'Connell, 1997). Larger blocks of time have cut down on the number of times students must pack up and move to the next classrooms. This has also reduced the number of minutes that teachers and students spend "getting settled" into the next instructional period. Several studies indicate that this aspect of block scheduling has also helped to foster improved

student/teacher interactions resulting in a more positive school climate (Chesapeake, 1996; Davis-Wiley, 1995; Pisapia & Westfall, 1997).

Finally, students in block-scheduled schools have the ability to take more elective classes. In addition, in semester block-scheduled schemes, students can make up first semester failures in the same academic year without having to attend summer school. This aspect of block-scheduled schools seems to be one of the constant positives among students who have been surveyed regarding their likes and dislikes of their experiences in schools with a block schedule (Guskey & Kifer, 1995; Chesapeake, 1996).

Implications for Further Research

It appears that some benefits have been realized in many block schedule schools and in south-central Pennsylvania, these benefits have been realized without any statistically significant loss of student achievement as measured by the eleventh grade PSSA Math and Reading Exams. Is this enough "benefit" to justify a move to a block schedule or is the lack of increased student achievement an indication that a move to block scheduling is not judicious? The answer to these questions remains up to individual schools and stakeholders. Certainly more research on block scheduling is needed in the future. Nationally, further research of block scheduling as suggested by this study could include the following:

1. Studies of student achievement in other disciplines between block scheduled and traditionally scheduled schools.

2. Studies of the interaction between specific instructional techniques of teachers within block schedules schools in regards to its relationship with student achievement.
3. Additional long-range quantitative studies that look at student achievement in the context of schools and school schedules.
4. Student achievement studies that provide not only comparisons between blocked and traditional schools but that also parse the analysis into sub-groups of students to include minority, gender, and rigor of academic programs selected by students.
5. Qualitative studies that look at other reasons to adopt a block schedule as reported by stakeholders.
6. Studies that consider the possible effect of block scheduling on specific sectors of students such as IEP, LEP and low SES students. Using a similar technique researchers could model the IEP effect using level 2 variables (like block scheduling) to see if the IEP coefficient changes after controlling for schedule type.

Since this study was conducted in Pennsylvania, consideration of further research within the state must take into account current and future educational initiatives that are being implemented across the commonwealth. The future of education in Pennsylvania seems to be changing with the advancement of two initiatives. It would seem prudent for school leaders to examine block scheduling the context of these two initiatives some time in the near future. One initiative that has caught the attention of high school leaders in Pennsylvania is the Classrooms for the Future (CFF) initiative instituted by Governor Ed Rendell, during the 2006-2007 school year. This initiative sought to change the way

teachers and students interacted by exposing teachers to staff development modules aimed at focusing them on altering their teaching styles. The two "pillars" of the CFF training were the promotion of student-centered learning activities and the advancement of higher-order thinking skills. The CFF grants helped schools implement these ideals by using an infusion of technology, staff development and providing for academic coaching for teachers. The focus of the data collection from this initiative was to see if teachers would indeed change the way they delivered content to their students. The initial results from the first year of the grant indicated that many teachers had begun to fundamentally change they way they were interacting with their students.

What remains to be seen in Pennsylvania, is if schools using longer blocks of academic time have reaped additional benefits from the CFF initiative. The longer blocks of instructional time afforded to teachers and students in block scheduled schools seems to be a good "fit" for the outcome expectations of this initiative. Further study of the results of the CFF program in Pennsylvania should take into account the schedule each high school in the study is using. If indeed this type of instructional focus can yield student achievement gains, it will be important to look at the overall results in the context of individual schools and individual school schedules.

A second initiative in Pennsylvania, which remains a few years away, is the proposed implementation of "Keystone Exams." Keystone Exams are among the new graduation requirements that are being considered for implementation by the year 2015. Keystone Exams are end-of-course exams "that students can take at any time and school district can choose to use instead of final exams" (Pennsylvania Department of Education,

2008). Starting in 2015, students will be able to take these exams to show mastery of specific skills in core disciplines. These exams are intended to replace traditional "final exams" and will be available in an online testing environment. Schools will be able to give the Keystone Exams at several times through out an academic year to coincide with the end of various courses. Unlike the PSSA exams that are given in the junior year and at set times each spring, the Keystone Exams can be given at the end of a particular course. Once Keystone Exams have been implemented in Pennsylvania, research into the achievement of students will need to be conducted to see if school schedules have any impact on the results. Given the ability for students in block scheduled schools to focus on fewer courses in a semester could mean that these students might only have to "sit" for one or two exams each semester. Also, since block scheduled classes are only one semester in length, students in block scheduled schools might have an advantage over better retention of knowledge and skills then their counterparts sitting in year long courses. If the Keystone Exam initiative takes place in 2015, further research into the effect of block scheduling will be needed to see if the intensive nature of the schedule reveals any net gain or lose for these students.

Clearly, further research of block scheduling initiatives in high schools is needed. Much in the landscape of national and state requirements has changed since many schools made the switch to block scheduling. These changes require continued study into the use of time in schools. Finally, with modern data collection techniques and greater availability of quantitative data from state systems, researchers will have increased access to student

achievement information that should aid in studying the effectiveness of teaching and learning within the context of schools and school schedules.

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VITA

Randall A. Grove

Randall A. Grove was born in LaGrange County, Indiana on March 23, 1963, to Boyd and Kathleen Grove. He graduated from the Eastern Lebanon County (ELCO) High School in Myerstown, Pennsylvania in 1981. In 1985, he graduated from Grace College in Winona Lake, Indiana with a Bachelor of Science degree in Music Education.

Following graduation from Grace College, Mr. Grove began his teaching career at Grace Christian School in Myerstown, Pennsylvania and in 1988; Mr. Grove began teaching high school vocal and instrumental music at the ELCO High School. During his teaching career, Mr. Grove directed many groups and musicals. In 1998, the ELCO Showchoir, "The Odd-18" was a featured group at the Pennsylvania Music Educators Convention in Erie, Pennsylvania.

While at ELCO, Mr. Grove completed his Masters in Music Education degree from West Chester University and earned his Pennsylvania principals certificate and letter of eligibility from the Pennsylvania State University. Mr. Grove began his administrative career as a part-time assistant principal at the ELCO Middle School in 1997. In 1999, Mr. Grove became the principal of the ELCO High School and in January of 2009, Mr. Grove accepted the position of Assistant Superintendent of the Eastern Lebanon County School District.