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ABSTRACT

This study investigated the effects of block scheduling on student learning. It compared the grade-point averages (GPAs) of one group of students during their 9th-grade year while under the traditional 7-period day to the GPAs of their 10th-grade year under the 4-by-4 block schedule. The text offers a history of block scheduling and lists some of the reasons for the shift to block scheduling, such as the more relaxed pace associated with block schedules. Disadvantages and concerns related to this type of scheduling are also listed and include conflicts with extracurricular programs and difficulties in balancing students' schedules. For the study, 198 students, out of a total enrollment of 650, in a rural high school in West Virginia participated. Three types of GPAs were used to compare the two schedules: GPAs in English and math; GPAs in English, math, science, and social studies; and GPAs in all subjects. Descriptive statistics and dependent sample t-tests were conducted on each of the three groups of GPAs. Results indicate no significant differences in GPAs in any of the three areas compared. It is claimed that to examine the effect of block scheduling on education, other factors will need to be considered. Appendices contain comparisons of English and math GPAs, core class GPAs and overall GPAs in ninth and tenth grades. Contains 35 references. ((RJM)

Effects of Block Scheduling on Grade Point Averages

A Thesis

Presented to

The Faculty of the Master of Arts Degree Program

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In Partial Fulfillment

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Master of Arts in Education

by

Laura M. Williams

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Abstract

This study investigated the effect of block scheduling on student learning. Block scheduling is a new idea in education. In 1995-96, Liberty High School had a traditional seven period day. In 1996-97, the schedule was changed to a four-by-four block schedule. This study compared the grade point averages of one group of students during their ninth grade year under the traditional seven period day and during their tenth grade year under the four-by-four block schedule. Grade point averages were compared in the ninth grade and tenth grade because students are taking mainly core classes. In the junior and senior year, students are taking mainly elective classes. First the English and math grades were averaged and compared using a t-test. Second, the core class (English, math, science and social studies) grades were averaged and compared using a t-test. Third, the overall grade point averages under the regular seven period day and the four-by-four block day were averaged and compared using a t-test. The results of this study showed no significant differences in the G.P.A.'s of students under a four-by-four block schedule and a traditional seven period day.

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CHAPTER 1

INTRODUCTION

Statement of the Problem

The arrangement of the school day has changed very little in the last 100 years. However, the job market has changed tremendously in the last century. Because the method of educating students has not changed to match the changing job market, educators feel that students are not being prepared for the future. One way to change the school program would be to convert the traditional seven period day to four 90-minute classes every day, also known as block scheduling (Wisconsin Association of Foreign Language Teachers, 1995).

Advocates of block scheduling say that the present school day is too fragmented with no connection between one class and another. Block scheduling may be the answer to improved learning for students. With block scheduling, students would concentrate on fewer classes each day. This gives students a chance to study a few classes in depth for a shorter period of time. School systems may graduate students with more credits and offer greater flexibility in scheduling college classes and work-study programs. Some school systems find that other benefits include a reduction in the failure rate, teacher-student ratio, stress among students and staff, and discipline problems (Carroll, 1994).

Change is always difficult. The concerns of educators with block scheduling include student absenteeism, student transfers, and moving at a faster pace for both students and teachers. The effectiveness of block scheduling has yet to be determined. More data must be gathered and interpreted (Carroll, 1994).

Hypothesis

The null hypothesis was grade point averages under the traditional seven period day and a four-by-four block schedule day would not differ significantly.

Three research questions were studied:

1. Would the grade point averages in English and math differ significantly?
2. Would the grade point averages in the core classes (English, math, science, and social studies) differ significantly?
3. Would the overall grade point averages differ significantly?

Limitations

The limitations of this study are as follows:

1. The study deals with 198 secondary school students while in their ninth and tenth grades at Liberty High School in Clarksburg, West Virginia.
2. The study is limited to information gathered during the 1995-96 and 1996-97 school terms.
3. The study is limited to grade point averages and cannot be compared to standardized test scores. At Liberty High School the type of testing was

changed from CTBS to SAT 9 the same year the change was made to block scheduling. Students took CTBS tests in the ninth grade and SAT 9 tests were given to students in the tenth grade.

4. The study did not distinguish between students with learning disabilities and other students, therefore grade point averages may not accurately reflect differences.

Definition of Terms

Block scheduling: For the purposes of the study this term refers to a four period day with each class lasting approximately 90 minutes (Shoenstein, 1995).

Four-by-four (4X4) Block Schedule: This term refers to a four period day with each period lasting approximately 90 minutes. The same four classes are repeated everyday for one semester and then four new classes are repeated everyday the second semester. At the end of each semester students will earn four credits with a total of eight credits for the year (Edwards, 1995).

A/B Block Schedule: This term refers to a four period day with each period lasting approximately 90 minutes. On day one, students will attend periods one through four and on day two students will attend periods five through eight. The schedule would continue on alternating days. At the end of the first semester students would earn one-half credit in each of eight classes. At the end of the year students would earn one credit for each

class totaling eight credits (Rettig & Canady, 1997).

Modified Block: This term refers to a combination of a traditional seven period day and a block schedule (Day, 1995).

Importance of the Study

Block scheduling is a new idea in education. Not all educators, parents, and students are confident that block scheduling is the best way to educate students. Some school systems have changed their schedules back to the traditional seven period day after trying the block schedule for a few years. Grade point averages may be one way to compare the effectiveness of block scheduling over the traditional seven period day.

CHAPTER 2

REVIEW OF THE LITERATURE

Introduction

For most of the twentieth century the view of time and learning has been shaped by the Carnegie Standard, in which student seat-time in a given subject area is equated to completion or mastery of that subject. In an effort to bring greater uniformity to the educational process, the Carnegie Commission used similar concepts in assuming that a certain quantity of time was directly related to more efficient production. Teachers were expected to produce a given amount of learning in students in a given amount of time. As a result, a "factory-like" system of educating students evolved and is still the major factor in setting up school schedules. Nationwide, educators, and administrators have turned to look at the manner in which time is allotted to various subject areas during the school day. They are seeking to discover if there is a way to organize instruction more effectively and improve the quality of learning (Carroll, 1994; Kruse & Kruse, 1995).

The basic framework for educating children in the United States was established over 100 years ago. Today scholars question whether this framework can still meet the needs of today's society. Leaders across the United States are demanding a change because young people are not adequately equipped for jobs in today's workplace, are less prepared for

the demands of rigorous college courses than their predecessors, and have a general knowledge base inadequate for meaningful participation in their communities. Consequently, schools are experimenting with a myriad of strategies aimed at school improvement (Wisconsin Association of Foreign Language Teachers, 1995; Kruse & Kruse, 1995).

Many educators have concluded that one reason for the perceived ineffectiveness of traditional schools is the fragmented school day with too many classes and no connections from one class to another. By reducing the number of classes per day students will be able to concentrate on fewer classes and be able to study those classes in depth. For example, in the junior year, students would be able to take Chemistry 1 first term and Chemistry 2 second term and still have time to take a college chemistry class their senior year. The same situation would apply to many other classes, such as foreign languages, history, and English.

The term "block scheduling" is a label given to a wide variety of alternative class schedules currently in the experimental stages across the United States. According to Cawelti (1994) block scheduling allows part of the daily schedule to be organized into larger blocks of time than the traditional period. This can allow greater flexibility and varied instructional activities in school programs (Irmsher, 1996). However, two characteristics are common to all. One is much longer class periods (80-110 minutes) than the traditional class period (50-60 minutes). The second characteristic is

that students concentrate on fewer subjects at one time. Because class periods are longer in block schedules, students may have only two, three, or fewer subjects a day (Wisconsin Association of Foreign Language Teachers, 1995).

Description of Block Scheduling

The common block schedules are called the four by four (4x4) and the A/B block. In the 4X4 block, students meet for 90 minutes in four classes for the first semester and in four different classes the second semester. Students earn one credit for each class each semester. In the A/B block, students meet in periods one through four for 90 minutes one day and on the second day students meet in periods five through eight for 90 minutes. At the end of the first semester students earn one-half credit in each class, and earn eight credits at the end of the school year (Carroll, 1994).

Schools have adapted block scheduling to meet their individual needs. At Masconomet Regional High School in Boxford, Massachusetts, the school year is divided into three trimesters with 60 days per trimester. Every morning students meet in two 100-minute classes and in the afternoon students have traditionally scheduled electives and seminars (Carroll, 1994).

The school year at Badger High School in Lake Geneva, Wisconsin is divided into two semesters with 90 days per semester. On Monday, Thursday, and Friday, students meet in eight 45 minute classes. On Tuesday and Wednesday, the school schedule consists of four 90-minute

blocks. On Tuesday classes one through four meet and on Wednesday classes five through eight meet (Carroll, 1994).

A model proposed by Robert Lynn Canady and Michael D. Rettig (1993) divides the school year into two semesters of 90 days per semester. On day one, first period meets for 104 minutes, periods three, four, and five meet for 50 minutes, and then period seven meets for 104 minutes. The next school day, period two meets for 104 minutes, periods three, four and five meet for 50 minutes and period six meets for 104 minutes. This type of arrangement is called a slide schedule (Davis-Wiley, George, & Cozart, 1995).

Another adaptation of the block can be found at Eastlake High School in San Diego, California. Eastlake High made the move to year-round school and to block scheduling at the same time. Eastlake's block features a setup day on Mondays, with all six 50-minute periods, followed by a Tuesday through Friday schedule of three 110-minute classes separated by a break and a lunch period (Stenvall, 1996).

The trimester model is another type of a modified block schedule. Boyd Anderson High School in Broward County, Florida, adopted this model. The school year was divided into three 12-week terms. All academic and most elective courses meet for 125-minute blocks daily for one trimester. Some electives (band, chorus, debate, newspaper, yearbook) meet for 60 minutes daily for the entire year. Credits for block classes are granted at

the end of the trimester and credits for one-hour classes are granted at the end of the school year (Geismar, & Pullease, 1996).

History of Block Scheduling

According to Joseph Carroll (1994), high schools in the United States must choose a different direction when educating students. He says that high schools in the United States are failing to produce a workforce capable of competing with those of other industrialized nations or a citizenry capable of meeting its critically important responsibilities under the present form of government (Kruse & Kruse, 1995).

When Joseph Carroll (1994) was the assistant superintendent for research, budget, and legislation for the District of Columbia Public Schools in the mid-1960s, he used extra money to fund a remedial summer school for academically troubled students. These students studied math and English for four hours a day, five days a week for six weeks, a typical summer school program, but the results of the students' achievement were atypical. The students were carefully evaluated with pretests and posttests. The average student's gains were equal to the gains achieved in about two years in regular classes. The teachers reported that the climate in the classroom, attendance, attitude and behavior were equally good. The question in Joseph Carroll's mind was if students and staff can do this well in 30, four-hour summer classes in nonairconditioned D.C. public schools, why can't students progress as well in traditional 180 day programs during

the regular school year? His conclusion was that educators probably knew a lot more about teaching than about how students learn.

In the early 1970s Joseph Carroll became superintendent of Los Alamos Public Schools in New Mexico. The summer school program classes met in a four-hour "macro-class" each day five days per week for six weeks. This was about 20 percent less time than was provided for a course under the school's traditional 180-day school year. These students were taking regular credit-bearing high school courses on a nonremedial basis. The teachers in the summer school program were asked to apply the same standards that were used to grade the students during the regular school year. The teachers reported excellent results with exceptionally good relations with the summer students (Carroll, 1994).

Later, when Joseph Carroll became superintendent of the Masconomet Regional School District in Massachusetts, a tax limitation referendum had passed in 1980 and by 1982 the district had lost about a sixth of its teaching staff. Keeping the program intact was going to be very difficult. It occurred to him that "macro-scheduling" might address this problem. A long planning process began and by the fall of 1983 Carroll distributed a document to the staff and school community called "The Copernican Plan: A Concept Paper Concerning the Restructuring of Secondary Education at Masconomet Regional School District."

Why did Joseph Carroll call it the Copernican Plan? Nicolaus Copernicus was a 16th century scholar whose major contribution was his explanation of planetary movement. Until that time it was assumed that the earth was the center of the universe. Copernicus concluded that the sun was the center of the universe, thereby making all astronomical measurements sensible. Copernicus' theory encountered tremendous resistance and was viewed as dangerous since it challenged articles of faith concerning creation and man's role on earth.

Joseph Carroll's Coperincan Plan also challenges what has become an article of educational faith, the Carnegie unit, which has dominated the structure of secondary schools for almost a century. Virtually all the research concerning better instructional practice emphasizes greater individualization of instruction. But secondary teachers are caught in a structure that fosters instruction and sharply limits their efforts to individualize.

According to Joseph Carroll, the Carnegie structure has an adverse impact on students as well. If students are taking seven classes plus a home room and a lunch period, they will be in nine different locations pursuing nine very different activities during the course of approximately a 6 1/2 hour school day. This creates an impersonal atmosphere for students with a student going through an entire day without a meaningful interaction with a teacher. Carroll believes that the Carnegie structure is a system

under which teachers can't teach effectively and students can't learn effectively.

The Copernican Plan fundamentally changes the way schools use time. Classes are taught in much longer periods which last 90 minutes, two hours, or four hours per day. The classes meet for only part of the school year, either 30 days, 45 days, 60 days, or 90 days. Students are enrolled in fewer classes each day and teachers deal with fewer classes and students each day. This creates a classroom environment that fosters vastly improved relationships between teachers and students and provides much more manageable workloads for both teachers and students. As a result, the outcome should be schools are more successful (Carroll, 1994).

Reasons to Change to the Block Schedule

In 1990, Roy J. Wasson High School, in Colorado Springs, Colorado, was facing a 31 percent failure rate, increasing stress levels, and a sense of "a bad fit" between students and the goals teachers expected. The school operated on the same bell schedule and the same seven period day since the school opened in 1959. A needs-assessment survey showed the staff was most concerned about class size, limitations in course offerings, teacher workload, and stress for both teachers and students. A faculty steering committee noticed most problems revolved around a time crunch and decided on a 4X4 block schedule. Also called the immersion model,

intensive mode, 4-block, or semester block, this schedule divides the day into four 90-minute blocks, instead of six or seven 50-minute periods. Students complete a "year-long" course, like first-year French, in 18 weeks instead of 36. Teachers see approximately half the number of students each semester and students are enrolled in fewer courses at a time. But by the end of the school year, students have taken more courses and teachers have taught more students in more courses (Schoenstein, 1996).

According to Wasson High School teachers, the main reason for a schedule change was to provide larger blocks of time to ensure that all essential materials were covered. Teachers could focus more on core learning and omit less essential materials from the curriculum. Another reason for making the change was to actively engage students in the instructional process. Rather than lecturing for 90 minutes per class, teachers stressed learning that relied on active student participation and hands-on labs or activities. With these procedures, students became more involved and accountable for their own learning (Wilson, 1995).

Other educators say that they do not cover as much material in a block schedule because there are not as many contact minutes. Once the teacher realizes how much students do not understand, it is hard to go on to something new until the problem has been resolved. However, learning is far more intense and time is available for group and cooperative work. Less time is wasted and emphasis is placed on really important concepts.

Block schedules offer many advantages over the regular six or seven period school day. In schools that use a block schedule, time is a resource that permits greater amounts of time for student learning, laboratory work, and student-directed interactive activities (Shortt & Thayer, 1995). Teachers benefit from increased usable instructional time because of fewer transitions and less time lost with class openings and closings. Fewer class changes result in a less stressful, cleaner school environment, less tardies, and fewer disciplinary referrals (Rettig & Canady, 1997). Students working in cooperative learning groups have time to make self discoveries. Ninety-minute classes allow a teacher to develop an entire idea in one setting rather than to extend it in several consecutive installments. Exams can feature thought-provoking essays rather than the fast multiple choice questions (Cooper, 1996).

In evaluations of schools using block scheduling, Carroll (1994) found more course credits completed, equal or better mastery and retention of material, and an impressive reduction in suspension and dropout rates. Carroll credits improved relationships between students and teachers as a major factor in the reduction in suspension and dropout rates. Every school in Carroll's study benefited from the changes, though not all in the same way or to the same degree (Irmsher, 1996).

Teachers generally have longer, more useful planning time because a 90 minute daily planning period is provided in many block-scheduling plans.

Teachers are able to plan lessons for extended periods of time and are motivated to use various instructional strategies other than lecture, such as models of teaching, learning centers, cooperative learning structures and seminars (Rettig & Canady, 1997). Also, teachers have time to research for the next few days' lessons, preview a video, go to the library, or plan new things, like a game. With a 90-minute daily planning period for three classes, some teachers such as Black say that he seldom has to grade papers at home (Winans, 1997).

Some educators say that teachers do not cover as much material because actual clock hours are lost. However, the quality of instruction is better. The success of block scheduling depends on continuous revision and improvement (Day, Ivanov & Brinkley, 1996). Atler High School teachers reported completing curriculum objectives the first year that block scheduling was implemented. In the second and third years many of the same teachers reported that increased instructional time provided an opportunity to teach concepts that had not been taught in the past. Teachers estimated an increase coverage of content which ranged from four to six weeks ahead of pacing in the previous years (Shortt & Thayer, 1995).

Also, block scheduling allows more opportunities for students and teachers to use technology. The 90-minute block gives students extra time needed for science labs, to use the internet, CD-ROM's or view videos. While technology makes information more readily available, students require

sufficient time to use the information effectively to go beyond the level of merely accessing knowledge for information (Shortt & Thayer, 1995).

One secondary school, Asheboro High School, has expanded course offerings to include biotechnology and environmental science. The block schedule allows Asheboro students to take four to eight more subjects than schedules permitted before the block. Asheboro teachers report that non-college bound students take some of the college prep courses while college prep students can take some courses like child nutrition. This allows students to have a well-rounded education. Students report this type of scheduling prepares them for their college courses making the transition from high school to college much easier (Winans, 1997).

The 4X4 block teachers prepare for fewer courses, work with fewer students during any one semester, and keep records and grades for only 60 to 90 students per semester. Teachers and students concentrate on only four courses per semester. Students can retake a failed course the second semester or have greater opportunities for acceleration (Rettig & Canady, 1997).

Students can learn more in a personalized classroom environment because teachers know individual strengths and needs better. Teachers are better able to offer assistance to students who require additional help to succeed and to offer more in-depth coverage of subject material to advanced students (Wilson, 1995). While teachers get to know their

students better, students also get to know their teachers better than in the traditional schedule. This helps to keep a positive classroom atmosphere that leads to fewer disciplinary interruptions (Day, 1995).

Other advantages in a 4X4 block schedule is that some students may graduate in three years. Some may earn a year of college credit while still in high school because eight credits can be earned each school year without the stress of taking eight courses at the same time. Finally, fewer textbooks are required because only half of the students take a class each semester (Rettig & Canady, 1997).

Patricia Davis-Wiley (1995) studied students and teachers from Knoxville County Schools, Knoxville, Tennessee and found there are benefits in block scheduling for both students and teachers. Block scheduling benefits schools in the following ways: increases length of class periods; enables teachers to use a variety of instructional approaches; decreases the number of class changes; limits the number of students taught each day; increases planning time for teachers; and helps teachers to develop closer relationships with students (Canady & Rettig, 1995; Davis-Wiley, George, & Cozart, 1995). Other research comparing traditional scheduling also heralds the benefits of blocks: improved student conduct; lower dropout rates; better academic performance; and increased course offerings (Buckman, King, & Ryan, 1995; Edwards, 1995; Geismar & Pullease, 1996).

Disadvantages and Concerns

All change is painful and often controversial. The process of making the transition is probably the biggest challenge. The most important part of the transition is staff development which when done adequately will take two years (Irmsher, 1996). Teachers cannot teach two 45 to 50-minute classes during a block. A block scheduling environment requires that teachers adjust to teaching required content in larger blocks of time. This may require a change in teaching behavior as well as a shift in attitudes (Shortt & Thayer, 1995).

Although extended classes might double the time that students and teachers spend with each other every day, the course moves at double speed through the semester. This presents a major problem for slower students who might fall behind. Other factors, such as illness, personal, or family problems, can play havoc with a student's ability to keep up with the class. Student absenteeism is also a problem. A student who has missed two days of an extended class has missed three hours of participation. Parental contact needs to be made immediately so that the student will not fall so far behind that missed work cannot be completed.

A school's extra curricular program may also conflict with the extended class schedule. Individual students may be out of class for sports, club activities, or special school projects. The schedule must have the commitment of the administration and staff to this program. The decision to

go to the extended class must include the realization that this educational approach results in new requirements for support (Brett, 1996).

Transfer students are another big concern in block scheduling. A variety of block schedules are now being implemented which exacerbates the transfer issue. If a student transfers to a school that is on a different schedule than the sending school, how does this affect the quality of the educational program that the receiving school offers the student (Winans, 1997)?

Teachers are concerned about how well students retain information from one course to another, especially courses taught in sequence such as a foreign language. Will a student who has taken first year French in the first semester of his ninth grade year retain enough information to do well in second year French the second semester of his sophomore year (Shortt & Thayer, 1995)? Experienced teachers from 4X4 schools say that they can discern little educational significance between differences in retention of students who recently completed a prerequisite and other students with greater time lapses between courses. The summer lapse from school appears to equalize the students who completed a course the previous fall semester (Rettig & Canady, 1997).

Another concern educators have with block scheduling is balancing the students' schedule. Principals must determine whether scheduling provides options in flexibility of course offerings, i.e. balance between

electives and academics. Students might have a first semester schedule with four academic courses and a second semester schedule with four elective courses. The impact of such scheduling should be determined in advance so that the school does not facilitate a negative learning situation for any student. Also, students must be given class schedules with a balanced load. Some classes simply require more homework, notebooks, and tests than other classes. Resolving the scheduling issue is essential for student success in a block schedule (Shortt & Thayer, 1995).

Another concern with the 4X4 schedule is changes in students' schedules at the beginning of the second semester. Students sometimes have a higher failure rate in first semester courses. Courses can be repeated second semester without going to summer school. This unexpected complication can cause havoc with the schedule. This can be addressed by limiting opportunities to repeat failed courses in any one school year (Rettig & Canady, 1997).

A critical factor in block scheduled classes is classroom behavior. One disruptive student can disrupt everyone's learning process. Some students are disruptive because they have a short attention span and a 90 or 100-minute class is too long for them. However, some educators have found that attention depends more on using a variety of active learning strategies than on the length of the class period. A variety of teaching techniques is necessary in extended classes such as group work, student

presentation, cooperative learning, library research, and use of technical equipment. Appropriate staff development activities are necessary to help teachers successfully use time in a block schedule.

Another issue to consider in block scheduling is the amount of subject material covered in class. Advocates of block scheduling say that after two years teachers enjoy this schedule and admit that less subject matter is covered but feel that students learn what was taught in greater depth. Another group feels that more subject material is covered because there are fewer disruptions with beginning and ending period activities. Advocates contend that less material or concepts covered well may result in more meaningful learning. Critics say that students are not being taught as much as before because less time is spent per course. Opponents of block scheduling have difficulty accepting the idea that "less is more". Several Canadian studies of science and math achievement suggest that students learn somewhat less in semesterized courses as measured by multiple-choice tests. Other research has suggested no significant differences between the achievement of students in intensive block schedules and year long courses (Brett, 1996).

Results of Block Scheduling

Not all results of block scheduling can be measured. Some teachers report smiles have increased. The entire culture and atmosphere of some schools has changed. Classes become noisier and students expect more

class activity. When the success of block scheduling is evaluated, in addition to the results of test scores, other issues such as contentment of students, cleanliness of the building, extra time staff members take to stand and chat with students in the hall, also should be evaluated (Brett, 1996).

In some cases the student-to-teacher ratio is reduced which leads to several other benefits. Teachers can implement more hands-on activities. Daily attendance has increased because students have realized the importance of frequent attendance in semester-long courses. Failure rates have decreased because students have more opportunities to engage in peer tutoring. Administrators report that discipline problems have diminished as a result of fewer changes per school day (Day, Ivanov & Binkley, 1996).

At Atlec High School in Virginia the dropout rate for students in grades 9-12 during the 1992-93 and 1993-94 school years was zero percent. The staff felt a major part of this success was the flexibility of the A/B block schedule. Creative use of instructional time allowed faculty and staff to identify, and provide relevant educational plans for at-risk students (Shortt & Thayer,1995).

According to studies completed by the Scotland County R-1 High School staff in Memphis, Missouri, three fundamental changes must occur within each classroom in order for block scheduling to be successful. First, the staff must be willing to accept change. Even though research has shown that lecturing is the least effective form of instruction that teachers

can use, it is still common in U.S. secondary schools. If 50 minutes of lecturing is not successful, teachers must realize that 90 minutes of lecturing will not be effective either.

Second, the staff must be able to accept the idea that the textbook is not the curriculum. Instructors are limited only by their imagination in this type of curriculum. The opportunities to advance the curriculum is endless. With wider opportunities for curriculum enhancement, students are provided with more avenues to master the subject.

Third, students will have greater opportunities to understand difficult subject matter. Instructors will have additional time to develop key concepts fully and to ask probing questions. This should allow students to master the material and not be confused about the lesson and concepts being taught. The extra time offered in block classes is often critical for struggling students and allows advanced students to explore advanced materials in which they are interested (Huff, 1995).

In the block schedule, teachers at Maplewood observed a need to shift from the traditional lecture-and-discussion format of instruction to a more hands-on project oriented curriculum. Science teachers at Maplewood report that a lab can be previewed, completed and discussed during the same period. Projects have been implemented which serve to draw out students' creative abilities and to enhance their writing and organizational skills (Day, Ivanov & Binkley, 1996).

Results of block scheduling has been positive at Frederick High School in Frederick, Maryland. In 1996, Frederick High School changed from a traditional seven period day to a 4X4 schedule. After the first year, student achievement was up on traditional measures, such as Advanced Placement exams, as well as Frederick's criterion-referenced evaluation system. More students were able to accelerate their program of study to higher levels of course work than ever before, and survey results from teachers, parents, and students indicated a strong preference for block scheduling (Cunningham & Nogle, 1996).

Many educators are concerned about the effects of block scheduling on standardized tests. According to Winans (1997), figures indicate that block scheduling has had an impact on college preparation. In 1991-92, under the regular seven period day, only 64 percent of Asheboro graduates qualified for entrance to the University of North Carolina system. By 1994-95, on a 4X4 block day, that number shot up to 82 percent (Winans, 1997). According to Fleming (1997) SAT scores will increase very slightly or stay the same. If more students are taking the SAT test, then this can be interpreted as a positive gain (Fleming, 1997).

According to Schoenstein (1996), the picture for the standardized tests is a bit more complicated. On average only about 78 students at Wasson High School in Colorado Springs have taken the SAT each year over the past five years. The average SAT verbal score has dropped from 455 to

428; the average math score is down from 493 to 482. More than twice as many students take the ACT, though, and the average verbal score is up from 19.8 to 20.2 and the average ACT math score moved from 20.1 to 20.0 (Schoenstein, 1996).

After five years of block scheduling at Wasson High School, the average daily attendance increased from 91.7 to 93.9 percent. The percentage of students on the honor roll rose from 20.8 to 26.5 percent. The number of credits students earned jumped from an average of 4.8 to 5.8 Carnegie units. Class size dropped an average of three students per class. The failure rate dropped from 31 percent to 25 percent. The graduating seniors enrolled in four year colleges and universities rose from 40.4 percent to 50.4 percent (Schoenstein, 1996).

At Atlec High School in Virginia the dropout rate for students in grades 9-12 during the 1992-93 and 1993-94 school years was zero percent. The staff felt a major part of this success was the flexibility of the A/B block schedule. Creative use of instructional time allowed faculty and staff to identify, and provide relevant educational plans for at-risk students (Shortt & Thayer, 1995).

In Douglas County, Colorado, Parker Vista Middle School, with a student population of just over 1,100 students, adopted a modified block schedule. Students and parents were interviewed frequently throughout the year. Responses were generally positive. There were some concerns about

discontinuity of content. Standardized test scores were analyzed and scores in all content areas revealed no significant differences when students' scores in a block schedule program were compared with those in a regular schedule program (Alam, Dale,& Seick, 1994).

Evans High School, in Orange County, Florida, was the first Orange County school to implement the block schedule in the fall of 1992. After one year on block scheduling, Evans' average daily attendance rose from 88.32 percent to 90.24 percent. Achievement, gathered from a random sample of 102 students, was measured by comparing grade point averages from the year preceding the block schedule to these students' G.P.A.'s at the conclusion of the first year. Fifty-four percent of the students increased their G.P.A.'s , 45 percent decreased slightly, while two percent stayed the same (Buckman, King, & Ryan,1995).

Boyd Anderson High School, in Broward County, Florida, was facing problems typical of many schools throughout the nation, such as large teacher loads, increasing dropout rate, and overcrowded facilities. Boyd Anderson High School moved to a modified block schedule to help alleviate these problems. A trimester block was chosen because the student mobility rate is 39 percent, which means more than 1,000 students withdraw or enroll each year. Credits for block classes are granted at the end of the trimester and credits for one-hour classes (band, chorus, debate, newspaper, and yearbook) are granted at the end of the school year.

Teacher and student attendance increased with block scheduling. Students realized that any absence from a class results in a lot of make-up work and the possibility of no credit for a class.Teachers felt "ownership" of their students and sincerely cared whether their students earn credits in their classes.

The comparison of the 1993-94 grades with grades from the first trimester showed a 3.67 percent increase in the number of students passing courses. At the end of the last marking period of the trimester, the percentage of students passing courses compared to the previous year increased to 7.62 percent. The end-of-year retention rate dropped from 27 percent in 1994 to 15 percent in 1995. The 1994-95 senior graduation rate increased by nine percent over the previous year (Geismar & Pullease, 1996).

In 1989, Masconomet Regional High School, Boxford, Massachusetts, experimented with a traditional schedule and a trimester block. Students were allowed to chose the schedule they preferred for the year. Teachers in both programs used the same curriculum. The same midterm and final exams were administered to students in both the traditional schedule and the trimester block. Seventy-four students' midterm and final scores were compared. Forty-nine showed no significant difference between the two groups' performance, 11 showed a significant difference favoring the

trimester block, and 14 showed a significant difference favoring the traditional schedule (Carroll, 1994).

Block scheduling has not been in place for very long and there is little data available which compares traditional high school students' test scores or other achievement data of students who have graduated from a block schedule high school. In the absence of hard data, professional judgement must be used to determine the viability of block scheduling and its impact on student success (Brett, 1996).

With so many factors at work, it's hard to decide what caused what in many of these school reports. Most schools report a calmer, quieter atmosphere. The hectic pace has slowed a notch or two. The stress levels have been reduced for staff and students alike (Schoenstein, 1996).

After looking at the results reported by schools using block scheduling, an increase in student G.P.A.'s does not seem to be the main benefit of changing to a block schedule. The block schedule just seems to make schools a friendlier place for both students and teachers. If absenteeism is reduced and "time-on-task" is increased, then it seems student learning also would increase (Geismar & Pullease, 1996). Even though no significant increase in the scores of students taking the standardized test scores have been reported, schools do report an increase in the number of students taking the standardized tests (Schoenstein,

1996). While still in high school students have the opportunity to take college, advanced, and a wider variety of classes (Winans,1997).

CHAPTER 3

METHOD

Subjects

Subjects were drawn from Liberty High School, a rural school in north central West Virginia. The population of the school is approximately 650 students, grades nine through twelve, with a teaching staff of 53. Liberty students come from the suburban areas of Adamston and Northview, the small town of Salem, and the rural communities of Bristol, Jarvisville, Marshville, and Wilsonburg. The school is located three miles west of Clarksburg and is one of five high schools in Harrison County. One class was selected to participate in this study. The students were freshman during the 1995-96 school year and sophomores during the 1996-97 school year. Altogether 198 subjects, 103 males and 95 females, were included in this study.

Design

The basic design of this study was to evaluate the information regarding grade point averages of students under the 4X4 block schedule compared to the traditional seven period day. As more school systems are questioning the effectiveness of the seven period day, educators are looking at block scheduling as an alternative. By looking at comparisons of grade point averages more informed decisions can be made regarding scheduling.

The null hypothesis was grade point averages under the traditional seven period day and a 4X4 block schedule do not differ significantly.

Procedure

During the 1995-96 school term, the schedule at Liberty High School was the traditional seven period day. For the 1996-97 school term, the school schedule was changed to the 4X4 90-minute block schedule. This study was conducted to compare the grade point averages of students completing the freshman year under the traditional seven period day and the same students after completing their sophomore year under the 4X4 block schedule. The freshman and sophomore years were compared because students are required to take the core subjects of math, science, English, and social studies. After the sophomore year, students take mainly elective classes and not as many core classes.

Instrumentation

Grade point averages of students were taken from official school transcripts. The total grade point average for the freshman year was compared to the total grade point average for the sophomore year. The mean, standard deviation, t-value, critical value, p-value were computed for a sample size of 198 and the null hypothesis was tested at the .05 level of significance using a dependent sample t-test.

CHAPTER 4

ANALYSIS OF DATA

Research Question

The purpose of this study was to determine if the grade point averages of students would differ significantly under a 4X4 block schedule and a regular seven period day.

Subjects

One hundred ninety-eight students who completed the entire freshman and sophomore years at Liberty High School were used in this study. These students were freshman during the 1995-96 school term under a regular seven period day and sophomores during the 1996-97 school term under a 4X4 block schedule. Official transcripts were obtained from the guidance office in June 1997. Grade point averages were computed for English and math only for the ninth grade and for the tenth grade. These grade point averages were compared using descriptive statistics and a t-test. In addition, grade point averages were computed for the core classes (English, math, science, and social studies) for the ninth grade and the tenth grade. These grade point averages were compared using descriptive statistics and a t-test. Finally, grade point averages were computed for all subjects for the ninth grade and the tenth grade. These grade point averages were compared using descriptive statistics and a dependent sample t-test.

Analysis of Data

The first descriptive statistics and t-test compared the English and math grade point averages in the ninth grade under a regular seven period day and the tenth grade under a 4X4 block schedule. The question considered here was: "Do the grade point averages differ significantly in English and math under the two different schedules?"

TABLE 1

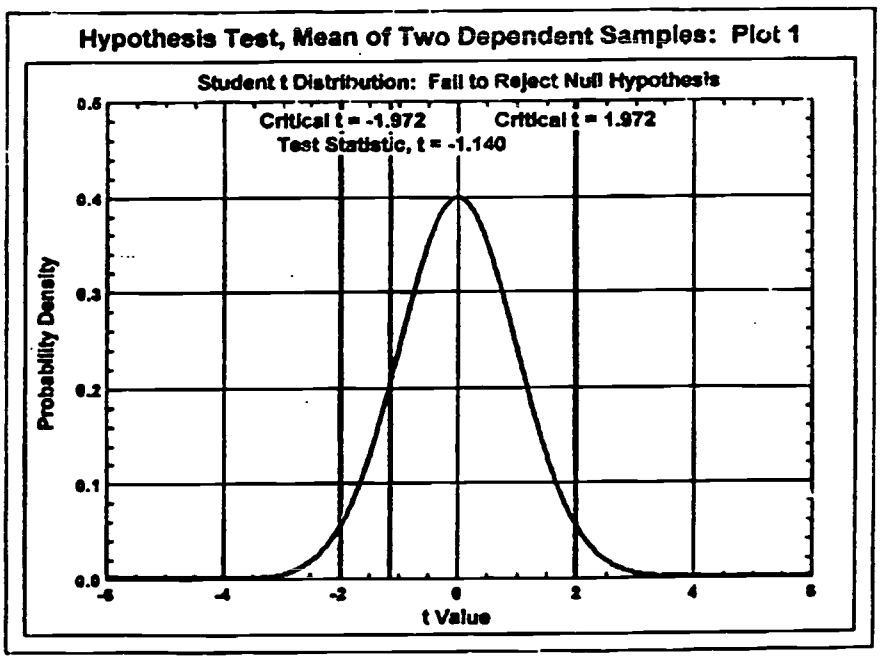
COMPARISON OF ENGLISH AND MATH G.P.A'S
IN NINTH AND TENTH GRADES

GRADE	M	SD
9	1.9703	0.98379
10	2.0352	0.99910

t-Test Results

Test Statistic, t	-1.1396
Critical t, for $\alpha = .05$	±1.9721
P-value	0.2558

Note. Results based on G.P.A.'s of 198 students who completed the ninth and tenth grade at Liberty High School.



This sample does not provide enough evidence to reject the null hypothesis that grade point averages do not differ significantly.

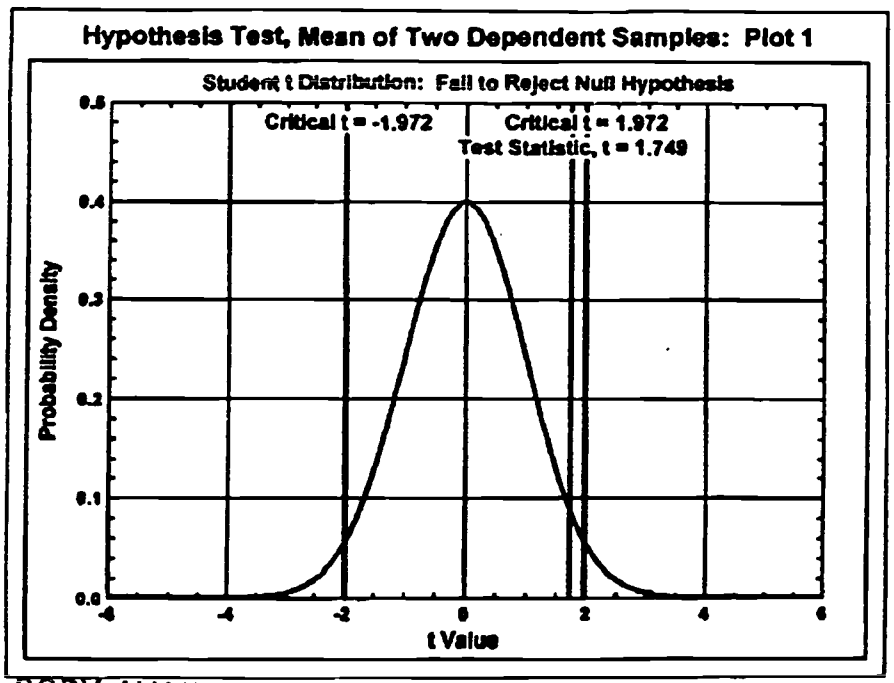
The second descriptive statistics and t-test compare the core class (English, math, science, and social studies) grade point averages in the ninth grade under a regular seven period day and the tenth grade under a 4X4 block schedule. The question considered here was: "Do grade point averages differ significantly in the core classes under the two different schedules?"

TABLE 2

COMPARISON OF CORE CLASS G.P.A'S
IN NINTH AND TENTH GRADES

GRADE	M	SD
9	2.148	0.96443
10	2.0759	0.97984
t-Test Results		
Test Statistic, t	1.7488	
Critical t, at α = .05	±1.9721	
P-value	0.0819	

Note. Results based on G.P.A.'s of 198 students who completed the ninth and tenth grade at Liberty High School.



This sample does not provide enough evidence to reject the null hypothesis that grade point averages do not differ significantly.

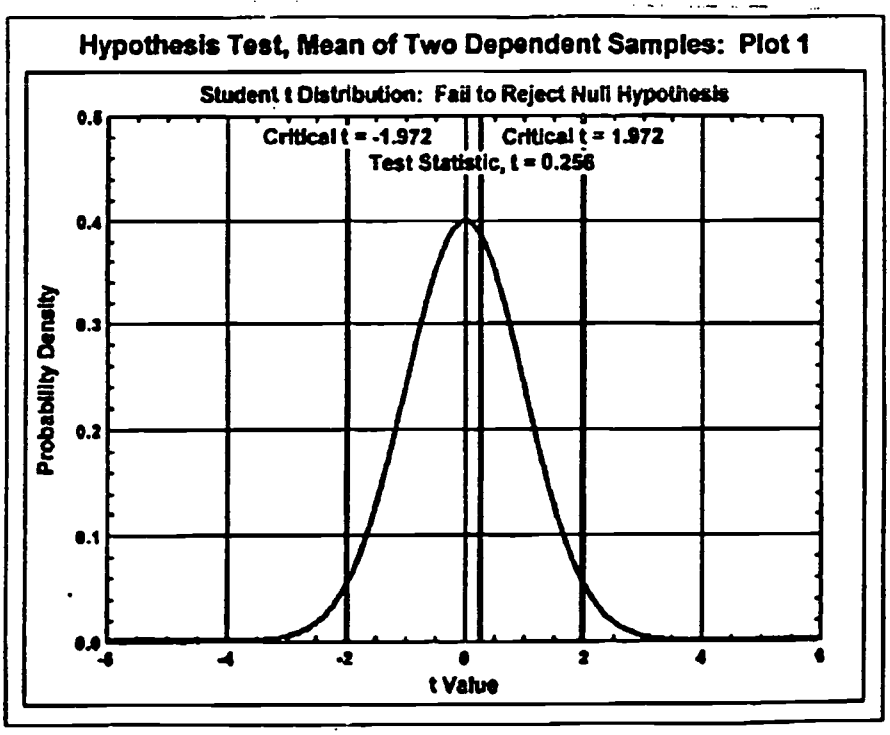
The last descriptive statistics and t-test compared overall grade point averages in the ninth grade under a regular seven period day and the tenth grade under a 4X4 block schedule. The question considered here was: "Do the overall grade point averages differ significantly under the two different schedules?"

TABLE 3

COMPARISON OF OVERALL G.P.A'S
IN NINTH AND TENTH GRADES

GRADE	M	SD
9	2.5182	0.85990
10	2.5099	0.97501
t-Test Results		
Test Statistic, t	0.2562	
Critical t, at α = .05	±1.9721	
P-value	0.7980	

Note. Results based on G.P.A.'s of 198 students who completed the ninth and tenth grade at Liberty High School.



This sample does not provide enough evidence to reject the null hypothesis that grade point averages do not differ significantly.

Conclusion

The results did not show a significant difference in grade point averages in the three areas considered. Therefore, this study fails to reject all three null hypotheses and concludes that there is no significant difference in grade point averages between a regular seven period day and a 4X4 block schedule day for students at Liberty High School who were freshman during 1995-96 and sophomores during 1996-97. This study should not be considered valid for all students that have changed from a seven period day to a block schedule. Many other factors may affect the outcome of future studies, such as the teachers, the students, and the type of block schedule adopted.

CHAPTER 5

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Purpose of the Research

The purpose of this study was to investigate the effect of block scheduling on grade point averages. Block scheduling is a new concept and educators have many different opinions about its overall effect on education and student learning. The null hypothesis was that grade point averages would not differ significantly under the regular seven period day and a 4X4 block day.

Research Testing

One hundred ninety-eight students who completed all of their ninth and tenth grade at Liberty High School were chosen for this study. These students were freshman during 1995-96 under a regular seven period day and sophomores during 1996-97 under a 4X4 block schedule.

Three types of G.P.A. measures were used to compare the two schedules:

1. Grade point averages in English and math;
2. Grade point averages in English, math, science, and social studies;
3. Grade point averages in all subjects.

Descriptive statistics and dependent sample t-tests were conducted on each of the three groups of grade point averages. The tests were performed to see if there was a significant difference in grade point

averages (measured in three different ways) of these students under a regular seven period day and a 4X4 block day. Three t-tests were conducted on the grade point averages. First, English and math grades were compared for the two schedules. Second, English, math, science, and social studies were compared for the two schedules. Finally, overall grade point averages were compared for the two schedules.

Results of the Tests

The tests showed the following:

1. There was no significant difference in grade point averages computed using only English and math during the ninth grade under a regular seven period day and the tenth grade under a 4X4 block schedule.
2. There was no significant difference in grade point averages computed using only the core classes of English, math, science, and social studies during the ninth grade under a regular seven period day and the tenth grade under a 4X4 block schedule.
3. There was no significant difference in the overall grade point averages in the ninth grade under a regular seven period day and the tenth grade under a 4X4 block schedule.

Conclusions

Even though this study was limited to 198 students at one high school, there was no significant difference in grade point averages of these students in any of the three areas compared. Using block scheduling may

not have benefited these students in grade point averages but no significant reduction in grade point averages was shown either. To determine the effect of block scheduling on education, other factors need to be examined. Benefits, such as reduced stress, opportunities to take more classes, and fewer classes each semester, may be hard to measure.

Further Research

Since this study was limited to 198 students in the same grade level at the same school, information from other schools that have switched from a regular seven period day to a 4X4 block day could be added to this data for further comparisons. Student grade point averages could be compared further by looking at the differences in the grades of girls and boys, in college bound students and non-college bound students, and in learning disabled students and regular students. Helpful information could be gained by comparing failure rates, absenteeism, and dropout rates before and after block scheduling.

Under the regular seven period day, students could graduate with 28 credits and under the block, students could graduate with 32 credits. Further research could compare the types of classes students are taking. Are students choosing to take more core class electives? Are more students taking college classes?

Standardized testing would be another way to identify the effects of block scheduling. Schools need to see if the number of students taking

these tests has increased, remained the same, or decreased. Comparing scores of the ACT and SAT may be good indicators of student learning, depending on the number of students taking the test.

In conclusion, this study found no significant differences in the G.P.A.'s of students in a block schedule and a regular seven period day. However, further studies could compare the grades of different types of students, the types of classes students are taking, and the scores of standardized tests. This would enable more conclusive comparisons to be made between block scheduling and a regular seven period day.

APPENDIX A

COMPARISON OF ENGLISH AND MATH G.P.A.'S IN NINTH AND TENTH GRADES

Subjects	9th Grade G.P.A.	10th Grade G.P.A.
1	2.5	1.5
2	1.25	1.5
3	2.0	2.67
4	.2	.25
5	3.0	2.5
6	.75	1.67
7	2.75	2.0
8	.25	1.33
9	.75	1.0
10	1.75	2.0
11	1.5	2.0
12	2.0	3.0
13	.75	1.0
14	.75	1.0
15	4.0	4.0
16	0	2.0
17	3.5	3.0
18	1.75	2.5
19	1.5	1.5
20	1.75	0
21	1.25	0
22	2.75	1.5
23	3.25	3.0
24	3.5	3.0
25	3.0	3.0
26	3.75	3.67
27	2.0	.5
28	1.0	2.0
29	1.75	2.0
30	.25	0
31	1.25	1.5
32	1.25	1.67
33	2.5	2.0
34	2.25	2.33
35	1.5	2.5
36	4.0	3.5

37	1.5	1.5
38	1.5	1.0
39	1.0	0
40	1.75	2.0
41	3.5	2.5
42	1.0	1.5
43	1.0	1.33
44	4.0	3.5
45	1.5	1.0
46	2.75	3.5
47	1.5	1.0
48	2.5	3.0
49	1.25	.5
50	3.25	3.5
51	.75	1.6
52	3.0	3.0
53	2.25	2.0
54	1.75	3.0
55	1.0	.75
56	1.0	1.5
57	1.25	2.0
58	2.75	2.5
59	.75	3.00
60	2.0	2.5
61	1.75	2.0
62	3.0	2.0
63	1.25	3.0
64	3.25	3.0
65	3.5	4.0
66	1.25	3.0
67	3.75	3.5
68	3.25	3.0
69	2.0	2.5
70	4.0	3.5
71	2.5	3.5
72	2.5	2.5
73	3.0	2.5
74	1.25	2.5
75	1.0	1.5
76	2.5	2.0
77	1.25	2.0
78	2.5	2.5
79	2.5	2.0
80	2.75	3.0
81	3.67	2.67
82	3.5	3.5

83	1.75	3.0
84	.5	2.67
85	.75	0
86	1.0	1.0
87	2.0	2.0
88	1.25	1.67
89	1.25	1.0
90	4.0	4.0
91	1.5	2.0
92	1.0	1.5
93	1.5	3.0
94	1.5	2.5
95	2.5	3.5
96	1.25	1.5
97	2.0	1.0
98	2.25	2.5
99	.75	1.5
100	1.75	1.0
101	1.5	1.5
102	1.25	1.5
103	1.0	1.0
104	2.75	2.33
105	3.0	3.0
106	1.25	1.5
107	.5	1.0
108	1.5	2.0
109	1.0	0
110	3.25	3.33
111	1.25	3.0
112	2.25	3.0
113	3.25	1.0
114	2.25	2.0
115	.75	1.5
116	1.5	3.0
117	2.5	2.0
118	2.75	2.33
119	3.0	3.5
120	.25	1.5
121	2.5	2.5
122	1.0	.5
123	3.25	2.0
124	4.0	4.0
125	2.25	2.5
126	2.25	2.5
127	.75	0
128	1.5	1.5

129	.75	1.5
130	1.25	1.0
131	1.25	1.5
132	.5	0
133	1.25	2.0
134	.25	.5
135	.75	1.67
136	3.25	3.5
137	3.0	2.5
138	.75	2.0
139	2.75	2.5
140	1.75	1.67
141	.75	1.33
142	1.0	0.5
143	2.5	1.5
144	3.5	3.0
145	2.0	2.0
146	.5	2.25
147	1.5	1.0
148	4.0	4.0
149	.75	0
150	2.75	3.0
151	3.75	3.0
152	2.0	2.0
153	2.25	3.0
154	2.5	0
155	1.0	1.5
156	2.75	2.5
157	2.75	2.0
158	2.5	2.5
159	3.0	3.5
160	2.5	3.0
161	2.25	2.0
162	2.0	2.5
163	1.75	1.5
164	3.0	3.0
165	2.0	1.5
166	3.0	2.27
167	3.0	3.0
168	2.0	1.5
169	1.0	1.0
170	2.25	2.5
171	1.5	1.5
172	1.75	0
173	.5	1.5
174	3.0	3.0

175	1.5	2.5
176	1.0	.5
177	.5	.5
178	1.75	2.0
179	3.0	2.67
180	1.75	1.5
181	1.5	0
182	3.5	3.0
183	3.5	3.5
184	1.0	1.0
185	2.25	3.33
186	2.5	3.5
187	2.25	2.0
188	1.75	.5
189	1.5	1.5
190	.75	1.5
191	2.75	2.0
192	1.25	.5
193	3.0	2.5
194	2.25	2.5
195	1.5	1.67
196	2.25	3.33
197	3.25	2.5
198	2.0	2.5

APPENDIX B

COMPARISON OF CORE CLASS G.P.A.'S IN NINTH AND TENTH GRADES

Subjects	9th Grade G.P.A.	10th Grade G.P.A.
1	2.89	2.5
2	1.75	1.0
3	2.13	2.2
4	.33	.17
5	3.0	2.5
6	1.13	1.4
7	2.63	2.25
8	.75	1.2
9	1.0	.83
10	1.75	2.0
11	1.5	2.0
12	2.13	2.8
13	1.25	1.5
14	.63	.5
15	4.0	4.0
16	0	2.0
17	3.63	3.25
18	1.63	2.25
19	2.13	1.25
20	1.63	0
21	.63	.43
22	3.0	2.5
23	3.5	3.0
24	3.38	3.33
25	3.38	3.25
26	3.75	3.8
27	1.75	.75
28	1.75	1.75
29	1.75	2.25
30	.75	0
31	1.88	2.0
32	1.13	1.4
33	2.63	2.25
34	2.38	2.4
35	1.5	2.25
36	3.88	3.25

37	2.13	1.75
38	2.38	1.75
39	1.25	0
40	1.88	1.5
41	3.63	3.25
42	1.13	1.5
43	1.88	1.00
44	4.0	3.25
45	1.63	1.25
46	2.75	3.25
47	1.13	1.17
48	2.5	2.8
49	1.88	1.5
50	3.63	3.5
51	.5	1.43
52	3.5	3.5
53	1.88	1.75
54	2.0	3.0
55	1.88	1.0
56	1.13	1.5
57	2.0	2.0
58	2.88	2.75
59	1.0	2.75
60	2.63	2.75
61	2.25	2.25
62	2.88	2.4
63	1.63	2.8
64	3.38	3.25
65	3.75	4.0
66	2.0	2.8
67	3.75	3.25
68	3.5	3.25
69	3.0	2.75
70	4.0	3.75
71	2.73	3.5
72	2.5	2.5
73	2.0	2.0
74	1.5	2.25
75	1.25	1.5
76	2.5	2.5
77	1.5	2.25
78	2.88	2.25
79	2.25	2.25
80	2.88	3.0
81	3.22	2.5
82	3.75	3.5

83	2.0	2.5
84	.38	2.0
85	.86	0
86	1.13	1.25
87	2.13	2.2
88	1.13	2.2
89	1.63	1.5
90	4.0	4.0
91	1.63	2.5
92	.88	1.25
93	2.25	2.75
94	2.25	2.75
95	3.5	3.5
96	1.38	1.0
97	2.0	1.75
98	2.88	2.75
99	1.38	2.0
100	1.88	1.0
101	1.75	1.75
102	1.37	1.25
103	1.5	1.0
104	2.75	2.4
105	3.38	2.25
106	1.25	1.5
107	.75	1.4
108	1.88	2.0
109	1.38	0
110	3.38	3.4
111	1.38	2.75
112	2.5	3.0
113	2.71	.67
114	2.0	1.75
115	1.0	1.0
116	2.0	2.4
117	2.88	2.25
118	2.38	2.4
119	3.13	3.25
120	.38	.75
121	3.13	2.76
122	1.13	1.0
123	2.88	2.25
124	3.5	3.75
125	2.63	2.25
126	2.63	2.25
127	.88	0
128	1.13	.75

129	1.13	1.5
130	1.38	1.5
131	1.5	1.5
132	1.0	0
133	1.5	1.75
134	.63	.5
135	.63	1.4
136	3.63	3.75
137	2.5	2.5
138	.75	1.5
139	3.25	3.25
140	2.5	2.2
141	.88	1.2
142	2.0	0.75
143	2.17	1.75
144	3.63	3.0
145	2.38	2.75
146	1.0	2.17
147	1.5	.8
148	3.75	3.75
149	.75	.5
150	3.13	3.0
151	3.88	3.5
152	2.25	2.0
153	2.5	3.25
154	2.75	0
155	1.63	1.5
156	2.88	2.5
157	3.0	2.5
158	1.63	2.0
159	3.5	3.5
160	2.88	2.75
161	2.17	2.0
162	2.75	2.6
163	2.0	1.5
164	3.13	3.2
165	2.0	2.25
166	3.13	3.0
167	3.25	3.0
168	1.63	1.25
169	1.38	1.0
170	2.0	1.0
171	1.25	1.75
172	2.13	1.0
173	1.25	2.25
174	3.0	3.25

175	2.13	1.75
176	.88	.75
177	.38	.5
178	1.63	2.0
179	3.5	3.0
180	1.63	.75
181	1.75	.25
182	3.63	3.5
183	3.75	3.25
184	.63	1.25
185	2.25	2.6
186	2.63	3.0
187	2.38	2.5
188	1.0	.67
189	1.75	2.0
190	1.0	1.0
191	3.13	2.25
192	1.75	.75
193	3.13	2.5
194	2.63	2.5
195	1.63	1.5
196	2.75	3.2
197	3.25	2.75
198	2.63	2.75

APPENDIX C

COMPARISON OF OVERALL G.P.A.'S IN NINTH AND TENTH GRADES

Subjects	9th Grade G.P.A.	10th Grade G.P.A.
1	2.93	3.00
2	3.43	3.38
3	3.29	3.50
4	2.21	1.92
5	2.93	2.75
6	3.29	2.88
7	2.43	2.25
8	3.50	3.00
9	1.93	1.63
10	2.14	2.56
11	1.86	1.13
12	2.86	3.19
13	3.21	3.50
14	2.50	2.88
15	1.43	1.00
16	3.79	3.69
17	3.79	3.81
18	2.07	.38
19	1.57	.5
20	3.71	3.31
21	1.86	2.50
22	.64	.79
23	1.5	2.14
24	1.86	2.75
25	2.79	3.19
26	1.79	2.13
27	2.86	2.00
28	1.83	1.50
29	2.89	1.38
30	2.36	2.38
31	2.06	2.25
32	3.5	3.25
33	3.43	3.44
34	2.89	1.88
35	3.21	3.38
36	2.64	2.44
37	2.93	3.13

38	2.64	2.38
39	3.0	3.38
40	3.5	3.69
41	2.29	2.88
42	3.43	3.19
43	3.14	3.31
44	2.5	2.0
45	2.78	.63
46	3.07	3.5
47	2.36	2.63
48	4.0	3.81
49	3.57	3.44
50	1.24	1.13
51	3.71	3.88
52	1.79	.88
53	.79	2.04
54	2.93	3.00
55	3.86	3.56
56	2.5	2.5
57	1.06	.88
58	1.21	1.13
59	2.86	2.63
60	3.5	3.69
61	1.5	1.75
62	2.93	3.00
63	3.71	3.88
64	.86	1.75
65	1.07	.5
66	1.86	1.86
67	1.63	.43
68	1.5	1.75
69	1.64	1.38
70	2.28	2.25
71	2.0	1.13
72	1.21	0
73	3.21	3.13
74	2.93	2.88
75	4.07	3.94
76	3.07	2.69
77	1.93	1.88
78	3.5	3.38
79	1.19	1.38
80	3.36	3.63
81	2.36	3.00
82	2.86	2.88
83	2.64	2.88

84	3.25	1.75
85	2.29	2.38
86	2.83	.75
87	3.14	3.56
88	2.00	3.13
89	3.5	3.56
90	1.86	0
91	2.57	2.63
92	1.43	2.00
93	2.14	2.50
94	3.57	3.06
95	3.00	2.88
96	2.00	2.13
97	1.43	1.63
98	2.63	2.63
99	2.14	1.75
100	2.43	2.50
101	3.14	3.38
102	2.50	2.25
103	1.43	1.25
104	2.86	3.63
105	2.79	2.88
106	2.71	3.25
107	1.21	1.25
108	2.14	2.75
109	4.07	4.06
110	1.86	2.19
111	1.64	1.88
112	2.07	1.83
113	1.93	2.38
114	1.06	2.34
115	.64	2.13
116	2.93	3.13
117	3.93	3.81
118	1.94	2.50
119	3.14	3.25
120	2.64	2.75
121	3.21	3.13
122	2.43	3.00
123	2.75	3.08
124	1.93	2.00
125	2.29	2.88
126	2.36	3.00
127	2.93	3.25
128	2.86	3.50
129	4.07	3.94

130	1.71	2.00
131	3.71	3.69
132	3.86	3.63
133	2.21	3.13
134	3.93	4.00
135	3.5	3.63
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140	1.02	3.00
141	3.14	2.96
142	2.64	3.00
143	2.75	2.75
144	1.36	1.13
145	2.29	3.13
146	2.29	2.50
147	3.61	3.81
148	.58	2.62
149	3.79	3.63
150	2.21	.75
151	2.86	3.13
152	1.14	.93
153	3.21	3.63
154	2.21	1.75
155	3.75	3.5
156	2.57	1.38
157	1.71	1.5
158	3.86	3.69
159	2.50	2.63
160	1.07	.63
161	2.79	2.88
162	2.5	2.5
163	4.00	3.88
164	1.5	2.63
165	2.5	2.63
166	2.71	3.13
167	2.00	1.63
168	2.79	2.88
169	1.21	.13
170	2.29	2.75
171	2.36	2.5
172	2.36	2.0
173	3.79	3.88
174	3.50	3.56
175	3.64	3.81

176	3.57	3.44
177	3.43	3.25
178	1.21	.75
179	2.07	.5
180	2.15	2.25
181	1.62	2.00
182	3.79	3.69
183	1.00	2.25
184	4.0	4.0
185	1.14	.50
186	1.64	1.25
187	2.39	2.88
188	1.79	1.88
189	2.57	2.75
190	1.57	1.38
191	1.43	1.50
192	3.21	2.75
193	2.07	1.63
194	3.43	3.13
195	1.14	.75
196	2.43	2.63
197	1.64	1.00
198	2.93	2.63

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