2002

Comparing Geometry 4x4 Block Scheduling with Geometry A/B Scheduling and it's Effect on Geometry SOL Test Scores

Daniel Rachid
Old Dominion University

Comparing

Geometry 4 x 4 Block Scheduling with

Geometry A/B Scheduling and

Its Effect on Geometry SOL Test Scores

A Research Paper Presented to the Faculty of the Department of Occupational and

Technical Studies at

Old Dominion University

In Partial Fulfillment of the Requirements for the Masters of Science in

Occupational and Technical Studies

By

Daniel Rachid

August 2002

Signature Page

This research paper was prepared by Danny Rachid under the direction of Dr. John M. Ritz, in OTED 636, Problems in Occupational and Technical Studies. It was submitted to the Graduate Program Director as partial fulfillment of the requirements for the Degree of Master of Science in Occupational and Technical Studies.

Approved by:

John M. Ritz — 8-15-02

Dr. John M. Ritz
Graduate Program Director
Occupational and Technical Studies
Old Dominion University

Date

Acknowledgements

The researcher wishes to express his sincere appreciation and thanks to Dr. John M. Ritz for his patience and guidance in preparing this research report. His guidance and support has allowed me to grow professionally and learn more about my capabilities and myself. I would also like to express my sincere appreciation to my beloved wife, Debbie, for her patience, guidance, coaching, and support. Her support was instrumental in the completion of this research paper.

Danny Rachid

TABLE OF CONTENTS

Table Of Tables

CHAPTER I

INTRODUCTION

As schools try to accommodate the needs of a growing population of students with the same number of teachers and increased graduation requirements, block scheduling has become more and more universally used. In a school system in Southeast, Virginia, the 4 x 4 block schedule was used to allow more students the opportunity to complete more classes in four years. The 4 x 4 block scheduling consists of four, 90-minute periods in the same day. Using this schedule, students can complete eight classes in one year. However, some of the mathematics classes were offered in two different options, a one-semester and a two-semester format. The two semester classes were known as A/B classes, where the student takes Part A one-semester and Part B the next semester. In this manner the students received more exposure, practice, and application time on the material taught.

Geometry is taught to students through a one-semester or A/B option. The one-semester course very briskly covers material in a more traditional lecture and example format accompanied by homework. There was no time in this option for a child to flounder on one topic or for the teacher to slowly teach a concept or re-teach any concept. The class was Standard Of Learning (SOL) driven and all the material that was needed for the SOL test was covered but must be understood quickly. The A/B class allowed students additional time to grasp and understand a concept more fully. The teacher could re-teach a concept and slowly explain a concept fully. In the A/B class the students experimented and expanded upon a concept, making it more useful and the knowledge more long term.

After one year of teaching Geometry at a high school in Southeast, Virginia, the researcher became curious about the SOL scores of the Geometry classes taught in two different formats. The general idea was to find out which option resulted in the best SOL test scores from students. Some peer teachers, guidance counselors, and the administrators expressed interest in the results of this study. Counselors could use the results of this study to aid students in making appropriate scheduling choices. This study emphasized the importance of an A/B Geometry class within a 4 x 4 block scheduling environment.

STATEMENT OF THE PROBLEM

The problem of this study was to determine whether students perform better on SOL tests with a one-semester ninety-minute block Geometry class or a two-semester ninety-minute Geometry class.

HYPOTHESIS

To solve this problem, the following hypothesis was developed:

H_1: Students who complete the A/B Geometry class will have higher SOL scores on average than the students who complete the one-semester Geometry class.

BACKGROUND AND SIGNIFICANCE

The development of this study occurred when colleagues at a high school in Southeast, Virginia, questioned the results of SOL testing using the two types of Geometry classes. Both classes were taught from the same books and the teachers had similar educational backgrounds. All Geometry teachers completed teaching the same material by the end of the course. The classes were the same time length per day, just that the A/B class took two semesters to complete the book and the one-semester class completed the book in one-semester. In the one-semester 4 x 4 classes students received a total of 8100 minutes of instruction per class, while in the A/B classes the students received 16,200 minutes of instruction.

A high school in Southeast, Virginia, utilized the 4 x 4 block scheduling which allowed students to complete eight full courses in one school year. The classes lasted 90 minutes and met every day of the week. This schedule allowed for the students to experience the college class style while still meeting every day of the school week. Amanda Crites' (2001) study about block scheduling used SAT scores for data collection because she was looking for a broad comparison of student performance. In this study a narrow comparison of data was used, which meant that a more specific test scoring option had to be found. SAT scores could never be divided that specifically. The SOL scores on the other hand, could be divided by subject and teacher. This allowed for the data to be accessed and examined in the manner best suited for this study.

The general philosophy of the scheduling process was that students who were currently enrolled in the A/B Algebra course would automatically be enrolled in the A/B Geometry course. Most of the students who were scheduled for the A/B course were

considered to be students who required slower paced instruction for academic success. These students needed extra time for practice, application, and to retain concepts on the material. The modern one-semester Geometry student was expected to be able to grasp and synthesize all the concepts in the Geometry course in one-semester.

In June 1995, the Virginia Board of Education approved the Standard's of Learning (SOLs) in four core content areas – Mathematics, Science, English, and History (Social Sciences) (VA Board of Education, 1995, p. 1). The Board of Education took important steps in raising the expectations for all students in Virginia's Public Schools by adopting these standards. The accountability of Virginia Public Schools was in question at the time. A better system of measurement was required to set accountability standards for all Virginia Public Schools. Years of complaints had arisen from the Virginia collegiate system and the business community that Virginia's public school students simply did not have the required knowledge to be effective in the workforce or successful as entering college freshman. The new standards were important because they set reasonable targets and expectations for what teachers needed to teach and students needed to learn.

The incorporation of the SOLs in the Virginia Public School System changed the way instruction was delivered completely. In the one-semester Geometry course, the instruction was done quickly, with very little in class practice time, and very little time to review the concepts a second time. Practical application of the concepts were lightly covered and often completely skipped. The course was usually taught in eighteen weeks and the SOL test was given about the fifteenth week. In the A/B Geometry course, the instruction was much slower, allowing more time for better retention of concepts.

Computer Lab applications of concepts were available and used more often. There usually was a second day of review on all concepts allowing for more practical application of each concept. All students were required to pass the SOL test on different subjects as a part of graduation requirements.

SOL scores became a focal point of Virginia Public Schools for the last five years. In Virginia, the number one topic of any public school was the SOL test scores. Unfortunately, Virginia schools were measured by their SOL test score data. This study measured the SOL test scores in Geometry when the Geometry courses were taught in two different block scheduling formats. Even though block scheduling does not have positive research supporting its effectiveness (VMEA, 1996), the aim of this study was not to compare the effectiveness of block scheduling. The aim of the study was to compare the scores on the Geometry SOL tests when taught in different formats and to make recommendations based on those findings.

LIMITATIONS

The limitations set the boundaries in this study. The group used to collect the data was Geometry students from a high school in Southeast, Virginia. The student population included grades 9 to 12, however most of these students were freshman and sophomores. The average age of the students were fourteen to sixteen with a select few being of age seventeen and eighteen. Included in this study will be data from two semesters, fall 2001 and spring 2002. The data were made available by the Mathematics Department at the high school in Southeast, Virginia. Special needs students were included in the data that was presented within this study.

ASSUMPTIONS

The researcher recognizes the following research assumptions as they related to this study:

1) Each student knew basic mathematics facts and concepts.

2) Each student had a sufficient algebraic foundation.

3) Every student who took the Geometry SOL test successfully passed an Algebra 1 course and passed the Algebra 1 SOL test.

4) Different teaching styles did not have an effect on the results of the Geometry SOL test.

5) The students had an understanding of the use of the TI-83 graphing calculator.

6) Different times of the day for testing did not adversely affect the results of the SOL test scores.

7) All Geometry SOLs were learned prior to taking the Geometry SOL test.

PROCEDURES

The data for this study were collected by the Mathematics Department at a high school in Southeast, Virginia. The data spanned two test iterations of the Geometry SOL. Once the data were compiled and examined, the test results were compared among the Geometry students who were taught in two different formats. Once the comparisons were made, statistical analysis of the data was used to either accept or reject the hypothesis.

DEFINITION OF TERMS

The following terms were defined to assist the reader in understanding this study:

1. **4 x 4 Block Scheduling** – ninety minute blocks that meet every day for one semester. Students may take four classes a semester in 4 x 4 block scheduling which is sometimes known as the accelerated schedule.
2. **A/B Block Scheduling** – ninety minute blocks of teaching time, which meet daily for one calendar school year.
3. **High School** – Grades 9, 10,11, and 12.
4. **SAT** – Scholastic Aptitude Test.
5. **SOA** – Virginia Standards of Accountability.
6. **SOL** – Virginia's Standards of Learning.
7. **www** – World Wide Web.

OVERVIEW OF CHAPTERS

The focus of this study was to compare the Geometry SOL test scores of two Geometry groups taught in different formats. Chapter I introduced the reader to the study. Chapter I also provided the reader some importance as to why they should read this study and gather their own conclusions from it. Chapter II reviewed the literature that was relevant to this study, while providing some research on the variables. The topics include 4 x 4 block scheduling, A/B block scheduling, Standard Of Learning (SOL), Mathematics SOL, and Geometry SOL. Chapter III outlined the methods and procedures of this study in a much finer detail. Chapter IV presented the findings of the data among

two iterations of the Geometry SOL test. Finally, Chapter V presented the summary, conclusions, and recommendations for further studies.

CHAPTER II

REVIEW OF LITERATURE

In this chapter the researcher presented background information and review of literature on key variables as presented in the problem statement and the hypothesis. These variables were block scheduling, 4 x 4 block scheduling, A/B block scheduling, Standard Of Learning, Mathematics SOL, and specifically the Geometry SOL test adopted by the Commonwealth of Virginia.

BLOCK SCHEDULING

During the past decade a major organizational change, block scheduling, appeared in high schools throughout the United States. Block scheduling expanded classroom time while limiting days. The traditional 50-minute seven period day schedule became the 90-minute four period day schedule. The research data varies on block scheduling usage. Depending on what study you read, 35% to 50% of America's high schools adopted some form of block scheduling (Hottenstein, 1998, p. 15). Almost every school division in the Commonwealth of Virginia adopted some form of block scheduling. There are a variety of reasons for switching to block scheduling but the main reason Virginia Public Schools adopted various types of block scheduling was to allow more opportunities for students to complete additional courses and fulfill increased graduation requirements imposed by the Commonwealth of Virginia (Virginia High School Graduation Requirements, 1997, p. 1). Edwards notes, "doubling the number of chances students have to take and pass their courses will immediately improve high school graduation rates" (Edwards, 1995, p. 26). Block scheduling addressed the 1990 American educational reform trend. The following

paragraphs describe the two models of block scheduling that were implemented in a school system in Southeast, Virginia.

4 x 4 BLOCK SCHEDULING

The 4 x 4 schedule divided the standard 180-day school year into two 90-day semesters. Each semester, students attended four 90-minute classes daily. Students completed an entire course in one-semester. The 4 x 4 block schedule required less time for administrative duties and provided greater variety in instruction and more guided practice time. "The major advantage of the 4 x 4 is its flexibility, designed to meet the particular needs of the school and community" (Brake, 2000, p. 6). In 1995-1996 school year, the 4 x 4 block scheduling pilot high school in Southeast, Virginia, surveyed the entire school community to ascertain data on the effectiveness of 4 x 4 bock scheduling. The findings of the research stated that 100% of school administration preferred the 4 x 4 block schedule to the traditional school schedule (4 x 4 Block Scheduling Evaluation, 1996, p. 127). Another important recommendation of this research was for all the remaining high schools in the school division adopt 4 x 4 block scheduling. As of 1997, all high schools in the Southeast, Virginia, school system used the 4 x 4 block schedule.

A/B BLOCK SCHEDULING

After the implementation of 4 x 4 block scheduling into a high school in a school system in Southeast, Virginia, it became obvious the school system had to do something with the slower paced learners, at-risk students, and the special needs populations. Finishing a course and taking the SOL test in a 90 day semester was just something that

these students could not successfully master. Harter "emphasized that students unlikely to succeed within existing time constraints could benefit from two-term core Mathematics courses" (Kramer, 1996, p. 760). The A/B block schedule can be integrated into the current 4 x 4 scheduling format in a high school in a Southeast, Virginia school system where the student took the first half the course (Part A) in semester one and completed the second half (Part B) of the course in semester two. This type of scheduling was done in the Mathematics courses since the curriculum was so rigorous and time consuming.

In 1995 a Math teacher responded to an editorial about block scheduling in the magazine, Mathematics Teacher, and noted that Algebra was too important and packed with too much information to be taught properly in only 18 weeks. Therefore this particular school taught Algebra for a full year in the A/B block scheduling format (Kramer, 1996, p. 761). A high school in a Southeast, Virginia school system agreed with this notion and implemented two-semester options for specific Math courses, namely Algebra I and Geometry. As a matter of fact, the school system also recognized the importance of teaching Algebra II in the same type of two-semester option and will begin teaching Algebra II in this manner in the fall of 2002.

STANDARD OF LEARNING

The Standards of Learning (SOL) provided a framework for instructional programs designed to raise the academic achievement of all students in Virginia. The Commonwealth of Virginia decided in 1995 that these new standards were an important part of the state's efforts to provide challenging educational programs in the public

schools. The standards were recognized as a model for other states to implement and use. These standards were developed using a collaborative effort with business and industry leaders, parents, teachers, and education officials through a series of public hearings, conferences, and seminars. These standards set clear, concise, and measurable academic expectations for students. Teachers were encouraged to go beyond the standards and select flexible instructional strategies that were appropriate for students. "A major objective of Virginia's educational agenda is to give the citizens of the Commonwealth a program of public education that is among the best in the nation and meets the needs of all young people in the Commonwealth. These Standards of Learning chart the course for achieving that objective." (Commonwealth of Virginia, 1995, p. 2)

MATHEMATICS SOL

Due to the increased demands for students to compete in the technologically oriented workforce and to pursue higher education, students today are required to have a stronger Mathematical knowledge. The Mathematics SOL adopted by the Commonwealth of Virginia aided students in gaining a superior knowledge base in Mathematics. These increased Mathematics skills included fundamentals of arithmetic, measurement, Geometry, probability, data analysis and statistics, Algebra and functions, and the development of proficiency in Mathematical skills. Students used a variety of computational skills to accomplish the Math standards including the use of paper and pencil, graphing TI-83 calculators, and computers. Technological devices such as graphing calculators, computers, and other forms of graphing information technology were now acceptable means for Mathematical problem solving and used as an integral

part of student learning. However, the use of the aforementioned technical tools in student learning was not a replacement for a student's understanding of quantitative concepts and the learning of basic Mathematical computational skills. The general content of the Mathematical standards are intended to support the following four goals for students: becoming Mathematical problem solvers, communicating Mathematically, reasoning Mathematically, and making Mathematical connections (Commonwealth of Virginia Standards of Learning, 1995, p. 1).

GEOMETRY SOL

The Geometry SOL specifically tested students on the content area of Geometry on the secondary level. The test concentrated on Geometry with no correlation to grade levels. Therefore, the Geometry SOL test was taken by any Geometry student enrolled in a Geometry course regardless of the grade level. The successful completion of this test was based on the assumption that the student successfully completed all the standards for Algebra I SOL course and test. The TI-83 graphing calculator, computers, and computer graphing simulators were also allowed to be used on this test. The following specific standards are included on the Geometry SOL test:

*"**G.1** The student will construct and judge the validity of a logical argument consisting of a set of premises and a conclusion. This will include:*

- *identifying the converse, inverse, and contrapositive of a conditional statement;*
- *translating a short verbal argument into symbolic form;*
- *diagramming arguments involving quantifiers (all, no, none, some), using Venn*

diagrams; and

- *using valid forms of deductive reasoning, including the law of syllogism.*

G.2 *The student will use pictorial representations, including computer software and coordinate methods to solve problems involving symmetry and transformation. This will include:*

- *using formulas for finding distance, midpoint, and slope;*
- *investigating and determining whether a figure is symmetric with respect to a line or a point; and*
- *determining whether a figure has been translated, reflected, or rotated.*

G.3 *The student will solve practical problems involving complementary, supplementary, and congruent angles that include vertical angles, angles formed when parallel lines are cut by a transversal, and angles in polygons.*

G.4 *The student will use the relationships between angles formed by two lines cut by a transversal to determine if two lines are parallel and verify, using algebraic and coordinate methods, as well as deductive proofs.*

G.5 *The student will:*

- *investigate and identify congruence and similarity relationships between*

triangles; and

- *prove two triangles are congruent or similar given information in the form of a figure or statement, using algebraic and coordinate as well as deductive proofs.*

G.6 *The student, given information concerning the lengths of sides and/or measures of angles, will apply the triangle inequality properties to determine whether a triangle exists and to order sides and angles. These concepts will be considered in the context of practical situations.*

G.7 *The student will solve practical problems involving right triangles by using the Pythagorean Theorem and its converse, properties of special right triangles, and right triangle trigonometry. Calculators will be used to solve problems and find decimal approximations for the solutions.*

G.8 *The student will:*

- *investigate and identify properties of quadrilaterals involving opposite sides and angles, consecutive sides and angles, and diagonals;*
- *prove these properties of quadrilaterals using algebraic and coordinate as well as deductive proofs; and*
- *use properties of quadrilaterals to solve practical problems.*

G.9 *The student will use measures of interior and exterior angles of polygons to solve problems. Tessellations and tiling problems will be used to make connections to art, construction, and nature.*

G.10 *The student will investigate and use the properties of angles, arcs, chords, tangents, and secants to solve problems involving circles. Problems will include finding the area of a sector and applications of architecture, art, and construction.*

G.11 *The student will construct, using a compass and straightedge, a line segment congruent to a given line segment, the bisector of a line segment, a perpendicular to a given line from a point not on the line, a perpendicular to a given line at a point on the line, the bisector of a given angle, and an angle congruent to a given angle.*

G.12 *The student will make a model of a three-dimensional figure from a two-dimensional drawing and make a two-dimensional representation of a three-dimensional object. Models and representations will include scale drawings, perspective drawings, blueprints, or computer simulations.*

G.13 *The student will use formulas for surface area and volume of three-dimensional objects to solve practical problems. Calculators will be used to find decimal approximations for results.*

G.14 *The student, given similar geometric objects, will use proportional reasoning to*

solve practical problems; investigate relationships between linear, square, and cubic measures; and describe how changes in one of the measures of the object affect the others.

***G.15** The student will:*

- *draw a system of vectors and find the resultant graphically, write the components of a vector as a column matrix, and find the resultant by matrix addition; and solve practical problems using a system of vector*"

(Standards of Learning, 1995, p. 11-12).

SUMMARY

The literature on block scheduling was very broad and it offered a variety of contradictory opinions depending of which study was read and reviewed. The consensus opinion of block scheduling was that the 4 x 4 block scheduling model was the most widely used. The A/B block scheduling model had very little research supporting the concept but it was used in a high school in a Southeast, Virginia school system in the Mathematics Curriculum. Even though the concept of block scheduling had literature that was inconclusive, the focus of the research was how the two different types of block scheduling models affect Geometry SOL test scores. The literature supporting the SOL, specifically Mathematics and Geometry, was very new and mostly www based. The

SOLs were born in 1995 and were implemented specifically in the Commonwealth of Virginia. Due to this fact, there was not much printed reference material on the SOL's. However, there was enough supporting documentation presented in this chapter to show the need and importance of the Geometry SOL. In the next chapter, Chapter III, the researcher will discuss the various methods and procedures of data collection used in this study to support or reject the hypothesis that stated that students in the A/B Geometry class would score higher on the SOL test than students in the one-semester Geometry class.

CHAPTER III

METHODS AND PROCEDURES

The purpose of this chapter was to describe the methods and procedures used to obtain the needed data for the study. An experimental study was done using data accumulated from two iterations of the Geometry SOL. The data were accumulated and released by the Mathematics Department of a high school in Southeast, Virginia, with permission granted by the SOL testing department of a school system. The data will be used to either defend or reject the hypothesis of this study. The hypothesis for this study was "students who complete the A/B Geometry class will have higher SOL scores on average than the students who complete the one-semester Geometry class." Information on the population, Research Variables, Instrument Design, Methods of Data Collection, and Statistical Analysis will be discussed in this chapter. Finally, a summary will conclude this chapter and lead into the findings of the research in Chapter IV.

POPULATION

The population of this study consisted of students who were enrolled in a Geometry course at a high school in Southeast, Virginia, from fall 2001 to spring 2002. The majority of students enrolled in Geometry were between the ages 14 to 15 and consisted mostly of freshman and sophomores. There was a small minority of students enrolled in these classes that were older and from higher grade levels. These students were enrolled in both types of block scheduling formats mentioned earlier, the one-semester option or

the A/B two-semester option. Table 1 provided the number of students enrolled in the two different class formats during the past two iterations of the Geometry SOL.

TABLE 1

NUMBERS OF GEOMETRY STUDENTS IN THE POPULATION

Geometry SOL Iteration	Geometry (one-semester)	Geometry A/B
Fall 2001	151	14
Spring 2002	164	105
Totals	315	119

RESEARCH VARIABLES

The Geometry SOL is an achievement test that was made by a panel of Virginia high school teachers, business and industry leaders, and professionals from the State Board of Education. This test has several different versions that are taken at different school divisions throughout the Commonwealth of Virginia. This test is administered twice a year in the current 4 x 4 scheduling format, typically in mid-January and late-May. The two groups involved were the students enrolled in the Geometry courses offered at a high school in Southeast, Virginia. One group was the students enrolled in the one-semester Geometry course and the other group was the students enrolled in the A/B Geometry class that spanned two-semesters. In this research study, the independent variable was

the two types of block scheduling for the Geometry classes. The dependent variable was the scores from the Geometry SOL test; taken twice annually by the students at a high school in Southeast, Virginia.

INSTRUMENT USE

This researcher will use the results of data collected from already developed Geometry SOL tests. The Geometry SOL test consisted of 15 standards that comprise the test. Each of these standards and expectations were explained in Chapter II of this research study. The test was administered twice annually to all students who were enrolled in a Geometry course. The scoring of the test was based on the following constraints:

1) A score of 600 is a perfect score
2) A score of 500 is passed advanced.
3) A score of 400 is pass proficient.
4) A score of 399 and below is failing.

To improve the security of test results in a school system in Southeast, Virginia, peer teachers administered the SOL test to students that they did not teach.

METHODS OF DATA COLLECTION

The data were collected from the Mathematics department at a high school in Southeast, Virginia, for the two-semesters, fall 2001 and spring 2002. Permission to release the data was granted by the Testing Department of a school system in Southeast,

Virginia, upon the condition of confidentially of all students involved. All students who took the Geometry SOL test were included in this study. Some students previously passed the Geometry SOL test in an earlier iteration and were not required to take the test again. These students' scores were excluded from the results of this study.

STATISTICAL ANALYSIS

Once the data had been collected, a t-test was used to determine if there was a significant difference between the means of the two groups. The two groups were the students who were enrolled in the one-semester Geometry class and the other group was the students who were enrolled in the two-semester Geometry A/B class.

SUMMARY

Chapter III provided an overview of the purpose of this study. The population that was involved in this study, the instrument used for this study, and the methods of data collection were discussed. The statistical analysis used for the research of the differing classes for the Geometry SOL test were also explained in this chapter. In Chapter IV the data were analyzed and the findings of this study were reported.

CHAPTER IV

FINDINGS

This study was undertaken as an experiment to determine if there was a significant difference between the Geometry SOL scores of two types of Geometry classes taught in different scheduling formats. Format one consisted of the one-semester class where the students completed the class in one eighteen week semester and the other was where the students complete Part A of the course in the first semester and Part B of the course in the following semester. This chapter will report the findings for the research study. The sub-sections of Chapter IV include the following; a brief introduction, Mean Comparisons, Results, and Summary.

MEAN COMPARISONS

The Mathematics Department from a high school in Southeast, Virginia, provided the data collected for this research study. The data analysis was a cumulative total of Geometry SOL scores from fall 2001 and spring 2002. The population of the Geometry (one-semester) group was 315. The Geometry A/B group had a population size of 119. The means were tabulated for both groups and then later used to calculate the t-coefficient. The results from the statistical analysis will be presented later in this chapter.

Table 2 shows the Mean Scores for the two controlled groups.

TABLE 2

MEAN SCORES

Group	Mean
Geometry (one-semester)	473.47
Geometry A/B (Two-semester)	436.29

The average mean score from the Geometry (one-semester) group was 473.47 and the Geometry A/B group had a mean score of 436.29. The difference between the two groups means was 37.18.

RESULTS

The t-test results showed a t-coefficient of 6.24 which exceeded the level of .01 $p>2.880$. The degree of freedom was 432.

SUMMARY

In summary, the findings reported a 37.18 difference in the means of the two groups. The Geometry (one-semester) class had a mean score of 473.47 while the Geometry A/B group had a mean score of 436.29. The data were cumulated from two-semesters, fall 2001 and spring 2002. In Chapter V, the interpretation of the findings of this research report was provided along with conclusions and recommendations for future study.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

In spring 2001, a school system in Southeast, Virginia, decided to implement an alternate format for taking classes in a slower paced two-semester approach. This new format was a modification of the current 4 x 4 block schedule and it was specifically implemented in the Mathematics Curriculum. The intention of this scheduling change was to raise every school in the division to full SOL accreditation. This chapter will summarize the entire research study. After summarizing the research study, it will draw conclusions from the findings and will conclude with recommendations for future studies.

SUMMARY

The purpose of this study was to determine if there was a significant difference in mean scores of two controlled Geometry groups in an experimental study. The specific scores involved here were Geometry SOL scores spanning two semesters, fall 2001 and spring 2002. One of the controlled groups was students who took Geometry in the one-semester format and the other was students who took Geometry in a two-semester format called A/B. The hypothesis was:

H_1: Students who complete the A/B Geometry class will have higher SOL scores on average than the students who complete the one-semester Geometry class.

This study examined the SOL scores for the two Geometry groups at a high school in Southeast, Virginia, spanning the school year 2001-2002. The main focus was to determine if there was a significant difference between the means of their SOL test

scores. To date there has been no examination of the effectiveness of the two-semester Math class verses the one-semester Math class. This research study concentrated on Geometry courses taught at a high school in Southeast, Virginia.

One way to determine if there was a difference in the effectiveness of the two Geometry classes taught in different scheduling formats was to look at their SOL test scores. Statistical analysis was performed to determine if there was a significant difference between the two means of the scores. The results of the statistical analysis provided the school some insight on these two class formats and their effectiveness.

The limitations set certain boundaries. All students that were enrolled in the Geometry courses were involved in the testing regardless of grade level. The assumption was that all Geometry students taking this SOL test had mastered all Geometry SOLs prior to taking the SOL tests. Another basic assumption was that all Geometry students had successfully completed an Algebra 1 course and passed the Algebra 1 SOL test. The data were collected and provided to the researcher by the Mathematics Department of a high school in Southeast, Virginia.

The review of literature confirmed that block scheduling was a necessary entity in secondary schools in the United States. The 4 x 4 block scheduling model is one of the most widely used. The school system in Southeast, Virginia, adopted 4 x 4 block scheduling in 1995 and it's the standard in the school system today. In 2001, the school system also adopted a slight modification to the standard 4 x 4 block scheduling specifically in the Mathematics Curriculum. This special scheduling was called A/B block scheduling where students took Part A of the class in semester one and Part B of the class in semester two. This A/B scheduling was specifically started to help

accommodate slower learners and special needs students. Also involved in the review of literature was the description of the Virginia SOL tests. The Virginia SOL tests are end of course competency tests given usually in mid-January and late-May to accommodate 4 x 4 block scheduling. The Virginia SOL tests were created in 1995 to measure the effectiveness of education in Virginia Public Schools. Another purpose of the Virginia SOL was to increase the standards in secondary education. This study concentrated specifically on the Geometry SOL scores. The two control groups involved in this study both took the same Geometry SOL test regardless of teaching format.

The procedures for the study included gathering test scores for all Geometry students taking the SOL test. The data were released with permission of the Testing Department of a school system in Southeast, Virginia. The population for the research study involved all students that were taking Geometry classes. Two semesters were included in this study, fall 2001 and spring 2002. The total population included 315 students in the Geometry one-semester class and 119 students in the Geometry A/B class. All scores from special needs students were included in this study.

The statistical procedures involved in the study included calculating the means of the two groups. A t-test was conducted to validate whether there was a significant difference between the means of both groups. The results and conclusions from the t-test will be forthcoming in the conclusions section of this chapter. In the final section of this chapter, recommendations and suggestions are provided for future research studies.

CONCLUSIONS

The hypothesis for this study was:

H_1: Students who complete the A/B Geometry class will have higher SOL scores on average than the students who complete the one-semester Geometry class.

The hypothesis, which stated there would be higher mean scores for students taking the Geometry A/B class than those students taking the Geometry one-semester class, was rejected. The t-test produced a t-coefficient of 6.24 which was significantly higher than .01 level at $p>2.880$ significance level. The t-test clearly showed that there was a significant difference between the means of the two control groups. The hypothesis stated that there was a higher mean average for the Geometry A/B students. The results of the study clearly showed that the students taking the Geometry one-semester class had a significantly higher mean and therefore the hypothesis was rejected.

RECOMMENDATIONS

A school division in Southeast, Virginia, implemented modified 4 x 4 block scheduling in the 2000/2001 school year specifically in the Mathematics Curriculum. The intent was to accommodate slower paced students and special needs populations. The findings and conclusions from the research study stated that the students in the one-semester Geometry class did much better on the SOL Tests. On the other hand, test scores were only one factor in determining the effectiveness of the two 4 x 4 scheduling formats. Many other factors should be researched and studied before a final determination on the effectiveness on the two types of scheduling formats is made. To help validate and confirm the effectiveness of the two scheduling formats, the researcher recommends:

1. Perform the same research study in five years after the new A/B scheduling has completed its infancy and more students are enrolled in this version of the class.
2. Investigate the grade point average of students enrolling in each type of scheduling as a predictor of SOL test scores.
3. Investigate students as to what background Mathematics classes they have taken before enrolling in a Geometry class.
4. Investigate student's Algebra 1 SOL test scores as a predictor of the Geometry SOL test scores.
5. Investigate other types of traditional and non-traditional scheduling formats to compare SOL test scores from neighboring school divisions.
6. Investigate the most effective techniques and approaches taken by A/B Geometry teachers to bridge the gaps between the two semesters.
7. Investigate a grade-level analysis involving the students enrolled in a Geometry course as a predictor of SOL test score success.
8. Investigate the Geometry SOL after school tutoring initiative as a predictor for increasing SOL test scores regardless of scheduling format.

BIBLIOGRAPHY

4 x 4 Block Scheduling Evaluation. (1999, June). ED427037 96. ERIC Digest RIEJUN1999. pp. 101-144.

Adams, Don C., Salvaterra, Mary E. (1997). Block Scheduling Pathways to Success. Lancaster, Pennsylvania: Technomic Publishing Co., Inc.

Brake, Nicholas L. (2001, May). Student Course-Taking Delivered through a High School Block Schedule: The Relationship between the Academic Core and Student Achievement. ED448194 01. ERIC Digest RIEMAY2001. pp. 4-8.

Commonwealth of Virginia. (1995, June). Standards of Learning for Virginia Public Schools Secondary Courses. Board of Education, pp. 2, 9-12.

Crites, Amanda. (2001). Block Scheduling Verses Traditional Scheduling and Its Effects on Students SAT Scores. Research Report. pp. 2-6.

Edwards, Clarence M., Jr. (1995, May). Virginia's 4 x 4 High Schools: High School, College, and More. NASSP Bulletin; Vol. 79, no. 571. pp.23-41.

Gandara, Patricia, ed. (2000). The Dimensions of Time and the Challenge of School Reform. New York, New York: State University of New York Press.

Hackmann, Donald G., Hecht, Janet E.; Harmston, Matt T., Pliska, Ann-Maureen, and Ziomek, Robert L. (2001, September). Secondary School Scheduling Models: How Do Types of Models Compare to the ACT Scores? ED452230 01. ERIC Digest RIESEP2001. pp. 3-22.

Hottenstein, David. (1998). Intensive Scheduling: Restructuring Americas Secondary Schools Through Time Management. Thousand Oaks, California: Corwin Press, Inc.

Kramer, S.L. (1996). Block Scheduling and high school mathematics instruction. The Mathematics Teacher, Vol. 89, no. 9. pp. 758-768.

Mathematics. (2002). http://www.library.thinkquest.org/50059/gather/SOL/math.intro.html. pp. 1-2.

Pisapia, John, and Westfall, Amy Lynn. (1997). Alternative High School Scheduling. Student Achievement and Behavior. Research Report. ED411337. Clearing House No. UD031868. pp. 9-43.

Standards of Learning Resources for Rockingham County Public Schools' Teachers and Students. (1998). http://www.rockingham.k12.va/vasol.htm. p. 1.

Stories from the Field: A State-by-State Review. (2002).
http://www.lab.brown.edu/public/pubs/ic/block/Section7.shtml. pp. 1-9.

Virginia Graduation Requirements. (1997).
http://www.internet-high.com/va/vgr02.html. pp. 1-3.