ABSTRACT

Coil, Krist Tina. Effects of Block Scheduling on the Level of Student Achievement of Agriculture Education Students in North Carolina. Under the direction of Dr. Jim Flowers.

The primary purpose of this study was to determine the impact of block scheduling on VoCATS scores of Agricultural Education students in North Carolina. The research objectives of this study were to determine if block scheduling affects student performance on VoCATS assessments and to determine if there is a relationship between size of school and level of achievement of students on block scheduling.

Data were collected using the survey method. Surveys were mailed to VoCATS coordinators of identified schools. The data were collected during the late summer of 1999.

The use of block scheduling is prevalent in high schools in North Carolina. According to analysis of data, overall block scheduling does not have a significant affect on student achievement, however there were areas of significant differences noted. School size as an interaction with schedule type does not affect student achievement, however data analysis of schedule type reveled that it was significant in the interaction between schedule and school size of Horticulture I mastery scores.

More research to determine effects of block scheduling other than just student achievement was recommended.
EFFECTS OF BLOCK SCHEDULING ON THE LEVEL OF STUDENT ACHIEVEMENT OF AGRICULTURAL EDUCATION STUDENTS IN NORTH CAROLINA

by

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Approved by ________________________________ ______________________________
Chair of Advisory Committee

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DEDICATION

This is for "Mumford" and Dad.

For all of the hugs, love and support

You have so unselfishly given me,

Here is your hug.
BIOGRAPHY

Tina is a native of Bloomingburg, Ohio, and is the daughter of Warren and June Coil. She is a 1992 graduate of Miami Trace High School. After high school she attended Midway College in Kentucky where she completed an Associates of Arts degree in Fashion Merchandising. Following completion of her associate’s degree, Tina attended the University of Kentucky and graduated in 1997 with a Bachelors of Science degree in Agricultural Education. While a student at UK, she was active as an Ambassador for the College of Agriculture, team captain for the UK Equestrian Team and was named “Outstanding Agricultural Education Member” for the Agricultural Education Society.

Upon graduation, Tina moved to North Carolina and taught Agricultural Education at Eastern Randolph High School for two years while working on her Masters of Science in Agricultural and Extension Education at North Carolina State University.

Upon completion of her thesis and graduation, Tina plans to pursue a Ph.D. in Animal Science.
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CHAPTER 1

INTRODUCTION

Introductory Statement

Block scheduling is no longer a possibility, it is reality. In a society filled with change and uncertainty, the educational needs of this nation’s students are foremost in everyone’s mind. Adequate education for America’s students to meet the changing needs of today’s society is a challenge that is being met by the educational system. According to a 1983 study A Nation at Risk conducted by the National Commission on Excellence in Education, the educational system in the United States was in jeopardy. Drastic changes were called for in our educational system. Higher standard therefore, more education to better prepare students for the changing world was demanded. As a result, American schools were urged to create more time for learning. “This will require more effective use of the existing school day, a longer school day, or a lengthened school year (A Nation at Risk, 1983 p. 4).”

In some cases, this has been addressed by the implementation of block scheduling where classes are taught in longer periods of time such as ninety minutes, two or even four hours per day. Sommerfeld (1993), discussing the time issue stated “We have met the enemy, and they are hours” (p 4). Block scheduling is rapidly
becoming an accepted practice by many schools within the United States educational system, even though the jury is not yet in on the effects of block scheduling (Schroth & Dixon, 1996). There is a need for further evaluation of the restructuring of time.

Student achievement is a measure of student success in an academic setting. It should be the goal of every parent, teacher, and school administrator to encourage and foster student success. According to Julia Anderson (1994), in the past ten years, our nation has watched young people from other countries outpace and outperform our own in scholastic achievement. All the while, business and industry have cited our student’s lack of academic skills to keep our nation technologically and economically competitive. Among the criticisms of the United States’ schools are the low achievement scores on tests of basic skills (Stinson, 1994).

In an attempt to improve the level of student achievement, all factors must be considered, but recently time reorganization in the form of block scheduling has emerged as a priority. Many researchers including Bennett (1981) have found that the length of the school day and time organization were directly related to student achievement. Even though time organization and student achievement were directly related, the level of significance this relationship remains unclear due to a lack of systematic research in this area (Russell, 1997). Studies by Furman and McKenna (1995) and Watts and Castle (1993) evaluated the need for rescheduling the school day, yet failed to present data regarding the effect on student achievement. A report by National Education Association (NEA, 1994) reported numerous changes as a
result of implementing block scheduling, but there was no mention of improved student achievement. This study will discover whether block scheduling is meeting the achievement needs of the educational system by increasing student achievement in selected courses.

**Statement of the Problem**

Before block scheduling can become a tradition, it must be fully assessed to determine if it is beneficial to our students. Seventy-four percent of all high schools in North Carolina are now on some form of block scheduling (NC DPI, 1999). Much needs to be learned about the effects of block scheduling on student performance. Without detailed knowledge of what types of programs and under what conditions actually provide a better match to the unique development needs of early adolescents, practitioners are left to select or design programs with little knowledge and quantitative data of their effectiveness (Russell, 1997). Blocher (1997) said that studies detailing the effects of block scheduling on student performance were limited, and there was a need to conduct more studies. Blocher is not the only researcher calling for more studies on the effects of block scheduling on student achievement and other non-academic areas. Russell (1997) felt that there was a need for further evaluation due in part to the fact that current comparisons of newly implemented time reorganization programs with its previous program have
often failed to demonstrate any significant differences after implementation. Sadowski (1996) observed that systematic forms of research on the effectiveness of block scheduling were scarce. Wortman (1997) posed the question “Will block scheduling be advantageous to the agricultural education program” (p 3)? The work of Becton (1996) and Wortman, (1997) answered part of this question by determining perceptions of block scheduling by both students and teachers. We now need to know how block scheduling has affected the level of achievement of agricultural education students. While researchers talk of the benefits of block scheduling for teachers and students, it is interesting that data on the measure of achievement most stressed today, test scores, is conspicuously sparse (Schroth & Dixon, 1996). There is enough history of block scheduling that it is now the time to determine the effectiveness of this most recent method of restructuring classroom time using the measure most often associated with effectiveness, student achievement.

**Purpose of the Study**

The primary purpose of this study was to determine the impact of block scheduling on the Vocational Competency Achievement Tracking System (VoCATS) scores of agricultural education students in North Carolina. VoCATS is
a system that uses a course blueprint for a curriculum guide and a pre and post test assessment to determine starting and ending points for students enrolled in vocational education classes. The research objectives of this study were to:

1. Determine if block scheduling affects mastery by students on the VoCATS assessment in identified agricultural education programs.
2. Determine if block scheduling affects gain by students on the VoCATS assessment in identified agricultural education programs.
3. Determine if there is a relationship between size of school and level of achievement of students on block scheduling and traditional scheduling.

**Definition of Terms**

1. Agricultural Education- The term applied to the modern high school course dealing with agriculture (Herren & Donahue, 1991).
2. Alternative Scheduling- Scheduling system in schools in which classes meet on a basis other than six periods each day (Carroll, 1990).
3. Block Scheduling- At least part of the daily schedule organized into larger blocks of time (more than sixty minutes), to allow flexibility for a diversity of instructional activities (Cawelti, 1994).
4. End Of Course Test - An examination administered to students following the completion of instruction in a specific subject matter area to determine level of understanding of concepts taught.

5. Gain - The percent gain between pre and post test scores.

6. Mastery - The level achieved when students score at or above the 80% level on the end of course test.

7. Percent Gain - The percentage of students demonstrating a gain in score between the pre and post tests.

8. Percent Mastery - The percentage of students scoring at or above the 80% level on the end of course test.

9. Traditional Scheduling - A scheduling system in which students typically enroll in six courses that meet daily for approximately 45-55 minute periods during a 180-day school year (Carroll, 1994).

10. VoCATS - (Vocational Competency Achievement Tracking System) - A curriculum model for all vocational education courses in North Carolina, including course blueprint, curriculum guide and a test-item bank (Wortman, 1997).
Limitations

1. Even though a return rate of 59% was achieved, the number of respondents was limited due to the time of year in which the data were collected. As school system employees, not all VoCATS coordinators are twelve-month employees. When the survey was mailed to them in July, many coordinators may not have been employed at the time.

2. Data for each individual student in every program surveyed was not available therefore this study used a mean score that was representative of each school. This is the accepted unit that is used to report test results to the North Carolina State Department of Public Instruction.

3. With only 9% of the schools in this study using a traditional schedule, the reader should be cautious when applying the results of this study. With such a low number of traditional schools, any school in this group with exceptionally high scores could potentially skew the outcomes of the study.

Summary

In the short term, block scheduling has become the direction and focus of educational reformers. It is imperative that educational professionals understand the effects of block scheduling on the agriculture educational program if it is to be
used to benefit the students. It is the objective of this researcher to analyze those
test scores and to determine if block scheduling has had an effect on the
achievement level of agricultural education students, and if so, whether it has been a
positive or negative effect. There needs to be substantial evidence that the
restructuring of class time organization benefits the students. More research needs
to be conducted in order to support the validity of reorganizing the school day from
a traditional schedule to a block schedule.
CHAPTER 2

REVIEW OF LITERATURE

Overview

A literature review was completed using the following resources: various sources in D. H. Hill library (North Carolina State University), W.T. Young and the education libraries (University of Kentucky), the Educational Resources Information Center (ERIC), and the World Wide Web. Faculty at North Carolina State University provided some documents. The review of literature was conducted to provide background information on related studies. The review of literature was divided into the following subheadings: Block Scheduling in North Carolina, Student Achievement and Testing, Advantages of Block Scheduling, Disadvantages of Block Scheduling, Block Scheduling and Testing, and Summary.

Block Scheduling in North Carolina

Block scheduling is often referred to as the Copernican Plan because it challenges the traditional school scheduling organization (Carroll, 1995). What is
block scheduling? Cawelti (1994) defined it as at least part of the daily schedule organized into larger blocks of time (greater than sixty minutes) to allow greater flexibility for a diversity of instructional activities.

Block scheduling is a reorganization of school time that is increasingly being adopted by North Carolina public high schools (Averett, 1994). The use of the Block Schedule (4 x 4) is the most rapidly growing practice in North Carolina high schools. The College Board reported that nationwide in 1994 about 350 schools implemented some form of block scheduling. They also report that block scheduling is not a national trend, but that it is most prevalent in North Carolina and Virginia (Averett, 1994). A study by the North Carolina Department of Public Instruction (1999) found that during the 1997-98 school year, 290 (73.6%) high schools in North Carolina were using block scheduling. Students in North Carolina that are on block scheduling receive about 30 fewer hours of instructional time per class over the course of a semester when compared to total instructional hours received on a traditional schedule (Averett, 1994).

One of the first schools in the state to change to block scheduling was Asheboro High School in the 1992-1993 school year. Following the switch to block scheduling, Asheboro High School graduates who qualified for the entrance to the University of North Carolina system were up by 18% to a total of 82% by the 1994-95 school year when compared to the 1991-92 school year when only 64% of
the Asheboro graduates qualified for entrance into the University system (Winans, 1997).

**Student Achievement and Testing**

Even though there were a number of studies in the 1980s that focused on variables such as “time on task” and “academic learning time”. Anderson (1994) felt that time as an educational variable that could be manipulated had yet to capture the attention of school reformers. This may have been the opinion in 1994, but by 1999 time as a variable in the learning process has stolen center stage. *A Nation at Risk* (1983) urged American schools to allocate “significantly more time to learning. This will require a more effective use of the existing school day, a longer school day, or a lengthened school year”(p 4). This abandonment of the Carnegie unit is a common theme among education researchers. Joseph M. Carroll (1994) foresaw the need of a revolution in education that was to focus on “eliminating the Carnegie unit that has dominated, and impaired secondary education for almost a century”(p 106). The implementation of block scheduling has not eliminated the Carnegie unit, but it has drastically modified the use of the Carnegie unit.

Research that has been conducted offers support to the direct relationship between student achievement and time. In one study, students were given less time to complete tasks. The results indicated that spending insufficient learning time had
a direct negative effect on achievement (Gettinger, 1995). In another study that
examined the link between the school day length and time allocated in
identified subjects, and test scores, similar results were found. Results of this study
implied that more time allocated to science and mathematics and a longer school day
are directly associated with higher test scores in all skill areas (Wheeler, 1986-87).

Limited studies of block scheduling have found higher levels of achievement.
Indicators of this are the use of grade point average, number of A’s and F’s earned
and the number of students attaining honor roll status (Buckman, King, & Ryan,
1997; Edwards, 1995; Hart, 1994; Hottenstien & Malatesta, 1993; Schoenstien,
1997). Lybbert (1998) stated that schools consistently report that the number of
students on the honor roll increased after changing to block scheduling. Western
Branch High School (1996-97) in Chesapeake, Virginia, conducted a two-year
follow up after switching to block scheduling. The following results as related to
student achievement were reported. The percentage of A’s stayed the same or
increased in most subject areas. The percentage of B’s like the A’s stayed the same
or increased in the first year but unlike the A’s, the B’s decreased in the second year
after switching to block scheduling. The number of students taking AP tests
increased and the percentage of students scoring a “3” or better on AP tests
remained stable at a percentage above 60 in both years. Also SAT mean scores on
verbal and math sections increased above previous non-block scores. Russell (1997)
found in her study of student achievement enhancement by middle-level
programming, that in 10 of the 28 possible cases of relationships, the regression and correlation analysis revealed a small, positive, statistically significant relationship. Reid (1995) also found improvements in the writing ability of students in block scheduled English courses.

A study conducted at Philo High School in southeastern Ohio parallels results from other studies. Parallels include higher grade point averages for students on block scheduling, a higher number of students making the honor roll, reduced disciplinary referrals, and improved student-teacher relationships. According to the study, block scheduling has had its greatest impact on the academic success of ninth grade students. The average number of ninth grade students making honor roll status doubled for the first grading periods and showed a total increase of 92% under block scheduling for the first year. Juniors and seniors also benefited from the change to block scheduling. After one year of block scheduling, eleventh and twelfth grade students achieved a 24% increase in the number of A’s and a 15% decrease in the number of F’s (Einder and Bishop, 1997).

Reid, Hierch, and Veregin (1994) examined gains in measures of achievement other than test scores and found improvements after the second year of block scheduling. A study of schools in North Carolina by Averett (1994) indicated that block scheduling had only a slight positive or no effect on achievement in the five subject areas of Economic, Legal, and Political Systems in Action (ELPS), United States History, English I, Geometry, and Algebra II, that were studied.
Studies have also taken into account not only the quantities or amount of education students are receiving, but also the quality. According to Adelman and Pringler (1995) more is not necessarily better. Increasing the amount of time students spend in school will not, by itself, lead to higher student achievement. They found this in a case study of two elementary schools that increased the length of the school year to 220 days. The increase of time was implemented with no opportunity for the schools’ faculty to plan for the added time. What the researchers found was that while quantity of time was increased, teachers did not increase the quality of education the students received. They simply taught in 44 weeks what had previously taken 36 weeks. Student scores on a standardized test did not improve enough to justify sustaining the experiment by the school district.

According to the findings of a Harvard University evaluation team, students on block scheduling and students on traditional schedules show similar scores. While the students on the different schedules scored alike, the differences of academic learning appeared in the students on block scheduling. Those students had the opportunity to participate in enrichment courses such as seminars, independent studies, and foreign language enrichment programs, and they completed 13% more course credits than the students on the traditional schedule (Carroll, 1994).

Meadows (1995) studied student achievement in four schools in Maryland that adopted a 4x4 block schedule in 1992 or 1993. She reported no significant change
in student achievement levels on course finals in English or mathematics. Stennett (1985), Stennett and Rachar (1973) and Smythe, Stennett and Rachar (1974) also reported findings of lack of effect on student achievement by block scheduling. All three studies were conducted on mathematics students in London, Ontario. Carroll (1994, 1995) found that achievement test results showed no significant difference between students on block scheduling and those on a traditional schedule. Also noted was no difference in retention of material by the two groups. Lockwood (1995) reported no significant difference in achievement in algebra and geometry students on block versus traditional schedules. This was measured by using the results of high school subject tests and standardized algebra and geometry tests. Van Mondfrans, Schott and French (1972) concluded that achievement and attitude scores were not affected by the two different types of schedules when applied to ninth through twelfth graders in required courses.

Other researchers have found that block scheduling has a negative effect on student achievement. The strongest data supporting this comes from Bateson's (1990) study of science achievement in British Columbia. Semester schools (4x4) reported strongly negative results when compared to scores from students on traditional schedules. Students in semester schools scored significantly lower than students in traditional schools in all six domains tested. The six domains tested were (a) Processes and skills, (b) Knowledge: Recall and understanding,
(c) Application of science concepts, (d) Rational and critical thinking, (e) The nature of science and (f) Safety. As indicated by Bateson, students in traditional schools outscored students in semested schools in all test questions. Marshall, Taylor, Bateson, Bridgen (1995) study supported Bateson’s 1990 study. Marshall, et al. replicated Bateson’s study and also applied it to mathematics students. Results in Marshall, et al. study, according to Kramer (1997), were not as strong as Bateson’s findings, but Marshall, et al. also found a negative effect of block scheduling on student test scores. Prior to Bateson’s study was a study by Raphael, Wahlstron, and McLean (1986). This Canadian study, like ones that came after it, found negative results in achievement, specifically a decline of achievement in mathematics. Wronkovich, Hess, and Robinson (1997) concluded students in traditional schedules in math should perform better in collegiate level mathematics than those enrolled in block scheduled classes.

**Advantages of Block Scheduling**

Carroll (1994) found that in evaluating schools using block scheduling that students had equal or better mastery and retention of material. According to Carroll (1995) under block scheduling virtually every high school in this nation can get students to master 25 to 30% more information. The Wisconsin Education Association Council (1996) reported that at Hottenstein and Malatesta High Schools
the number of students who made the honor roll increased from 244 to 534 students with the implementation of block scheduling. Schoenstien (1995) found after block scheduling was implemented in a Colorado high school, that the number of students on the honor roll and attending college increased.

According to a study by the North Carolina State Department of Public Instruction (Averett, 1994) over 75% of teachers surveyed believed that block scheduling has had a positive effect on student grades, problem solving ability, higher-order thinking, achievement on tests, and in-depth knowledge of subject matter. There are other effects of block scheduling.

Guskey and Kifer (1995) found less discipline problems in their Maryland school. After studying the effects of implementation of block scheduling in a Colorado high school, Schoenstien (1995) found that student and staff stress was lower and daily attendance was up. Reid (1995) also found that English students believed their writing had improved under the block schedule.

Carroll (1994) stated that other advantages of block scheduling include improved relationships between teachers and students, and teachers and students are provided with more manageable workloads. Other advantages of block scheduling include more opportunities with a larger variety of course offerings, more preparation time for teachers, more class activities, more cooperative learning between students, more time to motivate students and to work on skills such as problem solving, and communication and time management (Winans, 1997). Canady and Rettig (1993)
reported a number of advantages to using a block schedule. These are (a) teachers have fewer students to work with daily, a lower number of records to keep, a reduced number of courses for which to prepare and increased planning time; (b) students earn more credits each year; (c) students have fewer classes, therefore reducing the number of tests and homework assignments each day; (d) quality instructional time per day is increased; (e) class changes are reduced so schools are less chaotic; and (f) a greater use of a variety of instructional models is made possible such as cooperative learning, inter/ intradisciplinary instruction and portfolio assessment. By reducing the number of class changes each day, schools are also reducing the number of opportunities for disruptive behavior among the students. Longer class periods allow teachers more time to employ preventive disciplinary measures in class than during shorter class periods may be foregone in an attempt to cover as much material each day as possible (Einder and Bishop, 1997).

During a two-year follow up study of Western Branch High School (1997), several advantages of the block schedule were noted. Attendance rates increased during the two years since switching to block. Graduation rates based on average daily attendance remained stable or increased both years and the dropout rate decreased during the first year of block. Wronkovich, Hess, and Robinson (1997) determined that teachers felt that extended daily class time enhanced the
understanding of certain concepts. This came after completing the first year of block scheduling and reaching a comfort level with the restructured class time.

**Disadvantages of Block Scheduling**

According to Wronkovich, Hess, and Robinson (1997), disadvantages of block scheduling include teacher’s ability to cover all materials, time “gaps” between consecutive classes such as Algebra I & II, teacher’s ability to hold the attention of the students for extended time periods, and the lack of assimilation time between practice sessions. Also noted was that students inappropriately placed in classes above of their capabilities are at greater risk when on block scheduling. Not all research has proven block scheduling to be advantageous to student achievement. Data has been presented by King, Clements, Enno, Lockerbie and Warren (1975) and Gore (1996) indicating that improved grades on block schedules may be the result of grade inflation.

Other areas that have a direct impact on student achievement have been studied and have been found to negatively effect student achievement. Data from these studies suggest that even though students may enjoy classes on block scheduling, they may not be learning as much as or have mastered the materials as well as students on traditional schedules. Supporting this claim is a comparison of data from the Second International Science Study (SISS) and the Second International
Math Study (SIMS). Comparisons were of achievement of students enrolled in semestered programs with students enrolled in all-year programs. Achievement data for biology, chemistry, physics, grade 12 mathematics, or grade 13 mathematics were analyzed. In every subject area tested, all year students achieved higher mean scores than semestered students, with statistically significant differences in grade 12 math and grade 13 specialties (Raphael & Wahlstron, 1986; Raphael, Wahlstron, & McLean, 1986).

Kramer (1997) found that teachers cover less content after switching to block scheduling, and Chandler (1994) found another disadvantage in block scheduling is that students do not meet with their teachers on a daily basis throughout the school year. This raises concern for teachers who assert that daily drill and practice are required for skill mastery, particularly for low achieving students.

**Block Scheduling and Testing**

Preliminary indications are that across all schools in North Carolina, block scheduling has had little effect on end-of-course test scores to date. Average scores are about the same as before block scheduling. Long-term effects on student achievement have not been evaluated yet. Until students have been in block scheduling for several years, its effects on SAT scores, and long-term retention of knowledge and skills cannot be gauged (Averett, 1994). Averett also found that over
75% of the teachers surveyed believed that block scheduling would have a positive effect on student grades and achievement on tests.

In a study by Baylis (1983), post-test scores for community college students on block scheduling showed statistically significant advantages in attitudes, learning behaviors, and learning anxiety over students not enrolled in classes on the block schedule. Grade-point averages for the group on block scheduling was 2.31 verses a grade point average of 1.31 for students not on block scheduling. Guskey and Kifer (1995) found a significant increase in standardized scores of African American students in their Maryland school.

In 1997, it was noted that the reading scores of second graders in Wilks County school system in Washington, Georgia, rose 17 points in two years on the Iowa Test of Basic Skills. Their math scores rose 23 points in two years. This was after switching to block scheduling in 1994 (Delany, Toburen, Dec1997/Jan 1998). According to O’Neil (1995) and Huff (1995) more students took and passed AP exams when on block scheduling and Khazzaka (1997-98) found in a study of six secondary schools that the average ACT score rose from 19 to 22.5.

**Summary**

The researcher found a void in the information available on the effects of block scheduling on testing and student scores as related to agricultural education. Some
research has been completed in this area, but not enough, as more research is being called for by other researchers. Block scheduling has become an accepted practice in North Carolina (Averett, 1994). There are many advantages to block scheduling such as higher grade point averages, higher levels of mastery and retention of materials taught, decreased discipline referrals, improved student-teacher relationships, and increased opportunities for students to participate in enrichment courses and to complete up to 13% more course credits (Carroll, 1994). Disadvantages of block scheduling include the inability of teachers to cover all material, time “gaps” between consecutive classes and the ability of teachers to keep the attention of students for extended periods of time (Wronkovich, Hess, and Robinson, 1997). Some studies have found that block scheduling has had little impact on student achievement (Buckman, King, & Ryan, 1997; Edwards, 1995; Lockwood, 1995; Meadows, 1995; Smyth, Stennett, and Rachar, 1974; Stennett and Rachar, 1973; Stennett, 1985; and Van Mondfrans, Schott and French, 1972). Other studies such as Bateson’s 1990 and Marshall’s, et al. 1995 studies found that block scheduling had a strongly negative affect on student performance. This study has helped to fill a void in this area by addressing the impact of block scheduling on student achievement and VoCATS scores.
CHAPTER 3

METHODOLOGY

Introduction

While the concept of block scheduling has become more widely accepted in recent years, information on the effects of block scheduling on the level of learning of agricultural education students in North Carolina is scarce. The primary purpose of this study was to determine the impact of block scheduling on VoCATS scores of agricultural education students in North Carolina and to identify any relationships between school size and student performance.

Research Design

The study used a descriptive research design. A census survey was employed to collect the data used in this study. This method was used because it is an acceptable way to gather data from a small population. Surveys are used to obtain standardized information from all subjects in the population (Borg and Gall, 1989).
Population

Of the agricultural education programs in the state of North Carolina, 213 were identified and surveyed. The schools were identified by using a list generated by the state FFA Association and modified by removing any programs in private schools, vocational centers, and junior high/middle schools. The rationale for removing programs in private schools from the population was that private schools are not required to administer the VoCATS assessment instrument. Vocational centers and junior high/middle schools were not included because these schools would not use a daily schedule that would be used in a high school setting. The population included all programs in North Carolina public high schools in which AgriScience Applications, Horticulture I or Horticulture II were taught during the 1998-99 school year. These courses were selected because they have the highest enrollment of agricultural education students in the state. The researcher used the entire population instead of a sample due to the availability of data. Data were representative of the student scores of mastery and gain. As this study was just a snapshot in time of student performance, results may be generalized to following school years due to the entire population being representative of AgriScience Applications, Horticulture I and Horticulture II.
**Instrumentation**

Data were collected by using survey methods. A questionnaire was developed to collect data for the study (See Appendix A). The questionnaire contained five questions. The first question determined the type of schedule the school followed. The second question established the size of the school for which data was being reported. The third and fourth questions asked for information from the 1998-99 school year. The information requested were the mastery and gain scores of VoCATS tests and the number of students enrolled in the following courses: 6810 AgriScience Applications, 6841 Horticulture I, and 6842 Horticulture II. The final question was to determine if the VoCATS coordinators would like to receive a copy of the results of the study.

**Data Collection Procedures**

Data were collected by obtaining records of VoCATS scores of the entire population. Questionnaires were sent to the VoCATS coordinators of all public high schools in North Carolina that had an agricultural education program for the school year of 1998-1999. Data were provided from schools on traditional scheduling systems and the block schedule. Data were separated into groups of AgriScience Applications and Horticulture I and Horticulture II.
The researcher mailed 213 questionnaires to 98 VoCATS coordinators in North Carolina. Each VoCATS coordinator was asked to supply information for each of the schools for which they were responsible; therefore some VoCATS coordinators received multiple questionnaires. The VoCATS coordinators reported data as percentages for student mastery and gain scores. The mailing included a cover letter (See Appendix B), the questionnaire/questionnaires, and a self-addressed stamped return envelope. Stamps were placed on the return envelopes to help ensure a higher rate of return (Dillman, 1978). VoCATS coordinators were asked to return the questionnaires in nine working days. Responses were collected from 102 questionnaires out of 213 for a return rate of 48%. A second mailing was completed three weeks later with 111 questionnaires mailed. In order to differentiate between mailings, different types of stamps were used on the return envelopes as well as each questionnaire was dated with a "return by" date. Data were collected from 24 additional sources with an 11% return rate. There were 14 surveys not used due to incompleteness, and 16 schools or Vocational directors chose not to participate in the study. The total return rate was 59%. As surveys were returned, they were divided into groups of early and late returns. Miller and Smith (1983) suggested that non-response error can be controlled by comparing early and late respondents. There were seventy-nine (82%) surveys in the early group and seventeen (18%) surveys in the late group (Figure 1).
Of those surveys returned early (seventy-nine), seventy-one (90%) reported using block scheduling. Eight (10%) surveys returned early reported using
traditional scheduling. Seventeen surveys were returned late. Sixteen (94%) of those were using block scheduling and the remaining survey (6%) reported using a traditional schedule.

Data analysis of mastery and gain scores and early versus late returns did not reveal any areas of significant difference. There were no significant differences noted in the interaction between the time when data were reported and the scores or between time the scores were reported, schedule and the scores.

**Analyses of Data**

Data were analyzed using SAS (1999) and Microsoft Excel 5.0. Data were reported as mean percentages. Mean percentages are how North Carolina school systems report scores to the Department of Public Instruction for accountability purposes. Differences were analyzed using an analysis of variance. Relationships were examined using a Pearson correlation coefficient, which produces the same results as a Biserial correlation coefficient (Howell, 1985). Relationships were examined in this manner due to the inability of SAS to compute a Biserial correlation coefficient. Data from the first question on the survey instrument were used to determine the scheduling status of the school represented. Data from this question were grouped according to the following: (a) schools on a traditional six or
seven period schedule (N=9) and (b) schools that were currently using some form of block scheduling (N=87).

The second question asked VoCATS coordinators to report school size according to the North Carolina High School Athletics Association ranking. This ranking was used because it is an acceptable method of school size classification. Questions three and four asked for student mastery and gain scores and the number of students enrolled for the 1998-99 school years in the following classes: (a) AgriScience Applications (b) Horticulture I and (c) Horticulture II. Data were also analyzed for significance in early versus late returns.

**Summary**

A census survey method was used in this descriptive study. The researcher mailed 213 instruments to 98 VoCATS coordinators in the state. A total return rate of 59% was achieved. Data were recorded using the Microsoft Excel 5.0 program. Data were then transferred into the SAS program for statistical analysis. Data were reported as mean percentages. Differences were analyzed using an analysis of variance. Relationships were examined using a Persons correlation coefficient, which is the same analysis as a Biserial correlation coefficient (Howell, 1985). Relationships were examined in this manner due to the inability of SAS to compute a Biserial correlation coefficient. Data revealed number of schools reporting use of
block scheduling versus traditional scheduling, school size, and student mastery and gain scores for: (a) AgriScience Applications (b) Horticulture I and (c) Horticulture II.
CHAPTER 4

RESULTS

The population of this study was all agricultural education programs in public high schools in North Carolina that taught (a) AgriScience Applications (b) Horticulture I and (c) Horticulture II during the 1998-99 school year. A survey instrument for each of the 213 programs was sent to the VoCATS coordinator of that program. The primary purpose of this study was to determine the impact of block scheduling on VoCATS scores of agricultural education students in North Carolina. The research objectives of this study were to:

1. Determine if block scheduling affects mastery by students on the VoCATS assessment in identified Agricultural Education programs.
2. Determine if block scheduling affects gain by students on the VoCATS assessment in identified Agricultural Education programs.
3. Determine if there is a relationship between size of school and level of achievement of students on block scheduling and traditional scheduling.
All responses that were received indicated that at least one of the three selected courses was taught at each school. Of the 126 responses received only 96 were usable. Total response rate was 59%.

**Block Scheduling in North Carolina**

VoCATS coordinators reported that eighty-seven (91%) schools were reported to be using some form of block scheduling while nine (9%) were using a traditional form of scheduling (Figure 4).

![Block Versus Traditional Scheduling in North Carolina](image)

**Figure 4. Block Versus Traditional Scheduling in North Carolina**
School size was reported according to North Carolina High School Athletic Association classifications. This is a commonly recognized method for describing school size in North Carolina. Schools are broken into four groups according to attendance records. Groups were very small (A), small (AA), medium (AAA), and large (AAAA). Twenty-eight (29%) of the schools in this study were classified as very small, 32 (33%) were classified as small, 24 (25%) schools were medium size, and seven (7%) schools were large. Size was not reported for five (5%) schools (Figure 5).

![Pie Chart]

Figure 5. Schools According to Size

Information was tabulated to provide data on school size and schedule type. Twenty-seven (28%) were very small schools and used block scheduling, one (1%)
was very small and using a traditional schedule, 30 (31%) schools were small and using block scheduling, and two (2%) were small and using a traditional schedule. Eighteen (19%) schools were medium and using block scheduling and six (6%) were medium and using a traditional schedule. Seven (7%) schools were large and using block scheduling. There were no schools that were large and using traditional scheduling. Five (5%) schools reported using block scheduling but did not report school size (Figure 6).

![Graph showing Schedule Type and Size Interaction](image)

**Figure 6. Schedule Type and Size Interaction**
Effects of Block Scheduling on Student Performance on VoCATS Assessments

Effect of block scheduling was determined by analyzing percent mastery and percent gain scores of students in selected courses on both block schedules and traditional schedules. Percent mastery and percent gain scores are acceptable units that are used to report student performance on VoCATS assessments to the North Carolina Department of Public Instruction. Percent mastery is the percent of students scoring at or above the 80% level on the end of course test. Percent gain is the percent of students demonstrating a gain in score between the pre and post tests.

The first research objective was to determine if block scheduling had an effect on percent of student mastery on VoCATS assessments. Analysis of data indicated that scheduling was significant (P>0.05) for student mastery of Horticulture I and Horticulture II (Table 1). Students in AgriScience Applications on a traditional schedule had a 4.29% mean. Students in AgriScience Applications on a block schedule had a 4.71% mean. The difference between block scheduling and traditional scheduling was .42. This was not significant. Students in Horticulture I on a traditional schedule had a 27.57% mean. Students in Horticulture I on a block schedule had a 7.70% mean. The difference between block scheduling and traditional scheduling was 19.87. This was significant at P< .001. Students in Horticulture II on a traditional schedule had a 33.88% mean. Students in
Horticulture II on a block schedule had a 10.57% mean. The difference between block scheduling and traditional scheduling was 23.31. This was significant at P< .002. Block scheduling has a negative effect on the mastery scores of Horticulture I and Horticulture II.

Table 1. Percent Level of Mastery for Students on Traditional and Block Scheduling.

<table>
<thead>
<tr>
<th></th>
<th>Traditional</th>
<th>Block</th>
<th>F-value</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Standard</td>
<td>Mean</td>
<td>Standard</td>
</tr>
<tr>
<td></td>
<td>Error</td>
<td>Error</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AgriScience Applications</td>
<td>4.29</td>
<td>3.82</td>
<td>4.71</td>
<td>1.15</td>
</tr>
<tr>
<td></td>
<td>(N=7)</td>
<td>(N=78)</td>
<td></td>
<td>.01</td>
</tr>
<tr>
<td>Horticulture I</td>
<td>27.57</td>
<td>5.40</td>
<td>7.70</td>
<td>1.67</td>
</tr>
<tr>
<td></td>
<td>(N=7)</td>
<td>(N=73)</td>
<td></td>
<td>12.37</td>
</tr>
<tr>
<td>Horticulture II</td>
<td>33.88</td>
<td>6.88</td>
<td>10.57</td>
<td>2.53</td>
</tr>
<tr>
<td></td>
<td>(N=8)</td>
<td>(N=59)</td>
<td></td>
<td>10.12</td>
</tr>
</tbody>
</table>

36
The second research objective was to determine if block scheduling had an effect on percent of student gain on VoCATS assessments. Analysis of data revealed no significance in percent level of gain for students on either schedule. Students in AgriScience Applications on a traditional schedule had a 11.29% mean. Students in AgriScience Applications on a block schedule had a 16.74% mean. The difference between block scheduling and traditional scheduling was 5.45. This was not significant. Students in Horticulture I on a traditional schedule had a 30.13% mean. Students in Horticulture I on a block schedule had a 30.36% mean. The difference between block scheduling and traditional scheduling was .23. This was not significant. Students in Horticulture II on a traditional schedule had a 52.75% mean. Students in Horticulture II on a block schedule had a 74.44% mean. The difference between block scheduling and traditional scheduling was 21.69. This was not significant.
Table 2. Percent Level of Gain for Students on Traditional and Block Scheduling.

<table>
<thead>
<tr>
<th></th>
<th>Traditional</th>
<th>Block</th>
<th>F-value</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Standard Error</td>
<td>Mean</td>
<td>Standard Error</td>
</tr>
<tr>
<td>AgriScience Applications</td>
<td>11.29</td>
<td>7.82</td>
<td>16.74</td>
<td>2.34</td>
</tr>
<tr>
<td>(N=7)</td>
<td>(N=78)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Horticulture I</td>
<td>30.13</td>
<td>9.93</td>
<td>30.36</td>
<td>3.10</td>
</tr>
<tr>
<td>(N=7)</td>
<td>(N=72)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Horticulture II</td>
<td>52.75</td>
<td>10.92</td>
<td>74.44</td>
<td>4.02</td>
</tr>
<tr>
<td>(N=8)</td>
<td>(N=59)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Effects of Block Scheduling in Relation to School Size on Student Performance on VoCATS Assessments

The third research objective was to determine if there was a relationship between block scheduling and school size on the performance of students on the VoCATS assessment. This was determined by analyzing data supplied by VoCATS.
coordinators of school size, type of schedule utilized by the school and mastery and
gain scores of students in selected courses.

The researcher found that correlations were weak and non-significant. With one
exception all correlation’s were close to zero. The correlation between size and
Horticulture I mastery was significant but it was also a weak correlation (Table 3).

Table 3. Correlation of school size and student performance.

<table>
<thead>
<tr>
<th></th>
<th>AgriScience Applications</th>
<th>Horticulture I</th>
<th>Horticulture II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mastery</td>
<td>-0.003</td>
<td>-0.241</td>
<td>-0.019</td>
</tr>
<tr>
<td>p value</td>
<td>0.980</td>
<td>0.048</td>
<td>0.892</td>
</tr>
<tr>
<td>Gain</td>
<td>0.039</td>
<td>-0.072</td>
<td>-0.068</td>
</tr>
<tr>
<td>p value</td>
<td>0.744</td>
<td>0.559</td>
<td>0.626</td>
</tr>
</tbody>
</table>

Summary

Block scheduling was used in 91% of the programs surveyed. Traditional
scheduling was used in 9% of the programs surveyed. Block scheduling has a small
significant, negative effect on the percentage of students obtaining the mastery level
in Horticulture I and Horticulture II courses. Traditional scheduling has a
significantly higher mean score for Horticulture I mastery (P=.001) than block
scheduling. Traditional scheduling also has a significantly higher mean score for
Horticulture II mastery (P=.002) than for block scheduling. The relationship of school size and student achievement was not significant.
CHAPTER 5

SUMMARY OF STUDY, CONCLUSIONS AND RECOMMENDATIONS

Overview and Purpose

The primary purpose of the study was to determine the impact of block scheduling on VoCATS scores of agricultural education students in North Carolina.

The research objectives of this study were to:

1. Determine if block scheduling affects mastery by students on the VoCATS assessment in identified Agricultural Education programs.
2. Determine if block scheduling affects gain by students on the VoCATS assessment in identified Agricultural Education programs.
3. Determine if there is a relationship between size of school and level of achievement of students on block scheduling and traditional scheduling.
Summary of Procedures

The population of this study was all agricultural education programs in public high schools in North Carolina which taught (a) AgriScience Applications (b) Horticulture I and (c) Horticulture II during the 1998-99 school year. Two hundred and thirteen schools were identified. The survey method was used to collect the data. A survey instrument was developed that had five questions which were designed to collect data such as schedule type and size of school in question to mastery and gain scores of (a) AgriScience Applications (b) Horticulture I and (c) Horticulture II.

Data were analyzed using SAS (1999) and Microsoft Excel 5.0. Data were reported as mean percentages. Differences were analyzed using analysis of variance. Relationships were examined using a Pearson correlation coefficient which produces the same results as a Biserial correlation coefficient (Howell, 1985).

Summary of Findings

Block scheduling was used by 91% of the schools in this study. Schools were divided into groups according to size; (a) very small (N=28), (b) small (N=32), (c) medium (N=24), and (d) large (N=7). Size was not reported for five schools.
Seventy-nine surveys were returned early while seventeen were returned late.

Block scheduling does affect student performance on VoCATS assessments. However significant differences were only noted in Horticulture I mastery (P=.001) and Horticulture II mastery (P=.002) scores. The mean scores for students on traditional scheduling were significantly higher for Horticulture I and II mastery scores than for block scheduling. The relationship between block scheduling and school size proved to be nonexistent for AgriScience Applications mastery, AgriScience Applications gain, Horticulture I gain, Horticulture II mastery, and Horticulture II gain. All correlation’s except for size and Horticulture I mastery scores were near zero. This is the one statistically significant correlation, but it is a low relationship.

**Conclusions**

Application of the results of this study must be done carefully due to the low number of schools on traditional schedules that were involved in the study.

Based on the findings of the study, the following conclusions were drawn.

1. Students enrolled in Horticulture I and Horticulture II in a traditional schedule mastered more of the competencies than students in schools where block scheduling was used.
2. Block scheduling does not affect scores for the following areas: AgriScience Applications mastery, AgriScience Applications gain, Horticulture I gain, and Horticulture II gain.

3. There was no relationship between school size and the type of schedule the school was using.

**Discussion**

Findings of this study indicate that a large percentage of schools regardless of size in North Carolina are currently using some form of block scheduling. Block scheduling does affect level of student mastery on VoCATS assessments in particular classes such as Horticulture I and II but there was no difference in gain scores. This lack of effect on gain scores may be due to that students in the top programs in the state started out with high scores and did not have much room for improvement. Analysis of scores showed that block scheduling had a negative effect on student performance in these classes. While there was a significant difference between traditional scheduling and block scheduling, it must be noted that the difference was only in the mastery scores and not the gain scores. AgriScience Applications is a survey course that is similar to courses found in general education such as English or history. Moreover, Horticulture I is a combination of survey and hands on work and Horticulture II, the most hands on of the three, is similar to other traditional types of vocational education like masonry and carpentry. In
conclusion block scheduling will affect students in these courses differently. It must also be noted that in this study when dealing with a small number of schools on the traditional schedule, any of these schools with high scores can drastically affect the mean score. The researcher was aware that the traditional group did include scores from the top horticulture programs in the state. These students started at the mastery level and did not have much room to improve.

With the exception of one weak correlation, block scheduling does not differentiate between size of the school implementing the change. The weak correlation was detected between Horticulture I mastery scores and school size.

An area of concern that has come to light as a result of this study is that there is a very low percentage of students achieving the mastery level. This may be an indicator of several problems. It may indicate that teachers are not teaching the required content or that there is a serious problem with the VoCATS system. Lack of mastery by students is a problem and needs to be addressed.

As block scheduling has had little impact on student achievement, the importance of block scheduling may be found more in the role it plays in time organization. Advantages of block scheduling as suggested by Canady and Rettig (1993) are that students earn more credits each year and that students have fewer classes therefore reducing the number of tests and homework assignments each day. Carroll (1994) suggested that other advantages of block scheduling include better relationships between teachers and students and that students have opportunities to participate in
enrichment courses and to complete 13% more credits than students on a traditional schedule. Winans (1997) believed that students have more opportunities with a larger variety of course offerings to choose from.

**Recommendations**

Based on the findings, conclusions and discussion of this study, the following recommendations are suggested:

1. Develop a record keeping system that allows for easy comparison of scores in order to determine benefits of alternative scheduling.

2. Further research needs to be conducted to analyze level of student achievement determined by factors other than VoCATS such as mid-term assessments, daily homework/classwork grades and daily hands on participation grades.

3. Replication of this study needs to be conducted and applied to other Agricultural Education classes in order to determine the effect of block scheduling on these courses.

4. Replication of this study needs to be conducted and applied to other vocational areas and to general education classes in order to determine the effect of block scheduling on survey courses versus “hands on” courses.

5. Research needs to be conducted to determine other advantages and disadvantages of block scheduling and its effects on performance.
REFERENCES


North Carolina Department of Public Instruction. (1999, April). Block scheduled high school achievement: Part III. NC DPI Evaluation Brief 1, 1-10


APPENDIX A

SURVEY INSTRUMENT
VoCATS Questionnaire

Please complete this questionnaire using information relevant to «SCHOOL» and return by July 23, 1999.

1. This school is on a (circle one)
   traditional 6 or 7 period schedule     or     block schedule.

2. Circle the athletic division this school falls in.          A       AA       AAA

3. Please list the mastery* and gain scores for the following classes for the 1998-99 (if available) school year.

   * Mastery is defined as students who score at or above the 80% level.

<table>
<thead>
<tr>
<th>course number and name</th>
<th>98-99 mastery</th>
<th>gain</th>
</tr>
</thead>
<tbody>
<tr>
<td>6810 AgriScience Applications</td>
<td>____________</td>
<td>______</td>
</tr>
<tr>
<td>6841 Horticulture I</td>
<td>____________</td>
<td>______</td>
</tr>
<tr>
<td>6842 Horticulture II</td>
<td>____________</td>
<td>______</td>
</tr>
</tbody>
</table>

4. Please specify the total number of students enrolled in the following classes for the 1998-99 school year.

<table>
<thead>
<tr>
<th>course number and name</th>
<th>number of students</th>
</tr>
</thead>
<tbody>
<tr>
<td>6810 AgriScience Applications</td>
<td>________________</td>
</tr>
<tr>
<td>6841 Horticulture I</td>
<td>________________</td>
</tr>
<tr>
<td>6842 Horticulture II</td>
<td>________________</td>
</tr>
</tbody>
</table>

If this school offered none of the classes in the 1998-99 school year, please leave questions 3 and 4 blank and return the questionnaire.
5. Would you like to receive a synopsis of the results of this study? (circle one)

YES  NO

Thank you for your time.

Please return to: Tina Coil, PO Box 693, Ramseur, NC, 27316  by July 23,1999
APPENDIX B

FIRST COVER LETTER
July 12, 1999

Dear VoCATS Coordinator:

Block Scheduling has swept across our state and many schools have switched to it. Limited data is available on the effects of block scheduling on student performance. North Carolina State University with support from Workforce Development Education in the Department of Public Instruction is conducting a study of block scheduling. We need your help to determine the effects of block scheduling on VoCATS scores of selected agriculture courses. Your participation is important to the study due to the number of schools with data to be used in completion of the study. Under no circumstances will separate schools or school systems be identified in the study. Information will remain anonymous once reported.

Results of this study will be available in December of 1999 through the Department of Agriculture and Extension Education at NC State University. If you would like, a synopsis of the results can be sent to you. Please mark your questionnaire according to your preference. Please complete the questionnaire as identified by school and return using the enclosed self addressed stamped envelope by July 23, 1999.

Sincerely,

Jim Flowers
Associate Professor

Tina Coil
Graduate Student

Rebecca B. Payne
Section Chief
Workforce Development Education
Department of Public Education
APPENDIX C

SECOND COVER LETTER
August 11, 1999

Dear VoCATS Coordinator:

In July you received a packet similar to this one regarding the effects of block scheduling on VoCATS scores of selected agriculture courses. I have enclosed a second set of questionnaires identified by school, in case you misplaced the first set. If you have already returned the questionnaire, thank you and please disregard this packet. If you have not completed the questionnaires, please do so. Your participation is very important to the success of this study.

Block scheduling has become an important issue in education. In the past limited data has been available as to the effects of block scheduling on student performance. With your help, this can be changed. The information that we are requesting is a matter of public record and as we stated in the first letter to you, under no circumstances will separate schools or school systems be identified in the study. Information will remain anonymous once reported.

We understand that you may have been out of the office during July and that you may have not even seen the first mailing. We also realize how valuable your time is this time of the year, but if you will take a few minutes out of your busy schedule to complete the questionnaire, we will greatly appreciate it. Results of the study will be available in December of 1999 through the Department of Agriculture and Extension Education at NC State University. Please complete the questionnaire as identified by school and return using the enclosed self addressed stamped envelope by August 24, 1999.

Sincerely,

Tina Coil
Graduate Student