

4-1-1978

Comparison of Iowa Test of Educational Development Achievement Scores Between Ninth Grade Students Who Attend a Five Hour School Day and Ninth Grade Students Who Attended a Seven Hour School Day at Kirn Junior High School in Council Bluffs, Iowa

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COMPARISON OF IOWA TEST OF EDUCATIONAL DEVELOPMENT
ACHIEVEMENT SCORES BETWEEN NINTH GRADE STUDENTS WHO
ATTEND A FIVE HOUR SCHOOL DAY AND NINTH GRADE STUDENTS
WHO ATTENDED A SEVEN HOUR SCHOOL DAY AT KIRN JUNIOR HIGH
SCHOOL IN COUNCIL BLUFFS, IOWA

Presented to the

Graduate Faculty
University of Nebraska
at Omaha

In Partial Fulfillment
Of the Requirements for the Degree
Specialist in Education

University of Nebraska at Omaha

by

Harmon Tucker

April, 1978

UMI Number: EP74180

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FIELD PROJECT ACCEPTANCE

Accepted for the Graduate Faculty, University of Nebraska, in partial fulfillment of the requirements for the degree Specialist in Education, University of Nebraska at Omaha.

Supervisory Committee

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CHAPTER I

Introduction

One of the problems facing modern American education continues to be the adequate housing of schools. As urban areas grew rapidly in the two decades following the late 1940's, the problem of overcrowded schools became increasingly acute. Communities dealt with the problem in various ways. The most common solution was to build additional schools. As property taxes continued to spiral upward, bond issues for new schools began to fail in increasing numbers.

These failures causes educators to develop other solutions to overcrowded conditions. Year-round schools, split shifts, temporary buildings, leased buildings, and different grade level combinations have all been fairly common responses to the problem. Rarely has the complete double shift of two student bodies utilizing the same building been attempted except as an emergency measure. This has not often been considered as a permanent solution to the overcrowded school condition. While many of the reasons for the undesirability of such an arrangement are emotional or related to the inconvenience of such a schedule, the fear that the students' achievement will suffer is usually the primary argument against the double shift.

On October 3, 1976, Kirn Junior High School in Council

Bluffs, Iowa, was destroyed by fire. One week later, Kirn students began a double shift with Woodrow Wilson Junior High School in the Wilson building. On June 2, 1979, Kirk ninth grade students will have completed their entire junior high school years on the split shift schedule which runs for five hours each school day. While a new Kirn Junior High School building is scheduled for completion on July 15, 1979, there is great concern among school district personnel and many parents that students have suffered academically because of the shortened school day.

The Purpose

The purpose of this study was to determine if students at Kirn Junior High School who attended a five hour school day scored significantly lower on a standardized achievement test than those who attended a seven hour school day.

Basic Assumptions

- 1) It was assumed that the two populations used in the study were relatively equal in ability to learn.
- 2) It was assumed that the instructional staff for each group was essentially the same except for normal mobility.
- 3) It was assumed that the curriculum for the two groups was not substantially altered.

Limitations

- 1) Test scores used in the study included only those from Kirn Junior High School ninth grade classes in 1976 and 1978.
- 2) Only mean scores of the two groups above from the Iowa Test of Educational Development were utilized in the study.

Definitions

Mean. The sum of a set of scores divided by the number of scores.

Standard deviation. A measure of the variability or spread of a set of scores which indicates a range of scores above and below the mean score.

"t" ratio. The statistic used to determine the probability of the differences between the means occurring by chance.

Standard error. The degree to which the difference between two scores or sets of scores would occur by chance.

Iowa Test of Educational Development. A standardized achievement test which yields six sub-test scores and one composite score.

Hypothesis

This study tested the null hypothesis that there was no significant difference between the true means of scores

obtained by the two groups in the research population on the Iowa Test of Educational Development (hereafter referred to as ITED).

Significance of the Study

If students can attend a shorter school day with no significant loss of achievement, many implications can be drawn by educators. Overcrowded school buildings could be operated with more than one body of students by utilizing an extended school day. This could help reduce the number of new school buildings needed in crowded urban areas. Also, where old or inadequate buildings are in need of major repair or replacement, school administrators could save such costs by operating adequate buildings on a double shift and liquidating the inadequate property.

Procedures

A review of the relevant literature was made to determine if similar studies have been made and what significant results have been obtained.

Test scores for both the five hour and seven hour population from the ITED were obtained from district office files and a master table containing all mean scores for each group was constructed.

Statistical calculations performed with the scores were the standard errors of the means, the standard error of the difference between the means, and to test the

hypothesis for the existence of significant differences, a test comparing the means of the two research populations was conducted. The chosen level of confidence for the test was 0.05.

The data was displayed in a relevant manner and evaluated for significance. The relevance of the hypothesis was then addressed. Finally, conclusions were drawn from the data analysis and recommendations made.

Organization of the Study

Chapter one of the completed field project includes an introduction, statement of the problem, basic assumptions, limitations, definitions, the significance of the study, and the procedures followed in the study.

Chapter two contains relevant literature on similar studies or studies utilizing the Iowa Test of Educational Development.

Chapter three describes the procedures used in the collection and treatment of the data. Appropriate displays of the data to demonstrate the findings of the study are included.

Chapter four contains a summary of the data, conclusions the author has reached on the basis of the data, and recommendations.

Finally, the field projects contains a bibliography of all sources utilized in the preparation of the project.

CHAPTER II

Related Research

As a means of fully utilizing space to relieve overcrowded conditions in many of the school districts across the country, and indeed in other countries, school officials have been forced to consider alternative organization plans. One such plan is double shift scheduling. The double shift program is characterized by the assignment of the same housing facilities for use by two different groups of pupils that are not in attendance at the same time, usually as a temporary measure to relieve a school housing shortage.

Although the double shift has not been a widespread practice in the United States, it is a relatively common practice in some other countries. Italy makes extensive use of the double shift. "In Rome, 130,000 primary and secondary students attend school in the afternoon only" (Johnson, 1971). A like number of students attend in the mornings only. In a London Times Educational Supplement article, Anthony Johnson does not cite any loss in achievement. He does, however, state that the chief disadvantages are psychological and physiological. He states that morning is the most productive part of the school day and that those who attend afternoon sessions are victims. Disruption of family life and the normal routine of living are also mentioned in the article as great disadvantages to the double shift system

He offers as an example one family with children attending three different shifts at various schools and the ensuing problems of meal preparation, transportation, and time for other family functions.

In another London Times Educational Supplement article, Mark Webster points out that achievement can improve when children are taught for fewer hours. He discusses a study made by Dr. Guyermiel of Orsay Hospital in Paris, France, made in Herault, a Paris suburb. A control group attended a regular session of seven hours, while experimental groups ranging in age from six to eleven attended sessions that varied in length from two and one half hours to four hours. "The mean achievement level for the experimental group was 70.4%, while the mean achievement level for the control group was 58.3%" (Webster, 1976). Although Webster does not cite any other facets of the study, he does point out that, "when the United States went from a six day work week to a five day work week, productivity went up by fourteen percent" (Webster, 1976).

In England, the double shift has been viewed with alarm and strong resistance. In a 1974 article, Mark Vaughan tells of a proposal in Hampshire to run the schools from 8:30 a.m. until 1:30 p.m. Thus, the noon meal and all activities held later would be dispensed with and a substantial amount of money saved for the strained county budget. The

proposal was "greeted by ill-concealed pessimism on the part of the teachers' union which had been informed previously of the proposal" (Vaughan, 1974).

School districts in the United States have employed the double shift practice for various reasons and for various lengths of time. The most common reasons are a shortage of adequate space or as the result of disaster, when existing school buildings have been destroyed or severely damaged. A number of the double shift experiences have been the subject of journal articles or theses and dissertations. Most of these studies have concentrated either on attitudes about the double shift or on the achievement level of students involved in the arrangement. A few have broadened their scope to include both.

One such study by Van Drummond at the University of Miami concentrated on the effects of the double session as perceived by students and parents. He utilized researcher-developed instruments to collect data and the Analysis of Variance technique to analyze the data. His findings were

1. Attitudes toward school are not affected by either the schedule of the school they attend or their socioeconomic status.
2. The schedule of the school has a significant effect on how students use their non-school time.
3. Attitudes of parents toward school are not affected by either the schedule of the school their children attend or their socio-economic status.
4. Perceptions of parents in relation to children's non-

school time usage seem to be related to their socioeconomic status and the schedule of the school the children attend" (Drummond, 1975).

In a similar study on attitudes, Curtis Glenn Horne found attitudes toward the double shift somewhat in opposition to those found by Drummond. Horne utilized questionnaires administered to students in a regular school program, an experimental group of students in a double sessions program, the teachers assigned to the experimental group, and parents of experimental group students. He found that "Students enrolled in the experimental group held a significantly lower disposition toward learning, perception of school social opportunity, perception of the school schedule's effect on their personal lives, and a significantly lower level of satisfaction with their school schedule" (Horne, 1976). He utilized an analysis of variance technique and T-tests were used to isolate significant differences where multiple effects were possible. He considered findings significant at the .05 level.

Both teachers and parents viewed the effects of the double shift to be more negative than did students. He also found that seventh grade students viewed the measured areas more positively than did eighth or ninth grade students.

Robert Kenneth Zold in a dissertation written in 1973 at the University of Wisconsin found attitudes toward the double

shift similar to those discovered by Horne. He found opinions about the double shift were on the negative side, but that parent and teacher attitudes were more negative than students. Zold's findings in achievement of students on a double shift will be discussed later in this chapter.

While many studies have been conducted to determine attitudes and achievement of those involved in double shift programs, very few have been conducted to determine the most successful adaptations made by school districts in their instructional programs. One study, conducted by George Stanley Ingebo at the University of Washington in 1953, attempted to compile adaptations made by various double shift programs. No analysis was made of the effects of the adaptations. Ingebo interviewed building principals and superintendents from every school district in the state of Washington having a double shift program in one or more of its schools during 1951-1952. He collected data by interviewing the principals and superintendents utilizing a list of predetermined questions. No specific recommendations of adaptations were made in the study and no scale as such was used in treating the data. According to Ingebo, "In their raw form these data serve one of the most important functions of the study by presenting alternative procedures and conditions for construction or alternation of a double shift program" (Ingebo, 1953). The author did suggest, however, that further studies should be made of thirteen

adaptations he had observed to determine their effectiveness on a double shift program.

In addition to the studies sampling attitudes of those involved in the double shift, a number of studies have been conducted to determine whether the achievement of students involved in the double shift is lower than those who attend regular sessions. One such study made by Matt O. Hanhila at Arizona State University in 1961 measured two indices of achievement. He utilized the grade point average and achievement test scores as measured by the Iowa Test of Educational Development to determine if there was a significant difference in achievement between students who attended a double shift for two and one half years and those who attended a regular session during the same period of time. He accepted the .05 level of confidence in both cases.

Grade point averages of students who attended regular sessions, morning sessions, and afternoon sessions were compared and regardless of the type of session attended, students showed no significant difference in grade point average. Utilizing two other schools with regular sessions in the same school district as a control group, Hanhila compared the achievement of the double session students. He found "There was no significant difference at the .05 level in education achievement whether the students attended regular or double sessions" (Hanhila, 1961).

A somewhat broader study conducted by Ray Grant Harper at the University of Iowa in 1964 compared the achievement of primary pupils on double shifts with those on regular sessions. The Harper study utilized ten schools on double shifts and ten schools on regular session as comparison groups. Employing the Gates Primary Reading Test at grade one and the reading, arithmetic, and composite scores of the Iowa of Basic Skills, he tested a null hypothesis that there would be no significant difference between the different session attendance groups.

While achievement differences at the end of grade three in skills other than reading and arithmetic were slight, they did tend to favor regular session attendance. Harper felt that possibly portended a detrimental and cumulative effect from continued double session attendance beyond the third grade. In general, however, morning or afternoon double session attendance was not found to be a detriment to pupil progress. One of the most significant findings was "Double session attendance did not appear to unduly influence achievement of above average, average, or below average ability pupils" (Harper, 1964).

The Robert Kenneth Zold study cited earlier in this chapter found somewhat conflicting achievement results. A comparison of grade point totals showed a significant difference in favor of the "D" student under the double shift. Achievement

testing on the California Test of Basic Skills did not produce a consistent effect, however. Seventh grade mean scores favored the double shift, while grade placement scores favored ninth grade students on regular sessions. Mean scores of ninth graders on the C.T.B.S. showed no significant difference. Since the period of study was from December to May of one school year, one would question the validity of this particular study. Six months on a double shift would hardly be enough time to produce any significant or substantial differences in achievement. A Hawthorne effect could also have been produced by the determination of professional staff and students to make the double shift work as well as possible. (Zold, 1973).

In summary, this author's review of the literature has upheld his own experiences. While the attitudes of those involved in a double shift schedule are somewhat negative, professional staff and parents hold a more negative perception than do the students. While there were some conflicting findings in the studies cited, it does not appear that the achievement of students who attend a double shift is significantly lower than that of students who attend regular sessions.

Chapter III

COLLECTION AND TREATMENT OF DATA

Conditions Affecting the Research Population

When Kirn Junior High School students began the double shift program in 1976, the previous seven period day was retained. The basic difference was the length of these instructional periods. On the schedule before the fire referred to in Chapter I, instructional periods were fifty four minutes in length; in the shortened school day, instructional periods were thirty seven minutes in length. This represents a loss of seventeen minutes per instructional period or 119 minutes per school day.

To help compensate for this loss, some other adjustments were made. Before the fire, most students had a study hall each day. These were eliminated completely and all students were scheduled for an additional class. Required courses were not changes as a result of this addition. The additional course was an elective selected from the areas of music, art, career exploration, home economics, industrial arts or foreign language. All students at all grade levels both before the fire and after were required to take English, math, social studies, science, music, and physical education. The latter two courses were taught on an alternate day basis. In addition, all seventh and eighth grade students were required to take a reading course.

Interruptions of classes were held to a minimum on the shortened school day. All athletic contests were scheduled for Saturdays. Field trips and performances by musical and dramatic groups were substantially reduced as were the number of assemblies held. During the three years of the double shift, no student was allowed to be scheduled for an activity that required missing a regularly scheduled class more than six times during the school year. Exempted from this policy was time for standardized testing and honors assemblies. Three such assemblies were held each year.

Student Testing

The SRA-scored single booklet, 1972 edition, form X of the ITED was used for both test groups. The ninth grade students of 1976 (hereafter referred to as group I) were administered the ITED in December, 1976. The ninth grade students of 1978 (hereafter referred to as group II) were administered the ITED in December, 1978.

Testing conditions for both groups were controlled in the following ways. In both testing situations, tests were administered by classroom teachers to groups ranging from fifteen to thirty. Teachers received advance inservice in test administration and the maintenance of optimum testing conditions before each testing session. The tests for both groups were machine scored by Science Research Associates, Inc.

The Instrument

According to The Sixth Mental Measurements Yearbook, "The ITED battery is one of the most widely used measures of achievement ever designed. The battery is used to test over one and a half million students annually" (Buros, 1965). SRA reports within-grade split-half reliabilities for all tests ranging in the .80's and .90's with reliabilities for the composite score reaching .98. The battery yields separate scores in the following areas: correctness of expression, quantitative thinking, social studies, natural sciences, literary materials, general vocabulary, and uses of sources of information. It also yields a composite score and a reading total score.

For the purposes of this study, all the scores yielded were used with the exception of the reading total score. This score was eliminated because it is derived from individual items within the first seven sub-tests and may reflect the student's knowledge of those subjects rather than his general ability to read.

Data Treatment

Master tables containing all scores achieved by both groups I and II on the ITED were obtained from school district files and the data transferred to IBM punch cards. The number of students in group I was 280 while group II numbered 250. These numbers represent all the students

enrolled in the ninth grade at Kirn during the 1976 and 1978 school years. Considering eight scores for each subject, 4,240 separate percentile scores were used in the calculations.

The IBM punch cards were then fed into the IBM 370/158 computer along with a statistical package for the social sciences, os/360 version 4 program. This program is designed to determine the relationships between the means of large uncorrelated samples. The program yields a mean score for each group on each variable, a standard deviation and standard error of measurement for each mean, and a t value for the group I and group II means on each variable. The t test was chosen because it is the most widely used statistical tool so far developed in testing the difference between two means for significance.

For the purposes of this study the 0.05 level of confidence was selected. The t value for the means on the composite score was 0.07 times in 100 or 0.70 times in 1000. Therefore the null hypothesis that there is no significant difference between the true means obtained by the two groups in the research population on the ITED is accepted. Table I illustrates the calculations derived from the analysis of data for the composite scores of groups I and II.

Table I
Comparison of Composite Scores Between
Group I and Group II on the ITED

	Mean	Standard Deviation	Standard Error	t
Group I	50.0	28.9	1.7	0.007
Group II	49.8	28.8	1.8	

Recognized statisticians generally agree that "a rough rule of thumb that will serve for most investigations is to accept the null hypothesis (that is, to regard the difference is not significant) when t is less than 1.96 (0.05 level of confidence)". (Smith, 1962).

In addition to the t test of the composite score, the calculations for the value of t when comparing the group I and group II means on each of the seven academic achievement area were also supplied. In all cases the value of t was considerably below 1.96. Therefore, as illustrated in Table II, there was no significant difference observed between the means of group I and II on any of the subtests of the ITED.

Table II*

Comparison of Sub-Test Scores Between
Group I and Group II on The ITED

Variable	Mean	Standard Deviation	Standard Error	t
Correctness of Expression	50.0 49.9	28.8 28.9	1.7 1.8	0.05
Quantative Thinking	50.1 49.9	28.7 28.8	1.7 1.8	0.05
Social Science	50.1 49.9	28.7 28.8	1.7 1.8	0.07
Natural Sciences	50.4 49.9	28.7 28.7	1.7 1.8	0.19
Literary Materials	50.1 50.1	28.7 28.7	1.7 1.8	0.01
General Vocabulary	50.0 49.9	28.7 28.7	1.7 1.8	0.03
Sources of Information	50.0 49.9	28.8 28.8	1.7 1.8	0.04

*The first row of figures for each variable represents group I and the second row represents group II

The largest t score occurred between the means in the Natural Sciences subtest. However, the t score of 0.19 is still well below the 0.05 level of confidence. The smallest t score was 0.01 between the means in the Literary Materials subtest.

The t score for Correctness of Expression was 0.05. A t score of 0.05 was also achieved when comparing the two means

in Quantative Thinking. The Social Sciences t score was 0.07. Comparison of the group I and II means produced a t score of 0.03 on the General Vocabulary subtest while a 0.04 t score was obtained in the Sources of Information comparison.

Chapter IV

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

The purpose of this investigation was to determine if students at Kirn Junior High School in Council Bluffs, Iowa, who attend a five hour school day score significantly lower on a standardized achievement test than those who attended a seven hour school day. All the students' scores on the ITED from the ninth grade classes of 1976, who had attended a seven hour school day, and of 1978, who had attended a five hour school day, were utilized in the study.

This investigation tested the null hypothesis that there was no significant difference between the true means of scores obtained by the two groups in the research population on the Iowa Test of Educational Development. There were 280 cases in Group I and 250 cases in group II.

The IBM 370/158 computer was utilized to determine the means, standard deviations and standard error of measurement of each group on seven subtests and a composite score. The t score was then computed for each pair of means on each of the subtests and the composite scores. The 0.05 level of confidence, or a t score of 1.96, was accepted as being evidence that the observed differences between the two

groups' mean scores could have occurred other than by chance.

Conclusions

From the statistical analysis of data used in this investigation, the following conclusions were drawn:

1. The t value of the composite score on the ITED was 0.07, considerably lower than the 1.96 necessary for the 0.05 level of confidence.

2. The t values of all the subtests were also well below the 1.96 t value.

3. Ninth grade students at Kirn Junior High School in Council Bluffs, Iowa, who have attended a five hour school day do not score significantly lower in achievement as measured by the ITED than do those who attended a seven hour school day.

Recommendations

From the findings of this investigation, the following recommendations are offered with regard to the shortened school day for future consideration:

1. Before the double shift is considered as a permanent solution to overcrowded conditions, further studies should be conducted. Information should be gathered on the following:

A. Grade point average comparison between the two groups.

B. Attendance of group I in comparison with attendance of group II over the same span of time.

C. Comparison of achievement between the two groups after the completion of high school courses.

D. Attitudes toward the double shift as evidenced by parents, students, and the educational staff.

E. Comparison between the two groups of the degree of participation in extra-curricular and community activities.

2. A determination of how well educational goals established by the district, other than academic achievement, are being met on a double shift schedule.

3. A cost comparison between a double shift schedule and two single shift schedules should be conducted.

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