AN ANALYSIS OF THE EFFECTIVENESS OF AN OUTDOOR EDUCATION TECHNIQUE AS MEASURED BY THE IOWA TEST OF EDUCATIONAL DEVELOPMENT

by

R. Dwain Wilcox

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APPROVED:

M. L. Driscoll, Chairman

B. J. Brown	R. H. McCollum
A. P. Johnston	H. C. Conley

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CHAPTER I

INTRODUCTION

Outdoor Education as a Medium of Instructional Research

According to Hammerman and Hammerman (1968) despite the current nationwide acceptance of outside-the-classroom learning, outdoor educative techniques remain relatively new additions to the educational system. Prior to 1940, few outdoor education programs existed, and the ones that did exist were centered in the resident school camps. Furthermore, the amount of evaluative research conducted on the camping programs was woefully inadequate.

In spite of its modest origins, outdoor education has grown rapidly in recent years. The 1940's and 1950's saw a proliferation of outdoor education programs at all grade levels in concentrated areas of the curriculum. With the massive increase in outdoor education, greater attention to research was focused on the evaluative areas of outdoor learning, Wiener (1967).

Homan (1965) contended that from 1940 to 1960, the rapid development of outdoor education was paralleled by a corresponding increase in research devoted to the administrative and organizational aspects of outdoor education facilities. Similarly, research studies basically concerned with the implementation of resident school development showed a proportionate increase.

Changing Research Patterns of Outdoor Education

The many research studies were, at best, limited and incomplete in technical design. According to Rhead (1967), by 1965, most of the numerous research efforts in outdoor education employed a survey and/or questionnaire design. Nevertheless, improvements were made so that as this new educational area grew and gained acceptance, emphasis was gradually placed upon more sophisticated designs employing experimental techniques. Cohen (1956) heartily endorsed the improving trends in outdoor education research. He stated:

> Without some guiding idea we do not know the facts to gather. Without something to prove, we cannot determine what is relevant and what is irrelevant.

Kerlinger (1972) concurred with Cohen on the use of factual data in educational research:

> Statistical procedures and experimental design are only two different aspects of the same whole and that whole comprises all the logical regiments of the complete process of adding to national knowledge by experimentation.

The experimental design trend in outdoor education is still rather new. Consequently, while over 300 research studies have been completed in outdoor education, only seven or eight studies have been experimental in design, and they have been completed during the period of 1967-1973, DeBlanc (1973).

Need for the Study

According to Larson and Yocum (1951), the American Association for Health, Physical Education and Recreation believed that measurement and evaluation were needed more in health, physical education, recreation and outdoor education than in any other phase of education. This assessment was supported by the Council for Outdoor Education and Camping of the American Association for Health, Physical Education and Recreation which formulated a Task Force on Evaluation at the secondary level.

One result of the Task Force's efforts was the launching of a scientific research effort by the Hammermans at Northern Illinois University, Dekalb, Illinois. The Hammermans (1968) designed a three-part instrument to measure motivation interest shifts in secondary level students who participated in a resident outdoor education model. Unfortunately, the literature did not reveal whether this research effort had been successfully completed.

There has been other limited experimental design evaluation in outdoor education at the secondary level. For example, Steel (1969) studied the effects of educational treatments in the outdoors on self-concepts and academic achievement in language arts at the ninth grade level. Although Steel's study was evaluative in nature, it was vague and limited in experimental design and offered inconclusive results.

Steel's study notwithstanding, most of the prior research in outdoor education has dealt with the sixth grade level in the science field, Furthermore, according to Rillo (1970):

> Outdoor education research does not pertain to the science curriculum nor is it just nature study. It is more inclusive and has its place in varied fields such as social studies, mathematics, science, art, music, health, physical education, and language arts. Objective efforts in each of these subject areas need to be explored.

And in the most definitive source on the subject, Smith (1966) stated:

> This laboratory phase of education could be enhanced with provisions for evaluation in an objective format in all areas of the curriculum. However, curricular research on the secondary level with outdoor education connotations has been ignored.

Although there was an absence of outdoor evaluative research, a number of investigations have been conducted on the related areas of curriculum integration. These limited attempts made at evaluation usually investigated only one or two areas of the curriculum.

Presumably, the lack of conclusive evidence about outdoor education research with experimental design was evident in many other areas of the curriculum and this was summarized by Tickton (1971), who stated:

> Despite recent progress in educational research and development, educators still have few reliable, validated guidelines for choosing one instructional medium over another. Since the heart of education is the student learning, the value of any technology must be measured by its ability to facilitate learning.

Purpose of the Study

The purpose of this study was to determine whether the use of an outdoor education technique had a greater effect upon cognitive knowledge acquired by students than the traditional educational techniques as measured by the Iowa Test of Educational Development. The literature as presented in Chapter II reveals an absence of supportive evidence regarding the effect of outdoor education techniques upon cognitive knowledge acquired by students.

Statement of the Problem

The problem of this study was an analysis of the effectiveness of an outdoor education technique in measuring cognitive growth in language arts, mathematics, science, and social studies at the ninth grade level for one school semester, a semester which lasted from September through January.

Hypotheses

After reviewing the literature and formulating the need for this study, one assumes that the following hypotheses concerning outdoor education will be true.

H1. The cognitive knowledge acquired by the students will be affected to a measurable degree by the utilization of the outdoor education technique in the teaching of language arts.

H2. The cognitive knowledge acquired by the students will be affected to a measurable degree by the utilization of the outdoor education technique in the teaching of mathematics.

H3. The cognitive knowledge acquired by the students will be affected to a measurable degree by the utilization of the outdoor education technique in the teaching of science.

H4. The cognitive knowledge acquired by the students will be affected to a measurable degree by the utilization of the outdoor education technique in the teaching of social studies.

Definition of Terms

In order to clarify this study, the following terms are defined:

Junior High: Grades seven through nine on the secondary level.

Curriculum Research: The method of using collected data from past research in outdoor education in order to develop present courses.

Outdoor Education: An extension of the teaching process beyond contained classrooms. Specifically, it is extending the classroom outdoors so that learning may occur when students and teachers deal directly with natural resources and life situations.

Teacher Methodology: The use of existing equipment, content, materials, and teaching techniques to instruct students.

Outdoor Education Technique: The use of selected textbook units in a traditional school with assigned textbooks in the subject areas of language arts, mathematics, science and social studies to convey outdoor experiences to students from a prepared curriculum guide. A minimum of three selected textbook units were used per school semester, and a minimum of two class periods per week were used for each unit. Since each unit normally took three weeks to complete the total amount of time spent in the outdoor education technique was a minimum of nine weeks.

Component Areas: The separate areas of the Iowa Test of Educational Development (ITED) consisted of reading comprehension, language arts, mathematics, science and social studies.

Traditional Education: An educational program in which a majority of the planned instruction occurs within a physical setting designed for one teacher and a group of students approximating a normal class (20 to 40 students). The subject matter is presented in a formal way which emphasizes mastery of subject content as an end in itself.

Limitations

This study was limited to the following:

1. The context of the study was limited to students in the ninth grade.
2. The subject areas of the study were limited to language arts, mathematics, science and social studies.
3. The research design was limited to one experimental group of thirty-five students and one control group of thirty students.
4. Textbooks were limited to those assigned to the school by the Wood County Board of Education.
5. The study did not determine the philosophy of teachers. The nature of instruction received by the students prior to the study was not investigated. This study assumed that there were substantial differences in outdoor education programs occurring in different curriculum settings and that these differences may be organized or accidental due to limitations of space, equipment, or other factors.

Organization of the Study

The study is organized into five chapters. After Chapter 1, INTRODUCTION, in which the scope and purpose of the study are defined, four additional chapters are presented. Chapter 2, REVIEW OF THE RELATED LITERATURE, offers an overview of the related and specific literature pertaining to evaluative techniques concerned with outdoor education. Sections on language arts, mathematics, science, and social studies are included. The next chapter, METHODS AND PROCEDURES, deals with a description of the sample, the instruments and design, and the statistical treatment of the data. Chapter 4, RESULTS OF THE STUDY, presents an analysis of the measured effectiveness of cognitive knowledge acquired by the students based on standardized testing in the subject areas of language arts, mathematics, science, and social studies in grade nine. A summary of the study is presented, conclusions from the analysis of the data are drawn concerning the hypotheses, and recommendations are made for future study in Chapter 5, SUMMARY, CONCLUSIONS AND RECOMMENDATIONS.

CHAPTER II

REVIEW OF RELATED LITERATURE

This chapter reviews research and literature relevant to the outdoor education technique undertaken in this study. Hence, the review of literature centers on investigations completed in the four areas of the curriculum being studied: (a) language arts, (b) mathematics, (c) science, and (d) social studies.

Language Arts

In analyzing improvement of academic achievement in language arts, Steel (1969) investigated the effects of two educational treatments in the outdoors on self-concepts and academic achievement. He used sixty-two ninth grade students in a summer camp environment. Both the control and the experimental groups were made up of thirty-one randomly selected students. While the experimental group attended a four week summer day camp, the control group did not attend any camp sessions. Furthermore, the experimental group was divided into two sub-groups (experimental group E_1 and experimental group E_2). Experimental group E_1 received an outdoor educational treatment designed to improve academic self-concept (evaluating successful performance on reading and writing tasks), while experimental group E_2 received a treatment designed to improve physical skills of self-concept (improving physical skills of hand and eye coordination through evaluation).

Steel evaluated each student in the control group and the experimental group with an objective test in reading and language and a subjective test in the physical skills area. These evaluations were administered both prior to the summer camp and immediately after the camp experience in order to note changes in general self-concept and academic achievement. Gain scores were used to note academic achievement in the objective testing process.

The results of the study suggested the following:

1. In investigating ninth grade students who participated in outdoor experiences to improve either academic self-concepts or physical skills, Steel indicated that immediate gain was evident after the treatments were instituted. However, this gain was lost after one semester of school.

2. Improving physical skills did not appear to be more effective in improving general self-concepts than in improving academic self-concepts. This result occurred over one school semester.

3. Treatments to improve physical skills self-concepts and academic self-concepts were not effective in increasing academic achievement after the summer camp experience, nor were they effective beyond one school semester.

Mathematics

To ascertain the influence of surroundings on academic achievement in mathematics and environmental studies, Howie (1972) examined student learning in outdoor and indoor settings, respectively. Two student groups were organized for this study. The treatment group studied the subject areas outdoors, and the control group studied the subject areas indoors. One of Howie's major concerns was to measure the student's ability to conceptualize results and to apply information.

Howie's investigation dealt with: (1) the literature, (2) the designing of teaching materials for the outdoors, (3) the development of an outdoor testing instrument (objective test), (4) the collection of data, (5) the analysis and conclusions based on the data.

In conclusion, Howie found:

1. Students who received the outdoor treatments are better able to conceptualize mathematical and environmental principles than the students who did not receive the treatment.
2. When cognitive achievement gains were desired, those educated in the outdoor experiences were superior to the control group in total development and total conceptualization.

Science

In evaluating a study of outdoor versus indoor learning in elementary science, Wise (1970) examined and compared achievement of students taught by three different approaches: (1) direct experience (T-1), (2) the outdoor classroom (T-2), (3) the indoor classroom (T-3). This experimental study involved three classes, each from a different school, and included a total of 261 fifth grade students. Over three-week retention periods, the students were pre-tested and post-tested with the Science Acheivement Test. In addition, the student's observations of the outdoor environment for each outdoor treatment were analyzed.

The pre-test raw scores were analyzed by an analysis of variance computer program (ANOVES) to determine whether the randomly assigned groups were significantly different regarding knowledge and comprehension of the science material. Raw, post, and retention test scores were analyzed by an analysis of variance with repeated measures that used a computer program (ANOVR) to determine the effects of the treatments on knowledge, comprehension, and retention of the science material. Additionally, student observations of the outdoor treatments were analyzed through the use of an analysis of variance on the sampling means for the treatment groups at the .05 level of significance for rejection.

Wise's findings revealed an F ratio of significant difference among the treatment means. The three T-tests indicated significantly more students in T-1 had made outdoor observations in addition to the course work studied.

Slater (1972), like Wise, investigated elementary science and outdoor learning, but Slater's experiment focused upon the impact an exploratory field trip experience had upon sixth grade students' cognitive understandings of ecological concepts being taught by their respective instructors. His purpose was to analyze the change in the cognitive level of the students' classroom dialogue before and after being exposed to an exploratory field trip experience. In addition, he attempted to verify whether a significant change in the students' cognitive understanding of the ecological concepts had occurred as a result of a series of multi-sensory encounters in the out-of-doors.

Slater used a class of thirty-four sixth grade students studying the ecological concepts of adaptation, change, and interdependency in ecological communities. The class was observed for three class periods before the experience, and it was then observed again after the class participated in an exploratory field trip to three ecological zones.

The Campbell and Stanley Time Series Research Design and the Florida Taxonomy of Cognitive Behavior were used to measure changes in students' cognitive understanding of the three ecological concepts mentioned previously. The seven-point scale of the Florida Taxonomy of Cognitive Behavior was modified and used as a two-point scale separating rote recall skills from problem-solving skills.

Results of the study indicated a significant change in the level of the students' cognitive understanding of the ecological concepts being tested as a result of the outdoor experience. In conclusion, Slater indicated the exploratory field trip experience with the traditional procedures used in pre-planning and follow-up experiences produced significant gains in the students' level of cognitive understanding of ecology.

In another investigation of laboratory experiences in science, McNamara (1971) conducted a study that compared the learning behaviors of eighth and ninth grade science students. He used one-half of the class to experience laboratory investigations in the indoor environment while the other half of the class was experiencing laboratory investigations in the outdoor environment. McNamara attempted to determine if a significant difference in overall achievement and critical thinking would occur between the group experiencing the laboratory investigations in the indoor environment and the group experiencing the laboratory investigations in the outdoor environment. In addition, he attempted to determine if differences existed between the I.Q. group levels based upon the Lorge-Thorndike Intelligence Test.

The groups were pre-tested with the Earth Science Achievement Test-Unit One, the Cornell Critical Thinking Test and the McNamara Indoor-Outdoor Preference Appraisal; but they were not tested on the concept tests. Indoor group experiences closely followed the units in the earth science textbook, while the outdoor group experienced all phases of the course in the outdoor environment. Using the available resources, the laboratory investigations for the outdoor group were conducted in the out-of-doors surrounding East Ridge Junior High School in Ridgefield, Connecticut.

The student's Lorge-Thorndike Intelligence Test Scores were analyzed and the differences between the group means were tested for significance. An analysis indicated there were five groups that were significantly different in I.Q. level.

In conclusion, McNamara revealed the following:

1. Significant differences between the treatments may have been present if one evaluated individual concepts rather than overall achievement.

2. Learning in the out-of-doors was enhanced if the concepts were directly related to the environment.

3. Critical thinking and preference for the out-of-doors were changed significantly as a result of the out-of-doors treatment.
4. The out-of-doors environment was considered by curriculum planners for the low ability groups.

In an experimental study of outdoor education in the science field at the secondary level, DeBlanc (1973) examined science mean performance differences between senior high school students who took part in an outdoor education center and senior high school students who did not take part in the outdoor education center. He attempted to associate these differences with student participation in an outdoor education center's offerings.

A group of 285 senior high school students comprised the experimental group, while another group of 194 senior high school students were used as the control group. The two groups were pre-tested and post-tested with the Metropolitan Achievement Tests in the areas of science concepts and understanding science information. Basically, the treatment consisted of twelve short science courses offered through an outdoor education center and was administered to the experimental group for a period of five months.

One procedure of evaluation was an analysis of variance statistical treatment to gather data. An F-ratio number in terms of the five hypotheses was obtained and checked for significance.

The results revealed that the senior high school science students enrolled in the outdoor education short courses achieved a significant gain over the science students who were not exposed to the outdoor education short course. DeBlanc found, furthermore, that consideration should have been given to the inquiry role approach as a methodology for science instruction concepts. In the final analysis, DeBlanc's approach presented an outdoor education environment that seemed to produce more student involvement and to contribute to academic science gains among the below-average science students.

Social Studies

Stapp (1963) examined and evaluated the effectiveness of a conservation education program which was designed for Public School System (K-12). In this study, he investigated the social studies and science programs and identified the conservation elements in the existing curriculum.

Evaluation of the program consisted of the following:

1. Administrators and classroom teachers evaluated the program by recalling and recording brief statements of features of the conservation program that were helpful in approaching the instructional goals of the Public School System.
2. Classroom teachers evaluated the program by responding to a questionnaire that used a ten point non-graded scale.
3. A comparison was made between a list of "Important Understandings of Conservation Education" published by the Michigan Department of Conservation and the science program in the curriculum.

This study revealed that an outdoor education and conservation education program could be effectively integrated into the existing curriculum of the Public School System (K-12). Furthermore, the experimental program enhanced the existing curriculum of the school system by linking together the subject areas that related closely to conservation, especially social studies and science.

Stapp's study further revealed that the program was helpful in the following areas:

1. Approaching the instructional goals of the Ann Arbor Public School System.
2. Developing desirable interests, attitudes, and appreciations at all grade levels.
3. Developing desirable conservation understandings and concepts at all grade levels.
4. Aiding teacher effectiveness in the presentation of conservation material.
5. Expanding conservation study in the schools. For example, analyzing the list of "Important Understandings of Conservation Education" published by the Michigan Department of Instruction revealed that of the 212 understandings listed, ninety-two were included in the existing elementary science and social studies curriculum guides of the school system, and 172 understandings were incorporated into the outdoor and conservation program. Of the 172 understandings, 133 were incorporated into the elementary program and 138 into the secondary programs.

Another social studies investigation was compiled by Zacher (1972), who studied outdoor education approaches to teaching local history on the third grade level. Using four classes in two elementary schools, she assigned selected teachers one of three different methods of teaching local county history. Two classes used Method One, a method which employed experiences in the outdoors and non-school settings in conjunction with a guided discovery workbook with prepared lessons. Method Two stipulated that the class combine direct experiences in the outdoors with prepared lessons, and Method Three required that the class experience indoor activities and audio-visual aids in conjunction with the prepared lessons.

The findings in the study, obtained by an achievement test and an interest survey, showed that differences between method scores for the pre-test and post-test were significant. The gain from the pre-test to the post-test was sixty-nine percent in Method One, sixty percent in Method Two, and forty percent in Method Three. Method One students, on the average, scored twelve points higher on the post-test examination than did students in the Method Three program.

Summary

In conclusion, only recently have educational researchers seriously considered the effectiveness of outdoor education on the curriculum, and most of these endeavors have been concentrated in the administrative and implementative areas. Evaluative research in outdoor education, on the other hand, has been minimal, and results from the studies which have taken place have been inconsistent. A detailed examination of the research literature, then, compels one to be impressed by (1) its scarcity and (2) its unanticipated and inconclusive findings. For these reasons, additional research in the curricular areas is urgently required.

CHAPTER III

METHODS AND PROCEDURES

This study sought to measure acquired cognitive knowledge of ninth grade students through an outdoor education technique. It did not attempt to restrict this learning to a single cognitive aspect. The main concern of cognitive knowledge was supported by Bloom (1963), who stated:

> While it may or may not be true that the most important changes in the learner are those which may be described as cognitive, i.e. knowledge, problem-solving, higher mental processes, etc., it is true that these are the types of changes in students which most teachers do seek to bring about.

This chapter describes the methods and procedures used in collecting the data for this study. It includes the sample description and how it was obtained, the instruments and design, the research procedures and the statistical treatment of the data.

A Description of the Sample

The sample consisted of students in two ninth grade sections at Blennerhassett Junior High School, Wood County Schools, Parkersburg, West Virginia. At the time of the study, Blennerhassett Junior High School had an enrollment of 600 students in grades seven through nine.

The area served by the school included Lubeck and Washington, West Virginia, unincorporated towns, and also a heavily developed housing area close to the two major industries in Wood County-- E. I. Dupont Corporation and Borg-Warner Chemicals. This school was classified as a rural/small town school with high socioeconomic conditions because the population was fewer than 20,000 people with a median income exceeding $11,000 according to ITED (1973) classifications.

Students who participated in this study were designated by the principal of Blennerhassett Junior High School, Parkersburg, West Virginia. Thirty-seven ninth grade students were chosen to participate in the experimental group, while thirty-three ninth grade students were chosen for the control group. Both groups of students had courses in language arts, mathematics, science, and social studies, and they changed classes as a group.

The Instruments and Design

The Iowa Test of Educational Development

According to Buros (1972), the Iowa Test of Educational Development (ITED) was designed to enable teachers and administrators to become acquainted with the educational development of each subject and to provide a reliable and unbiased basis for evaluating the effectiveness of the current school curriculum. The entire ITED (grades 9-12; Achievement Series, Grades 1-8) was standardized in a nationwide testing program conducted in the spring of 1971.

Included in the ITED are the subject areas of language arts, mathematics, science, and social studies. The validity of this test includes:

1. Content validity--general skills in education that relate to concept development, social interaction and reading comprehension.

2. Criterion validity--a correlation coefficient at .85, course goals, cumulative grade average, rank in class, and a composite score

for the total battery at .95.

3. Raw scores--where the value is the largest.

4. Construct validity--the educational development and the intellectual achievement with dependence on reading comprehension that is highly inter-correlated.

When the ITED was planned, each of the tests was planned to be of sufficient length to ensure an average reliability of .91 with grades. These reliability coefficients were derived from Kuder-Richardson Formula 20 and were based upon the samples used to equate forms X5 and Y5 to form X4 in May, 1970. With this degree of variability and reliability of .91, the standard error of measurement equaled 1.5 and the reliability coefficient of the composite at each grade level was .95.

Design of the Study

The study utilized an experimental group and control group comparison, a technique which was supported by Kerlinger (1972) who stated:

> Whenever an independent variable can be manipulated, an experimental approach can and should be used. Ideally, we should, whenever possible, approach research problems and test research hypotheses experimentally.

An experimental group that consisted of thirty-seven students in the ninth grade, which included eighteen boys and nineteen girls, was used in this study. This group participated in the outdoor education technique as found in Appendix A.

The control group had an enrollment of thirty-three ninth grade students--fifteen boys and eighteen girls. A traditional method of teaching, as described in Appendix B, was used with this group.

Research Procedures

The pre-test (ITED-Form X-5) was administered on September 10, 1975 to thirty-seven ninth grade students in the experimental group and thirty-three ninth grade students in the control group at Blennerhassett Junior High School, Parkersburg, West Virginia. After one school semester of the outdoor education technique, the post-test (ITED-Form Y-5) was administered on January 27, 1976 to the experimental group of thirty-five students in the ninth grade and the control group of thirty ninth grade students at Blennerhassett Junior High School, Parkersburg, West Virginia. For the purpose of confidentiality, students in the experimental and control groups were referred to by their school identification numbers.

Statistical Treatment of the Data

Since students in the experimental and the control groups were designated by the principal, it was quite possible that they might have systematically differed from one another. For this reason, it was necessary to determine the differences by using ITED Reading Comprehension Pre-Test Raw Scores, which were highly correlated to intelligence according to Kerlinger (1972) and Buros (1972).

In addition, the analysis of covariance, (ANOCOVA) which was the main statistical tool employed in this study, was used to examine the covariate-reading comprehension raw scores and the ITED aggregate post-test raw scores. During this analysis, the ANOCOVA was used to see if any variability existed between the independent variable--the outdoor education technique, which produced the experimental group raw scores--

and the dependent variable--the Iowa Test of Educational Development, which was an achievement test.

Additional support for the use of analysis of covariance came from Popham and Sirotnik (1973), who stated:

> An analysis of covariance may be used when a relationship is being studied between a dependent variable and two or more groups representing an independent variable. This technique allows the study of performance of several groups which are unequal with regard to an important variable such as intelligence as though they were equal in this respect.

The analysis of covariance also provided an ITED aggregate mean score that showed differences between the experimental and control group. Similarly, mean scores created by the analysis of covariance were used to show differences between pre-test and post-test results from each of the component areas of language arts, mathematics, science and social studies for the experimental and control groups in the study. Kerlinger (1972) supported the use of means and a measure of variability with the following statements:

> Studying sets of numbers as they are is unwieldy. It is usually necessary to reduce the sets in two ways: (1) by computing averages or measures of central tendency, and (2) by computing measures of variability. The mean and the variance measure and epitomize sets of scores. They are both summaries that express their average tendency and their variability. Solving research problems without these measures is next to impossible.

Ferguson (1971) further defined and summarized the use of an analysis of covariance with the following statements:

> A statistical, rather than an experimental, method may be used to control or adjust for the effects of one or more uncontrolled variables, and permit, thereby, a valid evaluation of the outcome of the experiment. The analysis of covariance is such a method.

Statistical results have been reported in Chapter IV. Further discussion and interpretation of the results have been reported in Chapter V.

CHAPTER IV

ANALYSIS OF THE RESULTS

Introduction

This chapter is divided into the following sections: (1) introduction, (2) an analysis of covariance, which includes the hypothetical results for language arts, mathematics, science, and social studies, and (3) summary. The purpose of this chapter is to present and interpret the statistical techniques applied to the data and to indicate the results obtained. As stated in Chapter III, the major objective of this research was to analyze the effectiveness of an outdoor education technique by standardized testing.

A total of sixty-five students were involved in the study. Five students, three from the control group and two students from the experimental group, failed to take the ITED post-test and hence their scores were omitted from the final tabulation. Science Research Associates, Chicago, Illinois, scored the tests and a score was determined for each student by totaling the number of correct responses on the instrument. This score constituted the dependent variable as stated in Chapter III.

Three other scores were used in the analyses: the raw score from the reading comprehension sub-test of the ITED, the ITED aggregate scores of the pre-test and post-test, and the ITED aggregate post-test scores.

The means and standard deviations of the ITED component areas of language arts, mathematics, science and social studies and a composite mean are presented in Table I.

The observed differences on the means of the component areas showed substantial differences between the experimental and the control groups. The differences of the component areas of language arts, mathematics and science were quite large between the experimental and control groups. Differences which favored the experimental group were as much as seven points. However, in the social studies area, the difference was less than two points and this difference favored the experimental group. The composite means showed a difference of four points on the pre-test and six points on the post-test, and both cases favored the experimental group.

Analysis of Covariance

The analysis of covariance for the experimental and control group means on the pre-test and post-test was computed using computer programs in the Statistical Package for the Social Sciences, version 6-02 by Nie, Hull, Jenkins, Steinbrenner and Bent (1975). According to Popham and Sirotnik (1973):

> Analysis of covariance is an extremely valuable statistical technique, since it allows one to test for mean differences between two or more groups while compensating for initial differences between the groups with respect to relevant variable, thereby increasing the precision of the statistical tests.

Mean scores for the aggregate component groups of the ITED for the experimental and the control groups on the pre-test and the post-test are depicted in Figure 1. This graph shows that the control group advanced from 58.30 to 72.66 (increase 14.30) and the experimental group improved from 78.86 to 96.63 (increase 18.80). These groups differed

Table I.

ITED Means and Standard Deviations

	LA		Math		Science		SS		Composite	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Exp. Means	25.71	30.29	9.97	18.74	24.00	28.94	19.60	24.42	19.82	25.60
Cont. Means	17.93	23.20	7.60	11.33	18.50	20.93	16.03	22.67	15.02	19.53
Exp. S.D.	7.02	6.74	3.67	6.64	7.32	6.96	6.35	6.596	22.50	25.29
Cont. S.D.	5.11	4.29	2.94	3.89	6.08	5.34	5.83	5.50	16.14	16.53

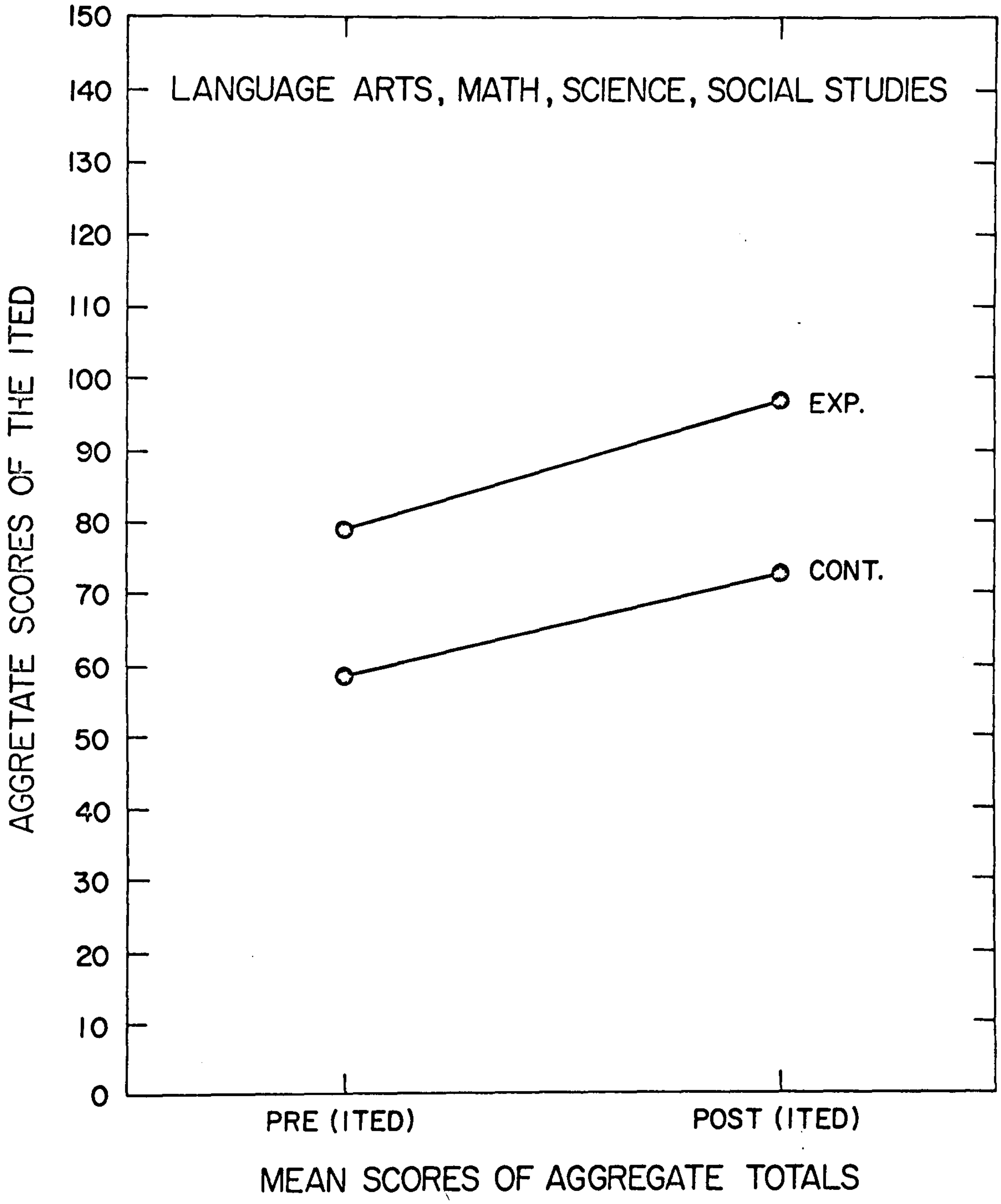
markedly from each other and the results favored the experimental group by 4.50.

Figure 2 reveals the mean language arts component scores of the ITED for the experimental and the control groups. The experimental group improved from a mean of 25.71 on the pre-test to 30.29 (increase 4.5 on the post-test). In addition, the control group improved similarly: its mean score rose from 17.93 to 23.20 (increase 5.3). As the figures show, the observed difference in improvement between the two groups amounts to only .8.

Figure 3, depicting the mathematical mean scores for the experimental and control groups, showed that the experimental group advanced from a mean of 9.97 on the pre-test to 18.74 on the post-test (increase 8.77). The control group also improved from a mean score of 7.60 on the pre-test to 11.33 on the post-test (increase 3.73). These conclusions showed that the experimental group and the control group improved substantially, with the increase favoring the experimental group by 5.04.

Test results in the science area revealed a similar phenomenon. Science mean scores increased from an experimental group mean of 24.00 on the pre-test to 28.84 on the post-test (increase 4.94), while the control group increased from a mean of 18.50 on the pre-test to 23.23 (increase 1.73). Thus, the experimental group mean score differed from the control group by 3.21, which favored the experimental group. These results are presented in Figure 4.

Data from the mean scores for social studies are presented in Figure 5. It showed that the experimental group increased from a mean


LANGUAGE ARTS, MATH, SCIENCE, SOCIAL STUDIES
AGGRETATE SCORES OF THE ITED
150
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130
120
110
100
90
80
70
60
50
40
30
20
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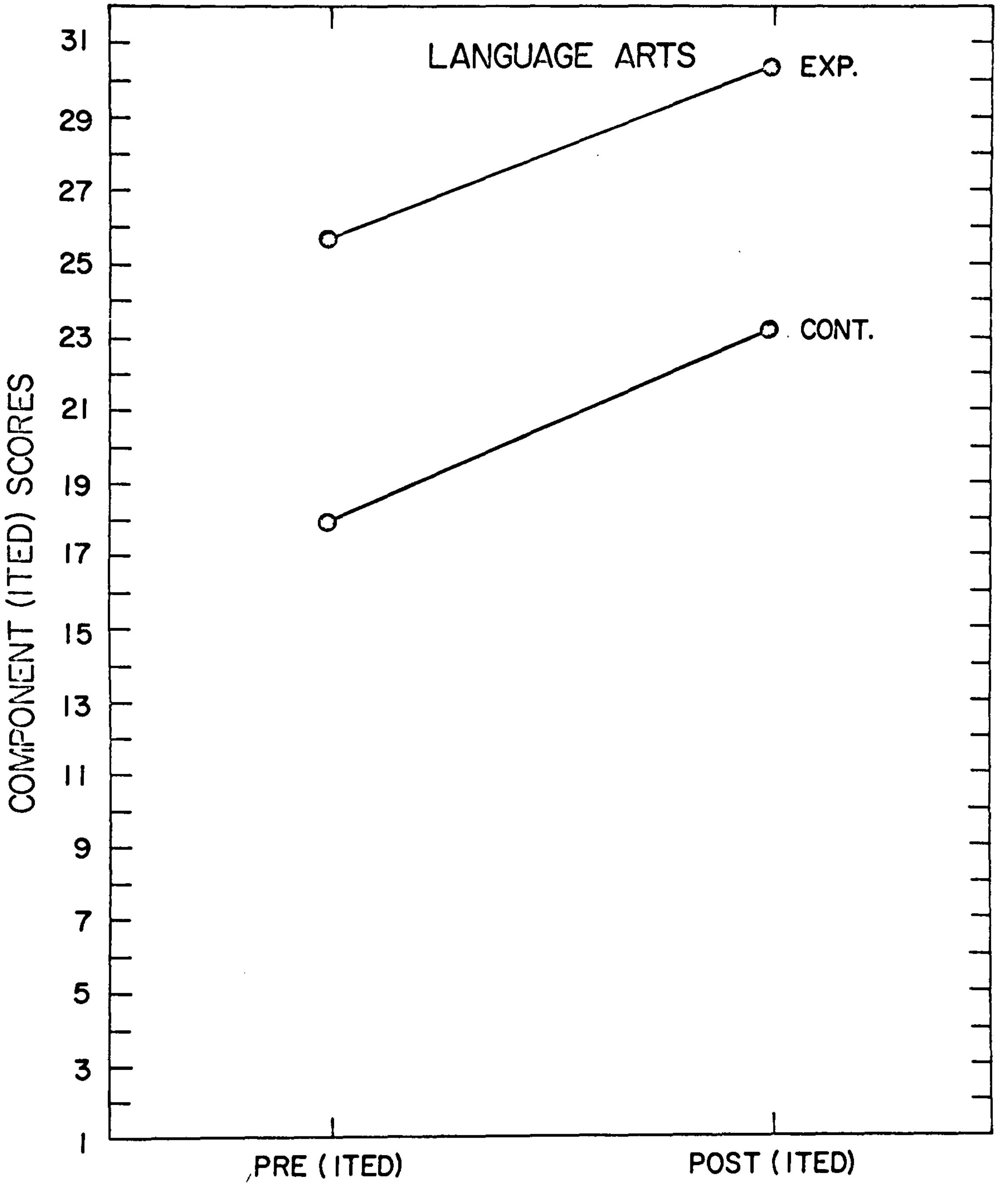
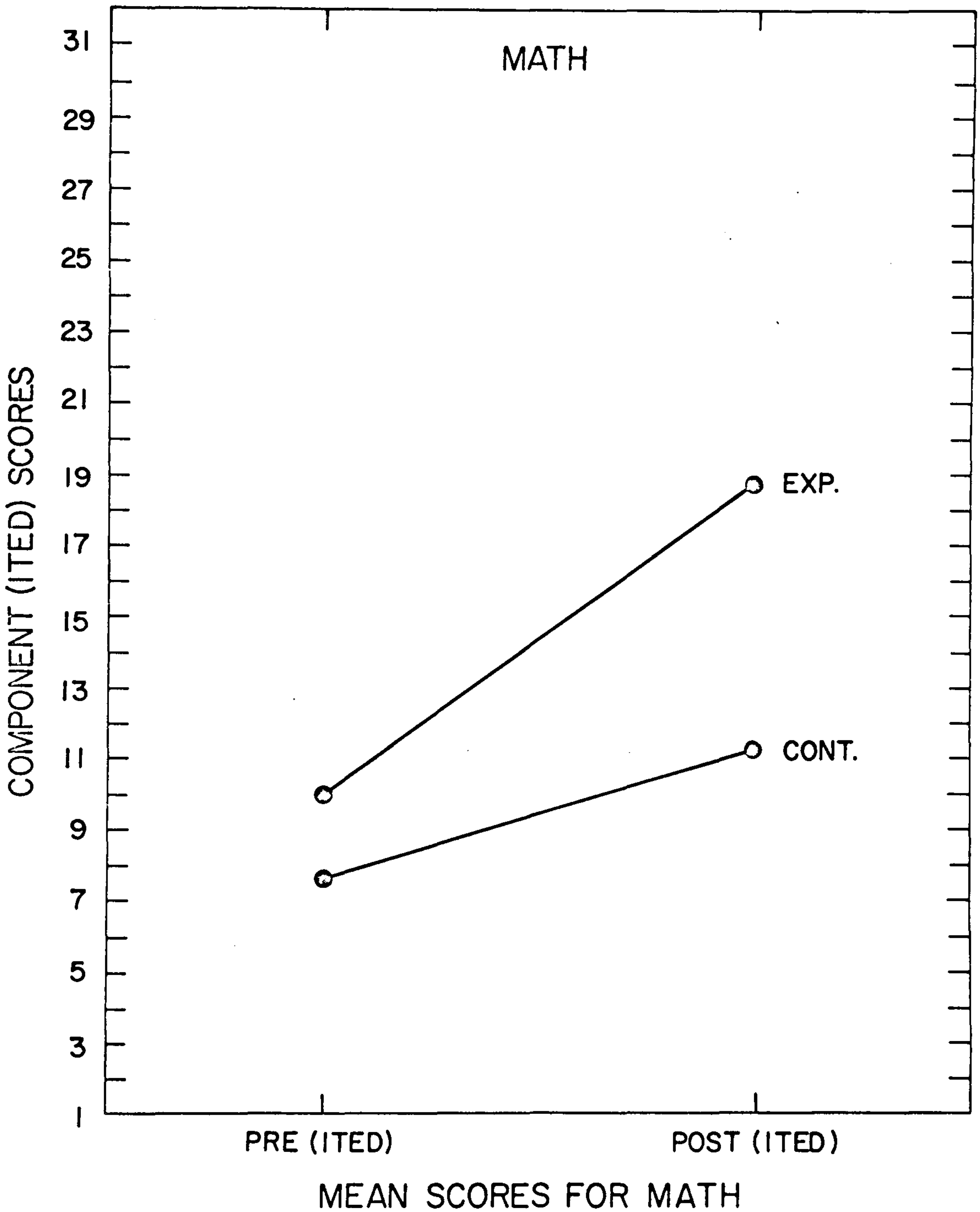
EXP.
CONT.
PRE (ITED)
POST (ITED)
MEAN SCORES OF AGGREGATE TOTALS

Figure 1.



MEAN SCORES FOR LANGUAGE ARTS

Figure 2.


MATH
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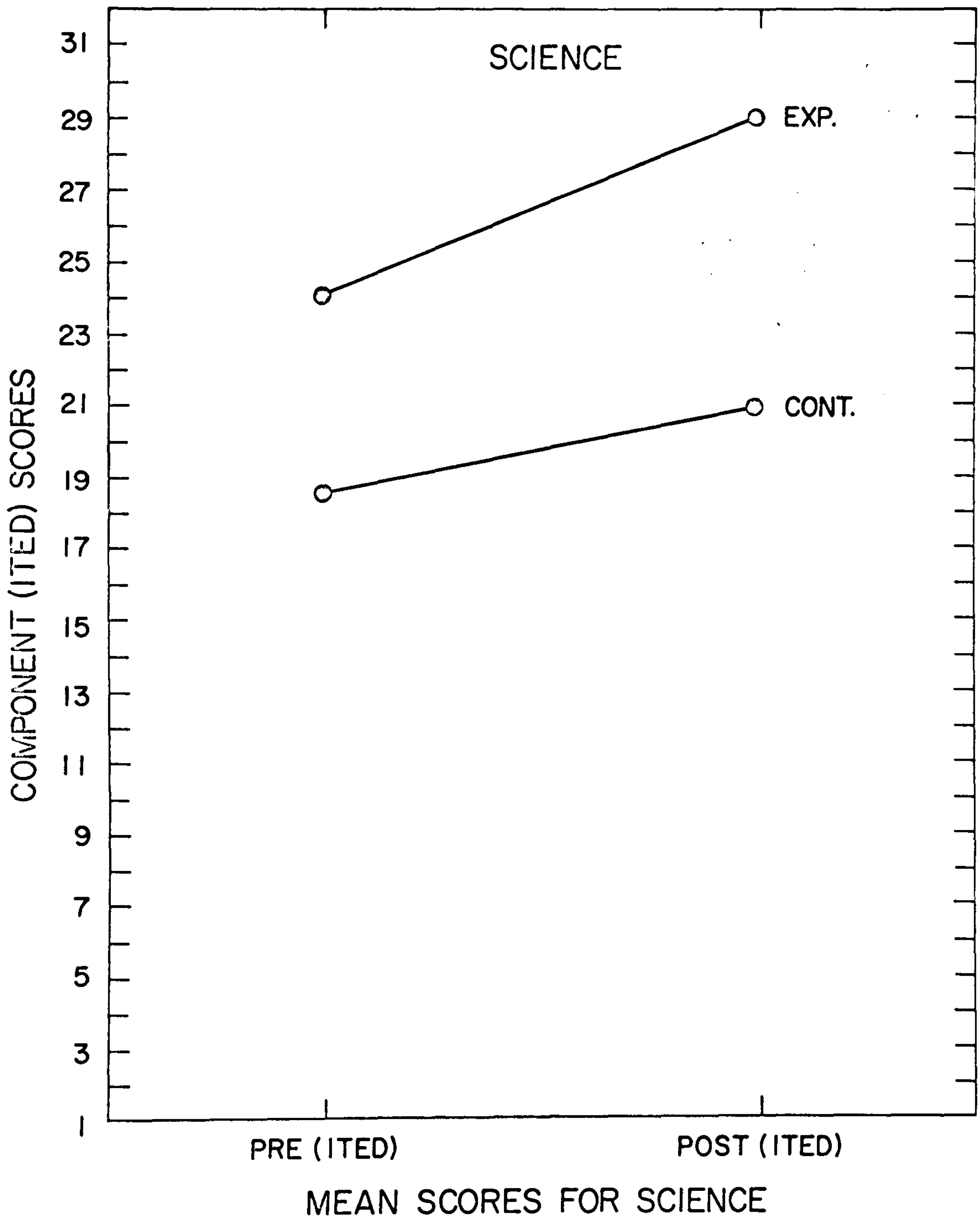
1
COMPONENT (ITED) SCORES
EXP.
CONT.
PRE (ITED)
POST (ITED)
MEAN SCORES FOR MATH

Figure 3.


SCIENCE
EXP.
CONT.
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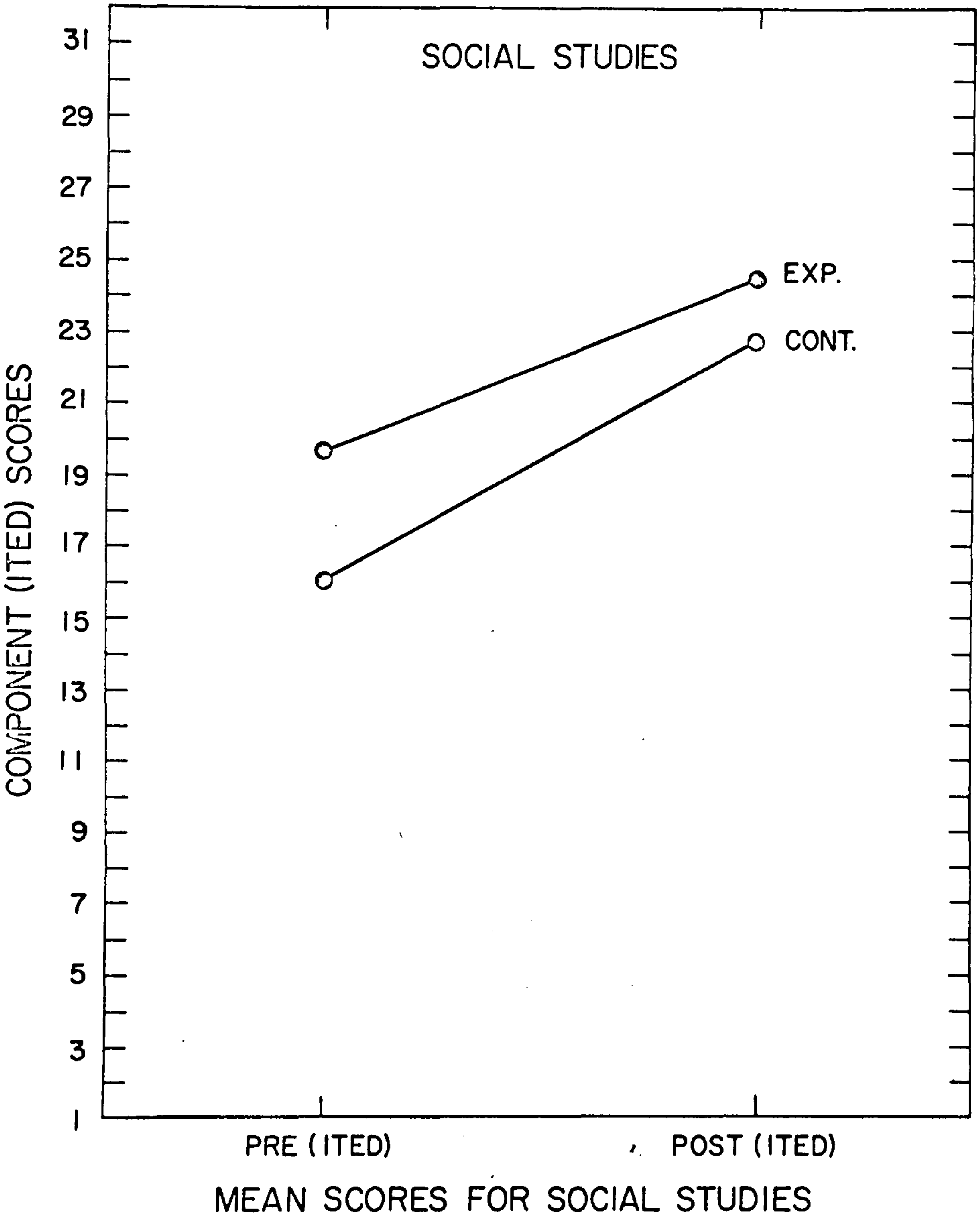
COMPONENT (ITED) SCORES
PRE (ITED)
POST (ITED)
MEAN SCORES FOR SCIENCE

Figure 4.


SOCIAL STUDIES
EXP.
CONT.
COMPONENT (ITED) SCORES
31
29
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17
15
13
11
9
7
5
3
1
PRE (ITED)
POST (ITED)
MEAN SCORES FOR SOCIAL STUDIES

Figure 5.

of 19.60 on the pre-test to 24.43 on the post-test (increase 4.83). Similarly, the control group mean increased from 16.04 on the pre-test to 22.87 on the post-test (increase 6.64). These results showed a similar marked increase for each group and the difference between the groups' improvement was 1.97, which favored the control group.

Since students in the experimental and control groups were not randomly assigned and because of the inability to secure the experimental and control groups' I.Q. scores and cumulative grade point averages, a covariate was needed to offset any unfair advantage that one group might possess in intelligence. An analysis of covariance was, thus, computed using the raw scores of the ITED reading comprehension pre-test, which correlated with intelligence, and the ITED aggregate scores of the component areas of language arts, mathematics, science, and social studies. This step was taken in order to correct any effect of intelligence which could have obscured the actual differences between the two groups. Buros (1972) supported the idea of this close interrelationship with intelligence and reinforcement came from Kerlinger (1972) who observed:

> A number of factors have been found to underlie intelligence, for example; verbal ability; reading comprehension, numerical ability, abstract reasoning, spatial reasoning and memory.

The analysis was significant at the .05 level and the results of this analysis are presented in Table II. These findings for the aggregate scores of the ITED with a reading comprehension covariate showed an F ratio of 13.76 which was significant at .001 for the main effects of the groups. This result indicated a great overall difference in acquired knowledge between the groups in the subject areas of language

Table II.

Analysis of Covariance: ITED Aggregate Scores

with Reading Comprehension

Source of Variation	df	Sum of Squares	Mean Squares	F	Significance of F
Reading Covariates	1	3410.27	3410.27	7.27	.001
Main Effects GP	1	6456.29	6456.29	13.76	.001
Residual	62	29087.62	469.15		
TOTAL	64	38953.83			

arts, mathematics, science, and social studies.

Language Arts Results

H1. The cognitive knowledge acquired by the students will be affected to a measurable degree by the utilization of the outdoor education technique in the teaching of language arts.

Table III indicates the results of the analysis of covariance of reading comprehension pre-test scores with the ITED aggregate pre-test language arts raw scores. This analysis showed a significant difference with an F ratio of 13.97 using .01. In the post-test results of this analysis that are revealed in Table IV, an F ratio of 17.53 was significant at the .01 level. These results revealed a significant difference between the two groups which was indicative of their ability to acquire cognitive knowledge. Therefore, the first hypothesis was accepted.

Mathematic Results

H2. The cognitive knowledge acquired by the students will be affected to a measurable degree by the utilization of the outdoor education technique in the teaching of mathematics.

Results of this analysis are presented in Table V. These findings revealed a resulting F ratio of 0.94 that was not significant at the .05 level on the pre-test, which used reading comprehension as the covariate with the ITED aggregate pre-test raw scores. However, the findings from the post-test in Table VI, which used reading comprehension as the covariate with the ITED aggregate post-test raw scores, showed a great significant difference with an F ratio of 15.47 at the

Table III.

Analysis of Covariance: Language Arts Aggregate

Pre-Test with Reading Comprehension

Source of Variation	df	Sum of Squares	Mean Squares	F	Significance of F
Reading Covariates	1	2009.01	2009.09	55.59	.001
Main Effects GP	1	504.99	504.99	13.97	.001
Residual	62	2240.53	1256.99		
TOTAL	64	4754			

Table IV.

Analysis of Covariance: Language Arts Aggregate

Post-Test with Reading Comprehension

Source of Variation	df	Sum of Squares	Mean Squares	F	Significance of F
Reading Covariates	1	224.04	224.04	4.85	.03
Main Effects GP	1	809.71	809.71	17.53	.001
Residual	62	2863.23	46.18		
TOTAL	64	3996.98			

Table V.

Analysis of Covariance: Mathematics Aggregate

Pre-Test with Reading Comprehension

Source of Variation	df	Sum of Squares	Mean Squares	F	Significance of F
Covariates Read	1	201.01	201.01	23.31	.001
Main Effects GP	1	8.15	8.15	0.95	>.05
Residual	62	534.59	8.62		
TOTAL	64	743.75			

Table VI.

Analysis of Covariance: Mathematics Aggregate

Post-Test with Reading Comprehension

Source of Variation	df	Sum of Squares	Mean Squares	F	Significance of F
Covariates Read	1	304.21	304.21	10.08	.001
Main Effects GP	1	466.93	466.93	15.47	.001
Residual	62	1871.87	30.19		
TOTAL	64	2643.01	41.30		

.01 level. Therefore, the second hypothesis was accepted.

Science Results

H3. The cognitive knowledge acquired by the students will be affected to a measurable degree by the utilization of the outdoor education technique in the teaching of science.

As indicated in Table VII, on the pre-test, which used reading comprehension raw scores and the ITED aggregate post-test raw scores, the resulting F ratio of 1.62 on this test was not significant at the .05 level. But, the post-test results in Table VIII using the ITED post-test raw scores and reading comprehension pre-test raw scores, showed an F ratio of 6.76 that was significant at the 0.01 level. There were significant differences among the students in the experimental setting and the students in the traditional settings in acquired knowledge. Therefore, the third hypothesis was accepted.

Social Studies Results

H4. The cognitive knowledge acquired by the students will be affected to a measurable degree by the utilization of the outdoor education technique in the teaching of social studies.

Table IX reveals the results from the analysis of covariance that used reading comprehension raw scores from the pre-test and the ITED aggregate raw scores from the component area of social studies. These findings indicated an F ratio of 0.56 on the pre-test that was not significant at the .05 level. The post-test findings using the reading comprehension and the ITED aggregate post-test raw scores in

Table VII.

Analysis of Covariance: Science Aggregate

Pre-Test with Reading Comprehension

Source of Variation	df	Sum of Squares	Mean Squares	F	Significance of F
Reading Covariates	1	2558.89	2558.89	110.84	.007
Main Effects GP	1	37.47	37.47	1.62	>.05
Residual	62	1431.42	23.09		
TOTAL	64	4027.78			

Table VIII.

Analysis of Covariance: Science Aggregate

Post-Test with Reading Comprehension

Source of Variation	df	Sum of Squares	Mean Squares	F	Significance of F
Reading Covariates	1	123.83	133.83	2.514	>.05
Main Effects GP	1	359.95	359.95	6.76	.001
Residual	62	3300.15	53.23		
TOTAL	64	3793.93	59.28		

Table IX.

Analysis of Covariance: Social Studies Aggregate

Pre-Test with Reading Comprehension

Source of Variation	df	Sum of Squares	Mean Squares	F	Significance of F
Reading Covariates	1	1751.31	1751.31	101.05	.001
Main Effects GP	1	9.73	9.73	0.56	>.05
Residual	62	1074.49	17.33		
TOTAL	64	2835.53	44.31		

Table X revealed an F ratio of 2.69 that was not significant at the .05 level. Overall, there were no significant differences between the students in the experimental and control groups in acquired knowledge. Therefore, the fourth hypothesis was rejected.

Summary

The results of the analyses indicated that the experimental and the control groups, initially, were quite different in intelligence, and reading comprehension pre-tests were used to offset the differences. Subsequently, the two groups performed differently in acquiring cognitive knowledge to a measurable degree in language arts, mathematics, and science. However, the two groups performed similarly in acquiring cognitive knowledge in social studies.

The differences among the two groups were substantial enough to make generalizations concerning acquired cognitive knowledge in the areas of language arts, mathematics, and science. Subsequently, the experimental group differed from the control group significantly in each of these component areas. But, there was no significant difference in social studies between the groups, and this statistical difference was not large enough to permit any generalization for this subject area.

A review of the analyses performed and their results are presented in Table XI. This table offers one an opportunity to see each area and the significance level for each analysis used.

Table X.

Analysis of Covariance: Social Studies Aggregate

Post-Test with Reading Comprehension

Source of Variation	df	Sum of Squares	Mean Squares	F	Significance of F
Reading Covariates	1	207.92	207.92	4.36	.003
Main Effects GP	1	128.02	128.02	2.69	>.05
Residual	62	2950.29	47.59		
TOTAL	64	3286.24	51.35		

Table XI.

Summary of Analyses Performed and Their Significance

	Analyses Performed	F	Significance	Level
1. Differences in Performance Between Groups on the ITED Aggregate Post-Test Controlled for Reading Comprehension	ANOCOVA	13.76	Yes	.001
Component-Tests				
2. Differences in Performance Between Groups on the Language Arts Aggregate Pre-Test Controlled for Reading Comprehension	ANOCOVA	13.97	Yes	.001
3. Differences in Performance Between Groups on the Language Arts Aggregate Post-Test Controlled for Reading Comprehension	ANOCOVA	17.53	Yes	.001
4. Differences in Performance Between Groups on the Mathematics Aggregate Pre-Test Controlled for Reading Comprehension	ANOCOVA	0.95	No	-
5. Differences in Performance Between Groups on the Mathematics Aggregate Post-Test Controlled for Reading Comprehension	ANOCOVA	15.47	Yes	.001
6. Differences in Performance Between Groups on the Science Aggregate Pre-Test Controlled for Reading Comprehension	ANOCOVA	1.62	No	-
7. Differences in Performance Between Groups on the Science Aggregate Post-Test Controlled for Reading Comprehension	ANOCOVA	6.76	Yes	.001
8. Differences in Performance Between Groups on the Social Studies Aggregate Pre-Test Controlled for Reading Comprehension	ANOCOVA	0.56	No	-
9. Differences in Performance Between Groups on the Social Studies Aggregate Post-Test Controlled for Reading Comprehension	ANOCOVA	2.69	No	-

CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

This chapter presents a summary of the research compiled, conclusions based upon the investigation, and recommendations for further research.

Research Summary

The purpose of this investigation was to determine the effectiveness of an outdoor education technique on acquired cognitive knowledge for students as measured by the Iowa Test of Educational Development. Available related literature indicated: (1) that there was a limited amount of experimental design research in outdoor education and (2) that the related literature available was concentrated in only one or two subject areas of the curriculum. Hence, this research study was undertaken to provide additional experimental design research in other subject areas of the secondary school curriculum.

The Iowa Test of Educational Development was used to evaluate the students' cognitive knowledge in the subject areas of language arts, mathematics, science, and social studies, and it was the primary measurement instrument employed in this study. In addition, the study also employed the reading comprehension section of the ITED.

An ITED pre-test was administered at the beginning of the school semester to an experimental and control group of seventy ninth grade students. An outdoor education technique was administered during the fall semester, and an ITED post-test was administered to sixty-five ninth grade students in the experimental and control groups at the conclusion of the school semester.

An analysis of covariance and mean scores of the ITED were used to analyze the final tabulations of the testing. Included in this analysis were reading comprehension raw scores that were closely correlated to intelligence, ITED pre-test and post-test aggregate raw scores, and ITED aggregate post-test raw scores.

Conclusions

Results presented in Chapter IV supported the following conclusions:

1. Students in the experimental group acquired to a measurable degree a greater amount of cognitive knowledge in language arts, mathematics, and science than those in the control group.

2. Students in the experimental and the control groups acquired a similar amount of cognitive knowledge in the subject area of social studies.

3. No student being administered the outdoor education technique suffered academically by his participation in the program. It appeared, furthermore, that the outdoor education technique is a valuable tool in the secondary school curriculum.

Recommendations for Further Research

Implications for future research include at least the following:

1) A longitudinal study of three years using the same outdoor education technique should be initiated.

2) A replication of this investigation using the same outdoor education technique with a random sample of students should begin.

3) The establishment of criteria for teacher methodology and teacher competence should be formulated for use in replication of the study with the same outdoor education technique. The teacher competency and methodology could be:

a. Five years teaching experience.

b. Master's Degree in the teaching field.

c. Superior evaluation from the administrators.

d. Similar lecture procedures in the classroom.

e. Correlation of the time structure in the classroom.

f. Coordinated use of the audio-visual equipment in the outdoor education technique.

g. Similar type of tests for students (objective or essay).

4) A study could be made to determine if the socio-economic background, ethnic background and regional or cultural differences of the students in grade nine could effect the cognitive learning of students in this outdoor education program. The same outdoor education technique could be used for this type of study.

5) Investigations of students in grades 10-12 could be made to determine if any differences exist in the data at different grade levels and age groupings. A different outdoor education technique

would have to be developed for this grade level.

6) This study used traditional materials from assigned textbooks. Perhaps a study could be done with materials unfamiliar to the students. Since many students in many suburban schools find outdoor experiences foreign to their way of life, this would seem to be an excellent study.

7) Results of this study could be used to implement another outdoor education investigation in the secondary school curriculum. These findings provide the necessary input for administrators interested in adding or eliminating outdoor education from the curriculum at the secondary level.

8) A similar study which assigned all students in the study to the experimental group could be done to secure added validation and reliability. This technique would show improvement or lack of improvement from the pre-test to the post-test period.

9) A study which assigned the intellectually superior group of students to the control group could be done with this outdoor education technique. This condition would enable administrators to evaluate the average students in comparison with the superior achievers in the control group.

10) Since the two groups showed little difference in social studies achievement, a study could be done to see if attitude influences cognitive learning.

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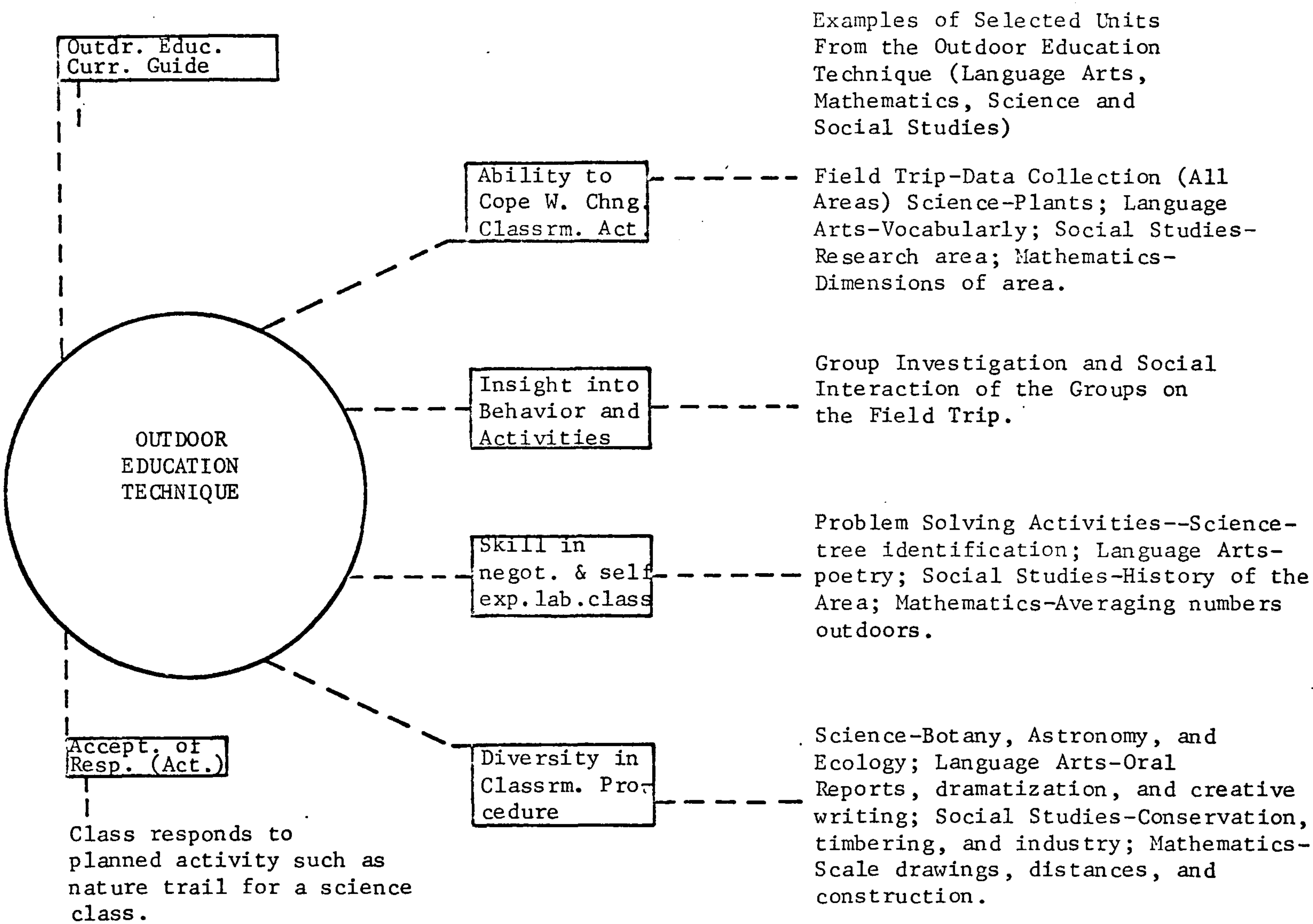
APPENDIX A

Outdoor Education Technique


Outdr. Educ.
Curr. Guide
Examples of Selected Units
From the Outdoor Education
Technique (Language Arts,
Mathematics, Science and
Social Studies)
Ability to
Cope W. Chng.
Classrm. Act.
Field Trip-Data Collection (All
Areas) Science-Plants; Language
Arts-Vocabularly; Social Studies-
Research area; Mathematics-
Dimensions of area.
Insight into
Behavior and
Activities
Group Investigation and Social
Interaction of the Groups on
the Field Trip.
OUTDOOR
EDUCATION
TECHNIQUE
Skill in
negot. & self
exp. lab. class
Problem Solving Activities--Science-
tree identification; Language Arts-
poetry; Social Studies-History of the
Area; Mathematics-Averaging numbers
outdoors.
Accept. of
Resp. (Act.)
Diversity in
Classrm. Pro-
cedure
Science-Botany, Astronomy, and
Ecology; Language Arts-Oral
Reports, dramatization, and creative
writing; Social Studies-Conservation,
timbering, and industry; Mathematics-
Scale drawings, distances, and
construction.
Class responds to
planned activity such as
nature trail for a science
class.

OUTDOOR EDUCATION TECHNIQUE

MONTH	DAY	SUBJECT	UNIT	ACTIVITY
October	22	Language Arts	Strong Paragraph	Lecture
October	23	Language Arts	Strong Paragraph	Lecture
October	24	Language Arts	Strong Paragraph	Visit outdoor campus-topics
October	27	Language Arts	Strong Paragraph	Use data for paragraphs.
October	28	Language Arts	Strong Paragraph	Orally present paragraphs.
October	29	Language Arts	Strong Paragraph	Question-Answ.
November	14	Language Arts	Sentence Sense	Lecture on sentence const.
November	17	Language Arts	Sentence Sense	Outdr. visit Group work on topic
November	18	Language Arts	Sentence Sense	Writing assign. on topics.
November	19	Language Arts	Sentence Sense	Work on black-board
November	20	Language Arts	Sentence Sense	Short Quiz on sentences
December	20	Language Arts	Your Dairy	Pre-Christmas Activity
December	21	Language Arts	Your Dairy	Short Snow Hike

OUTDOOR EDUCATION TECHNIQUE

MONTH	DAY	SUBJECT	UNIT	ACTIVITY
January	5	Language Arts	Your Dairy	Write about your outdr. act. during holidays
January	6	Language Arts	Your Dairy	Written exercise—Hand-out--Ends Unit

OUTDOOR EDUCATION TECHNIQUE

MONTH	DAY	SUBJECT	UNIT	ACTIVITY
September	25	Mathematics	Practical Areas in Mathematics	Use of dimen. gathered in lab to work prob. assigned.
September	26	Mathematics	Practical Areas	Work problems on board.
September	27	Mathematics	Practical Areas	Short Test 10 problems
October	15	Mathematics	Integers	Lecture
October	16	Mathematics	Integers	Tour of outdrs. to discuss numb
October	17	Mathematics	Integers	Class disc. of topics found on tour.
October	20	Mathematics	Integers	Use of numbrs. to work probls.
October	21	Mathematics	Integers	Work problems on worksheet from outdrs.
October	22	Mathematics	Integers	Practical Test.
November	17	Mathematics	Geometry	Brief Intro. to Unit
November	18	Mathematics	Geometry	Outdr. Visit (Rain) Lecture

OUTDOOR EDUCATION TECHNIQUE

MONTH	DAY	SUBJECT	UNIT	ACTIVITY
November	20	Mathematics	Geometry	Outdr. Visit (Rain) Lecture
November	21	Mathematics	Geometry	Outdr. Visit
November	24	Mathematics	Geometry	Work problems from outdr. situation
November	25	Mathematics	Geometry	Short Quiz
January	12	Mathematics	Probability & Statistics	Visit outdrs. to observe angles, gather data for statistical problems
January	15	Mathematics	Probability & Statistics	Work on problems in class
January	19	Mathematics	Probability & Statistics	Short quiz
January	20	Mathematics	Probability & Statistics	Handout-Work problems based on outdr. problems
January	21	Mathematics	Probability & Statistics	Unit Test

OUTDOOR EDUCATION TECHNIQUE

MONTH	DAY	SUBJECT	UNIT	ACTIVITY
September	24	Science	The Dynamic Earth	Class discussed the samples found on tour.
September	25	Science	The Dynamic Earth	Identification terms tabulated into list
September	26	Science	The Dynamic Earth	Filmstrip- Rocks & Sources
September	29	Science	The Dynamic Earth	Quiz on the terms & Mater.
October	9	Science	Rocks & Mineral Energy & Change	Outdr. hike to collect other samples of rocks
October	10	Science	Energy & Change	Tour of Dupont Plant.
October	13	Science	Energy & Change	Slides & Film on Energy
October	14	Science	Energy & Change	Class disc.
October	15	Science	Energy & Change	10 question quiz.

OUTDOOR EDUCATION TECHNIQUE

MONTH	DAY	SUBJECT	UNIT	ACTIVITY
October	16	Science	Energy & Change	Lecture-Review
October	17	Science	Energy & Change	Essay Test
November	4	Science	The Land Wears Away	Visit stream and site of erosion in outdr. lab.
November	5	Science	The Land Wears Away	Lecture
November	6	Science	The Land Wears Away	Oudr. visit (postponed-rain)
November	7	Science	The Land Wears Away	Question-Answ.
November	10	Science	The Land Wears Away	Guest Speaker Soil Conserva.
November	12	Science	The Land Wears Away	Review of Unit
November	13	Science	The Land Wears Away	Unit Test-Objective
January	15	Science	Odds and Ends (Water Cycle)	Temperatures-Outdr. Thermom.
January	16	Science		Class discussion

OUTDOOR EDUCATION TECHNIQUE

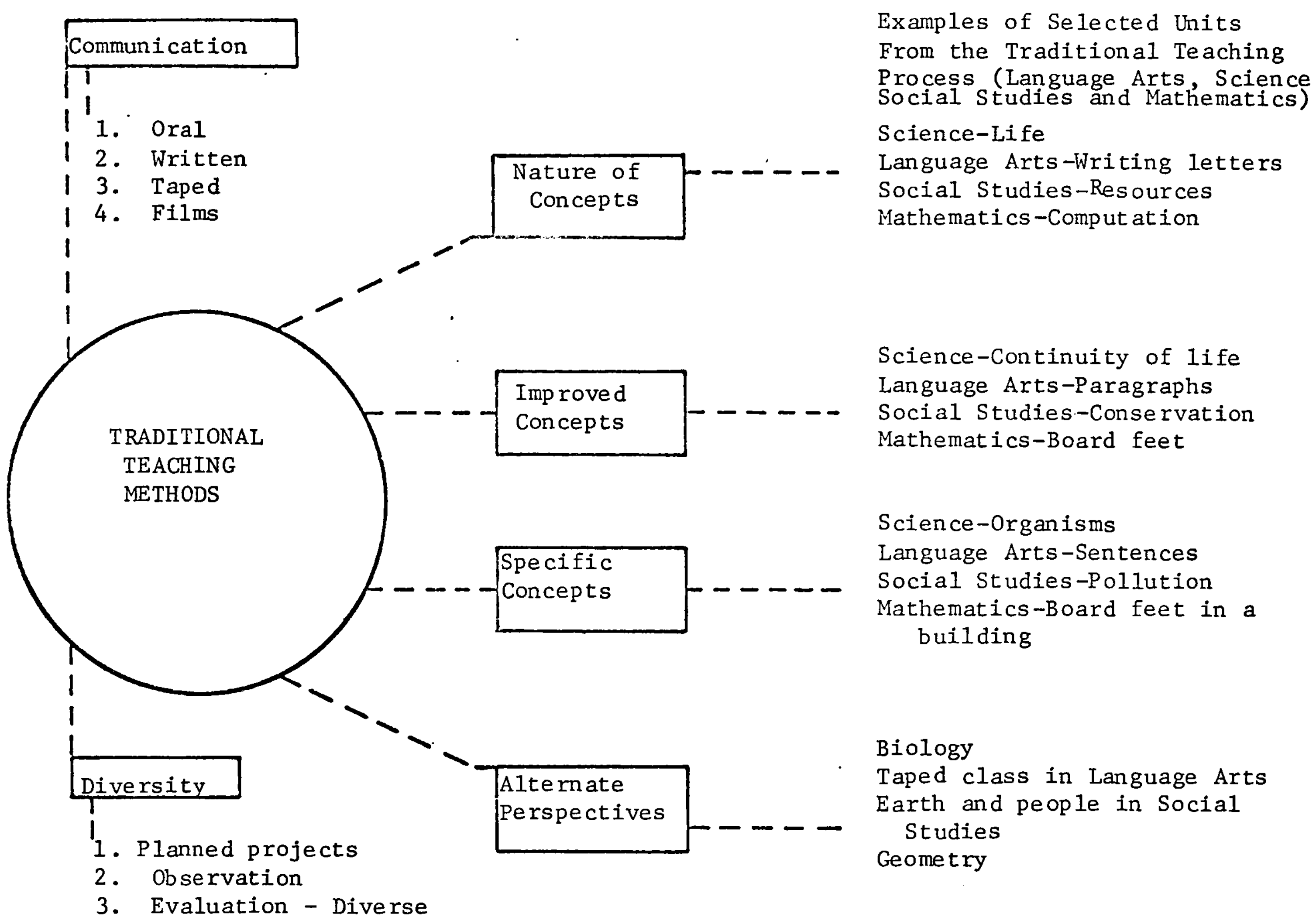
MONTH	DAY	SUBJECT	UNIT	ACTIVITY
September	30	Social Studies	Society in Change	Oral rsp. on subject
October	1	Social Studies	Society in Change	Questions and Answers
October	2	Social Studies	Society in Change	Essay Quiz. 5 questions
October	13	Social Studies	Human Resources	Visit to Cabot Carbon Black
October	14	Social Studies	Human Resources	Class discussion on visit.
October	15	Social Studies	Human Resources	Film on coal & conversion
October	16	Social Studies	Human Resources	Question-Answer
October	17	Social Studies	Human Resources	Film-The Most Valuable Resource
October	20	Social Studies	Human Resources	Unit Test
November	6	Social Studies	Historical Background	Visit to Blenner-hassett Island
November	7	Social Studies	Historical Background	Class Discussion
November	10	Social Studies	Historical Background	Class skit

OUTDOOR EDUCATION TECHNIQUE

MONTH	DAY	SUBJECT	UNIT	ACTIVITY
November November	11 12	Social Studies Social Studies	Historical Background Historical Background	Film Short Essay Test
January	21	Social Studies	Odds and Ends	Visit Blenner-hassett Overlook Cancelled Snow Classroom Disc.
January	22	Social Studies	Odds and Ends	Oudr. Visit Cancelled--Snow Slides in the Classroom

APPENDIX B

Traditional Education


Communication
1. Oral
2. Written
3. Taped
4. Films
TRADITIONAL TEACHING METHODS
Diversity
1. Planned projects
2. Observation
3. Evaluation - Diverse
Nature of Concepts
Improved Concepts
Specific Concepts
Alternate Perspectives
Examples of Selected Units From the Traditional Teaching Process (Language Arts, Science, Social Studies and Mathematics)
Science-Life
Language Arts-Writing letters
Social Studies-Resources
Mathematics-Computation
Science-Continuity of life
Language Arts-Paragraphs
Social Studies-Conservation
Mathematics-Board feet
Science-Organisms
Language Arts-Sentences
Social Studies-Pollution
Mathematics-Board feet in a building
Biology
Taped class in Language Arts
Earth and people in Social Studies
Geometry

TRADITIONAL EDUCATION

MONTH	DAY	SUBJECT	UNIT	ACTIVITY
October	22	Language Arts	Paragraphs	Discussion
October	23	Language Arts	Paragraphs	Lecture
October	24	Language Arts	Paragraphs	Lecture
October	27	Language Arts	Paragraphs	Quiz
October	28	Language Arts	Paragraphs	Lecture
October	29	Language Arts	Paragraphs	Oral Disc.
October	30	Language Arts	Paragraphs	Unit test
November	14	Language Arts	Sentences	Lecture
November	17	Language Arts	Sentences	Group work
November	18	Language Arts	Sentences	Group work
November	19	Language Arts	Sentences	Quiz
November	20	Language Arts	Sentences	Writing assignment
December	20	Language Arts	Your Dairy	Snow Hike
December	21	Language Arts	Your Dairy	Lecture
January	5	Language Arts	Your Dairy	Discussion

TRADITIONAL EDUCATION

MONTH	DAY	SUBJECT	UNIT	ACTIVITY
January	6	Language Arts	Your Dairy	Lecture with exercise

TRADITIONAL EDUCATION

MONTH	DAY	SUBJECT	UNIT	ACTIVITY
September	25	Mathematics	Practical Areas	Discussion
September	26	Mathematics	Practical Areas	Lecture
September	27	Mathematics	Practical Areas	Lecture
October	15	Mathematics	Integers	Discussion
October	16	Mathematics	Integers	Lecture
October	17	Mathematics	Integers	Lecture
October	20	Mathematics	Integers	Quiz
October	21	Mathematics	Integers	Film strip
October	22	Mathematics	Integers	Test
November	17	Mathematics	Geometry	Lecture
November	18	Mathematics	Geometry	Lecture
November	20	Mathematics	Geometry	Quiz

TRADITIONAL EDUCATION

MONTH	DAY	SUBJECT	UNIT	ACTIVITY
November	21	Mathematics	Geometry	Question-Answ.
November	24	Mathematics	Geometry	Field Trip
November	25	Mathematics	Geometry	Unit Test
January	12	Mathematics	Probability & Statistics	Lecture
January	15	Mathematics	Probability & Statistics	Quiz
January	19	Mathematics	Probability & Statistics	Discuss Test
January	20	Mathematics	Probability & Statistics	Lecture Short Test
January	21	Mathematics	Probability & Statistics	Lecture

TRADITIONAL EDUCATION

MONTH	DAY	SUBJECT	UNIT	ACTIVITY
September	24	Science	Dynamic Earth	Lecture
September	25	Science	Dynamic Earth	Lecture
September	26	Science	Dynamic Earth	Lecture
September	29	Science	Dynamic Earth	Film
October	9	Science	Energy & Change	Question-Answ
October	10	Science	Energy & Change	Lecture
October	13	Science	Energy & Change	Quiz
October	14	Science	Energy & Change	Discussion
October	15	Science	Energy & Change	Lecture
October	16	Science	Energy & Change	Film
October	17	Science	Energy & Change	Test
November	5	Science	Land	Filmstrip
November	6	Science	Land	Discussion
November	7	Science	Land	Question-Answ
November	10	Science	Land	Quiz

TRADITIONAL EDUCATION

MONTH	DAY	SUBJECT	UNIT	ACTIVITY
November	11	Science	Land	Lecture
November	12	Science	Land	Review
November	13	Science	Land	Unit Test
January	15	Science	Odds & Ends	Lecture
January	;6	Science	Odds & Ends	Filmstrip & Field trip

TRADITIONAL EDUCATION

MONTH	DAY	SUBJECT	UNIT	ACTIVITY
September	30	Social Studies	Society & Change	Film
October	1	Social Studies	Society & Change	Lecture
October	2	Social Studies	Society & Change	Lecture
October	13	Social Studies	Society & Change	Lecture
October	14	Social Studies	Human Resources	Question-Answ
October	15	Social Studies	Human Resources	Filmstrip-Coal
October	16	Social Studies	Human Resources	Lecture
October	17	Social Studies	Human Resources	Quiz
October	20	Social Studies	Human Resources	Unit Test
November	6	Social Studies	Historical Background	Lecture
November	7	Social Studies	Historical Background	Lecture
November	10	Social Studies	Historical Background	Lecture

TRADITIONAL EDUCATION

MONTH	DAY	SUBJECT	UNIT	ACTIVITY
November	11	Social Studies	Historical Background	Quiz
November	12	Social Studies	Historical Background	Lecture Essay Test
January	21	Social Studies	Odds & Ends	Lecture
January	22	Social Studies	Odds & Ends	Discussion

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AN ANALYSIS OF THE EFFECTIVENESS OF AN OUTDOOR EDUCATION TECHNIQUE AS MEASURED BY THE IOWA TEST OF EDUCATIONAL DEVELOPMENT

By

R. Dwain Wilcox

(ABSTRACT)

A comparison was made of acquired student knowledge using an outdoor education technique by students in an experimental and traditional classroom as measured by the Iowa Test of Educational Development. Analyses were performed in the subject areas of language arts, mathematics, science, and social studies.

There was significant difference in performance between students in the experimental classroom situation and those in the traditional classrooms in the subject areas of language arts, mathematics and science. There was no significant difference in the social studies area. There was an indication that the students in the experimental situation using the outdoor education technique performed better than the control group in the traditional classroom. However, the outdoor education technique was not detrimental to either group.

A series of figures and tables used in the analysis, which indicated the results of the statistical procedures, are included.