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AUTHOR Milner, E. Keith: Hancock, P. A.
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ABSTRACT

The purpose of this study was to determine the effects of an environmental science program on the development of student attitudes toward selected physical activities and social concepts. The subjects of the study were high school students enrolled in the Florida Environmental Studies Program. The program emphasized observation and experience as vehicles for learning. Canoeing, backpacking, skin and scuba diving, and camping served as a catalyst for the program with the primary emphasis on the study of the environment. Findings revealed that these physical activities contributed to the growth of positive attitudes toward the concepts of individual responsibility, group differences, awareness of environmental problems, and sense of belonging. The active involvement of the participants in team efforts such as camping, canoeing, and skin and scuba diving had a tendency to enhance interactions among students. It was concluded that the environmental science program had a positive effect on the development of student attitudes toward physical activities and social concepts.
(Author/JD)

THE EFFECTS OF AN INTERDISCIPLINARY COLLEGIATE PROGRAM FOR SECONDARY SCHOOL STUDENTS ON THEIR ATTITUDES TOWARD SELECTED PHYSICAL EDUCATION AND SOCIAL CONCEPTS

E. Keith Milner and P. A. Hancock
University of Illinois
Urbana-Champaign, Illinois 61820

ABSTRACT

The purpose of this study was to determine the effects of an environmental science program on the development of student attitudes toward selected physical activity and social concepts. Sixty-four high ability high school students with similar interests and abilities from all regions of the United States were included in this investigation. A Sematic Differential instrument consisting of 15 bipolar adjectives and 12 concepts was administered to all subjects. Data were analyzed through the use of Principle Component Analysis with varimax rotation, a 2 X 2 factorial analysis of variance and the Scheffe' post hoc test. Statistically significant differences were found for several concepts across the four dimensions measured. The physical education activities contributed to the positive growth for the concepts of Individual Responsibility, Group Differences, Awareness of Environmental Problems and a Sense of Belonging. The active involvement of the participants in team efforts such as camping, canoeing and skin and SCUBA diving has a tendency to enhance student-to-student interactions. It was concluded that the environmental science program had a positive effect on the development of student attitudes toward selected physical activity and social concepts.

Key Words: Environmental Studies, Social and Physical Education Concepts, Attitude.

Introduction

Numerous studies have been reported dealing with attitudes toward some aspect of physical activity in a physical education setting (O'Bryan & O'Bryan, 1969; Zaichkowsky, 1975). Unfortunately, few studies have been conducted regarding interdisciplinary work directed toward what effect other subject areas might have on an individual's attitude toward selected social concepts. Little data is available to evaluate what effects programs with content foci other than physical education have on student attitudes toward physical education activities which are integral components of these programs. Yet, an environmental field studies program almost always includes such skills as camping, hiking, backpacking and canoeing. With increased emphasis on ecological and environmental science programs, more students are involved in physical education activities via science than ever before. Many states have mandates that the school curriculi must include environmental education. In addition, special programs are designed by various colleges and universities to involve secondary students in field-oriented programs taught by university staff, Pizzini (1978).

There is little doubt that physical education activities enhance special programs which emphasize other disciplines. In most cases in higher education, physical education activity classes are used as a foundation whereby students from other areas acquire skills to enhance their abilities in their own subject. For example, skin and SCUBA diving can serve as a valuable tool for the marine geologist or biologist. Likewise, the "social" physical activities, such as golf and tennis can be of significant value in the business world.

Seldom are situations found whereby another discipline is the foundation for the acquisition of physical activity skills.

Grebner and Razor (1975) addressed this issue by [illegible]ing that physical educators should not perpetuate an environment in [illegible]eir field is always the dominant partner in any cooperative venture. They [illegible]est that allowing other disciplines to utilize physical education activities is educationally sound and provides the impetus for cultivating long range endeavors. Ziegler (1976) also has discussed the important implications and influence that ecology has played in physical education and the role that physical educators can play in the development of an ecological awareness. This study was designed to determine the effects of an environmental science program on the development of student attitudes toward selected physical activities and social concepts.

Method

Sixty-four motivated, high ability male and female high school students with similar interests from all regions of the United States were included in this investigation. Thirty-two students, representing the total number enrolled in the Florida Environmental Studies Program, comprised the experimental group. The control group consisted of thirty-two students who were accepted into this program and were qualified to have participated. All students had a minimum of three years of science in high school, grade point averages of 3.0 (4.0 scale). All had an interest in environmental science and were eligible for early admission at a university. Such admission allows a non-high school graduate the opportunity to enroll in university courses for credit providing that certain requirements are met, such as rank in class and grade point average.

Both the control group and experimental group were randomly split, providing two control groups of 16 and two experimental groups of 16 respectively. A Semantic Differential instrument was first administered to one control

group and one experimental group prior to the beginning of the program. At the conclusion of the Florida Environmental Studies Program, the remaining groups, i.e., one control and one experimental group, completed this instrument. Thus, each subject completed the instrument only once. This technique was used in order to eliminate any test re-test effects.

The Florida Environmental Studies Program sponsored by a Midwest University is a two-week outdoor educational program. It is concerned with utilizing the unique environmental setting, Florida, as a living laboratory for field studies in ecology, marine biology, and oceanography. Students undertake study of environmental problems through the activities of camping, canoeing, backpacking, and skin and SCUBA diving.

The program utilized three different geographical areas in southern Florida. One area observed and investigated is the southern portion of the Everglades. During this facet of the program, opportunities to participate in an overnight canoe venture and hikes are included. These physical activities enhance the observations and investigations of the participants for the diverse flora and fauna associated with the area. Projects are conducted to introduce students to the fragil ecosystems of the Everglades.

The northeastern portion of the National Park is able to emphasize the various ecosystems within and adjacent to the Everglades. This facet of the program stresses ecological principles, concepts and relationships within the total environment. Such features as the pinelands, hammocks, and swamp habitats are observed and investigated to increase the participant's understanding of "diversity of species" and the interrelationships of the biotic to the abiotic and the biotic to the biotic.

The third geographical area, the Florida Keys, is utilized to investigate the various life zones from near-shore-to-reef communities and the flora and fauna succession in the environment. Training sessions are conducted so as to enable all participants to skin dive. Opportunities are provided for all students to observe and compare the full range of zones from the shore out to the reefs. Skin and SCUBA diving enhances the activities while enabling each student to observe and study the marine environment.

The major goal of this program is to stimulate an interest in and an understanding of the natural world. The program emphasizes observing and experiencing as a vehicle for learning. Canoeing, backpacking, skin and SCUBA diving, and camping serve as a catalyst for the program despite the primary emphasis being the study of the environment. The field experience, therefore, is designed to surround the students with the most exciting and stimulating environment possible. The activities become a mixture of science content, natural awareness, values clarification, and physical education.

Instrument

One of the many techniques available to evaluate the affective domain is the Semantic Differential. It is especially useful in evaluating concepts relating to a particular program or component thereof. The instrument was designed by Osgood, Suci and Tannenbaum (1951) and includes attitude assessment among its applications.

The Semantic Differential consists of a number of scales, each of which are bipolar adjectives, together with a list of concepts. The concepts are rated along a continuum, usually consisting of seven points. The concepts selected for this study resulted from the responses of fifteen instructors and sixty-eight students who were involved in a previous program. Their

responses were categorized, rated, and the top twelve concepts were selected for use in this study. Following the identification of the concepts, one must select the bipolar adjectives or scales. Each bipolar adjective pair measures one of the basic dimensions (factors) that Osgood and colleagues believe to be representative of three dimensions of word meaning. The criteria for their selection are threefold: 1) factorial composition, 2) relevance to the concepts, and 3) stability for the concepts and the subjects. The concepts used for this study include the following: 1) Understanding of the Communities of Southern Florida, 2) Skin and SCUBA Diving, 3) Interpersonal Relations, 4) Camping, 5) Canoeing, 6) Group Difference, 7) Individual Responsibility, 8) Instructional Group, 9) Awareness of Environmental Problems, 10) Field Studies, 11) Values, and 12) A sense of Belonging.

Results and Discussion

Principle Component Analysis with varimax rotation was the form of analysis used in order to regroup the original Semantic Differential Scales properly into four dimensions. These were general and concept specific evaluation, activity, and integrity. Scales which were found to have high loadings for the same factor were combined to form a certain dimension. Those scales which did not reach this criterion were eliminated. No scale was used for more than one dimension.

A 2 X 2 (Condition X Time) factorial analysis of variance was computed individually for each of the twelve different concepts measured. Upon finding significant interactions, further analysis was completed with the use of the Scheffe' post hoc test in order to determine which of the four groups studied were significantly different from each other.

Results of the factor analysis are presented in Table 1. It can be seen from this table that the evaluation dimension, the dimension used to measure attitude, was broken down into two dimensions. The Evaluative I dimension, or the general evaluative dimension, consisted of three scales while the Evaluative II dimension or the concept specific evaluative dimension, consisted of two scales. Although the Evaluative II dimension consisted of only two scales, it is assumed that since the factor loadings for each scale are so high (.83 and .72), the results have validity. Thus, five of the original fifteen scales were treated as evaluative scales. Also included in the statistical treatment were two scales comprising the Integrity dimension (loadings of .83 and .70) and two scales comprising the Activity dimension (loadings of .86 and .70).

As a result of the factor analysis, further statistical analyses to determine means, standard deviations, and F values for a two-way ANOVA were derived for the four dimensions and individually for each of the twelve concepts included in the study, Table II.

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Insert Tables I and II about here

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Significant F values for the main effect of condition (experimental groups vs. control groups) are reported. For the general Evaluative dimension, four concepts were found to be significantly different. These concepts were: Individual Responsibility, Group Difference, Field Studies, and Sense of Belonging. For each of these four concepts, the experimental groups scored

significantly higher than the control groups. The significant attitude shifts suggest that the participants in the Florida Environmental Studies Program were encouraged by their experience to assume the responsibility to work within a group structure to improve the quality of life and their environment. The change in the perception of the participants toward Field Studies programs was indicative of the interdisciplinary program being successful and beneficial as perceived by the participants. The positive growth in Individual Responsibility, Group Differences and a Sense of Belonging may be attributed to the social concept in which physical education played an active role. The involvement of the participants in team efforts, such as camping, canoeing, backpacking, and skin and SCUBA diving, has a tendency to enhance student/student interaction. The growth in these concepts is probably not a result of the cognitive aspects of the program but the nature of the specific physical education activities. This interpretation can be made based on the fact that the comparable control group did have "selected readings" which constituted the course content.

For the concept specific evaluative dimension, only one concept was found to be significant for the main effect of condition. For Group Differences, the experimental subjects again scored significantly higher than the control group. The positive shifts in the attitudinal scales for this concept indicates that the participants become more flexible and democratic as a result of their participation. These changes are interpreted to mean that the participants become more aware of the spectrum of individual differences within the group and that the participants are adaptable in their approach to Group Differences. These changes suggest the participants are more compromising and pluralistically orientated which is an essential prerequisite to solving complex environmental and ecological problems. The growth in Group

Differences is apparently a result of participation in the group activities--the sharing of responsibilities and the working together in the physical education activities.

For the activity dimension only one concept was found to be significant for the main effect of condition. For the concept of Communities, the experimental groups scored significantly higher than the control groups. The perception of the participants toward Communities changed, to be more obvious and active. The participants were able to observe various communities in their own environment by skin and SCUBA diving, backpacking, and canoeing. Apparently, this lead to a more favorable impression than the control group who had only the readings to possibly alter their conceptions of communities.

Six of the concepts for the integrity dimension were found to be significant for the main effect of condition. These concepts included Communities, Group Differences, Awareness of Environmental Problems, Instructional Teams, Field Studies and a Sense of Belonging. The inclusion of physical education activities not only enhances but complements the science and social facets of the interdisciplinary program.

A significant F value for the main effect of time (pre-test Groups vs. post-test groups) for the concept specific evaluative dimension was found for the concept of Communities, Table III.

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Insert Table III about here

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In this instance, the pre-test groups scored significantly higher than the post-test groups. This change in a negative direction for the experimental groups may have been indicative of their increased knowledge of the difficulties of flora and fauna to adapt to the effects and influence of man. The participants' perception prior to their experiences and observations were

that adaptation was generally easy; however, this preconceived and naive notion was altered by observing specific examples of the difficulty of organisms to adapt.

Significant F values for the interaction effect (condition X time) for the general evaluative dimension were found for two concepts. These were Individual Responsibility and Group Differences. Further analysis using the Scheffe' post hoc test revealed that for the concept, Individual Responsibility, the experimental post-group scored significantly higher than the experimental pre-group and the control post-group. For the concept, Group Differences, the experimental post-group scored significantly higher than the experimental pre-group and the control post-group, Table IV.

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Insert Table IV about here

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The experimental pre-group scored significantly higher than the control post-group while the control pre-group also scored significantly higher than the control post-group. For the concept specific evaluative dimension, three concepts were found to have significant interaction effects. These concepts were Individual Responsibility, Awareness of Environmental Problems, and Values. For Individual Responsibility, the experimental pre-group, the experimental post-group, and the control pre-group all scored significantly higher than the control post-group. For the concept, Awareness of Environmental Problems, the experimental post-group scored significantly higher than the experimental pre- and control post-groups, while the control pre-group also scored significantly higher than the control post-group. For the concept, Values, the control pre-group scored significantly higher than the experimental pre- and the control post-groups.

It is apparent that participation in the program resulted in students assuming individual responsibility for improving the quality of the environment. Participation in the program apparently made the students more tolerable

of other people's idiosyncrancies as they become more adaptable in coping with them. In addition, the participants increased their Awareness of Environmental Problems as a result of this program.

The only directly related physical education activity which resulted in a significant difference was skin and SCUBA diving. This change in attitude was probably partially a result of the weather conditions. The water was rough and choppy. This unexpected difficulty led to students' negative attitudinal change toward this activity. Group Differences were also found to have significant interactions for the Activity dimension, the experimental pre-group scored significantly higher than the experimental post-group. For the Integrity dimension, two concepts were found to have significant interaction effects, Interpersonal Relationships and Values.

As for the other physical education activity related concepts, camping and canoeing, no significant change in attitudes were found. The results are not that surprising when considering the type of student present on the program. There is little doubt that any student enrolled in the Florida Environmental Studies Program had already developed more than a passing interest in the outdoors and outdoor activities. Thus it is probable that the majority of students on this program had already been exposed to camping and canoeing in a natural setting, little different from those settings encountered during this program.

Taking this into consideration, it may be expected that no significant changes resulted from the program because students already rated physical activity concepts high before partaking. This would not be the case for the concept of skin and SCUBA diving, which is a more extraordinary activity and one that is not as popular or as readily accessible as camping or canoeing.

It is apparent the Florida Environmental Studies Program affected student attitudes toward selected physical and social concepts. The only significant change in physical education concepts was the concept of skin and SCUBA diving. The physical education activities, including camping and canoeing, being an integral part of the program, contributed to the positive growth in Individual Responsibility, Group Differences, Awareness of Environmental Problems, and a Sense of Belonging. These attitude changes are essential if we are to improve the quality of life and the environment of which we are all a part.

TABLE 1

FACTOR ANALYSIS VARIMAX ROTATION OF BIPOLAR ADJECTIVES

	SCALES	DIMENSIONS OF ATTITUDE Eval. I	Eval. II	Integ. III	Activity IV
1.	subtle - obvious	- .11	.07	.09	.86*
2.	resting - busy	.06	.01	.04	.70*
3.	uplifting - depressing	.82*	.20	.13	.04
4.	weak - strong	.11	.04	.50	.55
5.	pleasant - unpleasant	.86*	.22	.10	- .02
6.	interesting - boring	.26	.09	.14	- .04
7.	disorganized - systematic	.25	.08	.48	- .04
8.	adaptable - inflexible	.24	.72*	.05	.08
9.	democratic - autocratic	.06	.83*	.05	- .05
10.	progressive - regressive	.27	.59	.75	.12
11.	meaningless - meaningful	.20	.07	.83*	.11
12.	mild - tense	.28	.17	.04	- .09
13.	sociable - unsociable	.27	.53	.27	.06
14.	dishonest - honest	.10	.31	.70*	.10
15.	beautiful - ugly	.76*	.21	.20	- .05
	Eigenvalue	4.41	1.98	1.20	0.84
	% of Total Variance	29.50	13.20	8.00	7.60

* Scales utilized to measure the four dimensions of attitudes

TABLE II

SIGNIFICANT MAIN EFFECTS - CONDITION (EXPERIMENTAL - CONTROL)

N=32	CONCEPT	DIMENSION	Exp $\bar{X}$	Exp SD	Cont $\bar{X}$	Cont SD	F
1.	Individual Responsibility	Evaluative (I)	5.38	3.10	4.86	4.19	4.62*
2.	Group Differences	Evaluative (I)	4.40	4.78	3.65	4.37	5.38*
3.	Field Studies	Evaluative (I)	6.24	2.23	5.58	2.99	13.76*
4.	Sense of Belonging	Evaluative (I)	5.77	3.76	5.13	3.64	5.73*
5.	Group Differences	Evaluative (II)	5.13	2.73	4.60	3.02	3.05**
6.	Communities	Activity	4.52	2.65	4.05	2.34	2.99**
7.	Communities	Integrity	5.62	2.38	5.05	2.24	5.37*
8.	Group Differences	Integrity	5.37	2.74	4.73	2.54	4.87*
9.	Awareness of Environmental Problems	Integrity	5.67	2.50	5.16	2.90	3.22**
10.	Instructional Teams	Integrity	5.88	2.51	5.45	2.26	2.85**
11.	Field Studies	Integrity	6.13	1.93	5.63	1.90	5.62*
12.	Sense of Belonging	Integrity	6.02	2.03	5.21	2.92	10.35*

* Significant at 0.05 level ** Significant at 0.10 level

TABLE III

SIGNIFICANT MAIN EFFECTS - TIME (PRE-POST)

	CONCEPT	DIMENSION	Pre $\bar{X}$	Pre SD	Post $\bar{X}$	Post SD	F
1.	Communities	Evaluative (II)	4.93	2.08	4.59	2.08	2.78*
2.	Group Differences	Activity	5.19	2.41	4.70	3.38	2.82*

Significant at 0.10 level

TABLE IV

SIGNIFICANT INTERACTIONS CONDITION X TIME

	CONCEPT	DIMENSION	F
1.	Individual Responsibility	Evaluative (I)	4.42*
2.	Group Differences	Evaluative (I)	6.40*
3.	Individual Responsibility	Evaluative (II)	7.58*
4.	Awareness of Environmental Problems	Evaluative (II)	7.44*
5.	Values	Evaluative (II)	3.99*
6.	Skin and SCUBA Diving	Activity	6.81*
7.	Group Differences	Activity	3.69**
8.	Interpersonal Relations	Integrity	2.97**
9.	Values	Integrity	3.22**

* Significant at 0.05 level

** Significant at 0.10 level

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Address for correspondence: P. A. Hancock
Institute for Child Behavior and Development
51 Gerty Drive
University of Illinois
Champaign, IL 61820