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**AUTHOR** Iozzi, Louis A.  
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**ABSTRACT**

This publication contains summaries of items on the literature related to environmental education research found in professional journals, doctoral dissertations, and the fugitive literature. The fugitive literature was obtained primarily through a search of ERIC materials. The publication was prepared by the National Commission on Environmental Education Research of the National Association for Environmental Education in cooperation with ERIC/SMEAC. Summaries are listed by type of literature (journal and yearbook papers, dissertations, and fugitive literature). Descriptor and author indexes are included. While the documentation efforts of these groups are continuing, this is the most complete single reference to literature on environmental education research available at this time for the years 1971-1980. (RH)

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Prepared by  
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Louis A. Iozzi, Chairman

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RESEARCH IN ENVIRONMENTAL EDUCATION  
1971-1980

Published by



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and Environmental Education  
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## ENVIRONMENTAL EDUCATION INFORMATION REPORTS

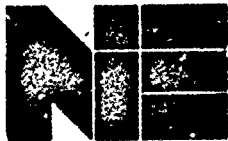
Environmental Education Information Reports are issued to analyze and summarize information related to the teaching and learning of environmental education. It is hoped that these reviews will provide information for personnel involved in development, ideas for teachers, and indications of trends in environmental education.

Your comments and suggestions for this series are invited.

John F. Disinger  
Associate Director, ERIC/SMEAC  
Environmental Education

\*\*\*\*\*

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*DEDICATION*

*The Editors and all those associated with this project  
dedicate this work to*

*Professor A. Clay Schoenfeld*

*teacher, scholar, journalist, environmentalist, leader and friend*

## PREFACE

During the Ninth Annual Conference of the National Association for Environmental Education, at the University of New Mexico, Albuquerque, in May 1980, NAEF President A. Clay Schoenfeld invited a large group of interested NAEF members to meet with him to:

- 1) discuss the need for and feasibility of compiling a document or series of documents containing abstracts and/or summaries of the increasing body of environmental education research,
- 2) enlist the assistance and support of a highly competent team of environmental education researchers and scholars to plan a course of action, and
- 3) conduct the project.

At that meeting in May 1980, the National Commission on Environmental Education Research (NCEER) was officially established.

President Schoenfeld appointed Dr. Lei Lane Burrus-Bammel of the University of West Virginia to chair the Commission. Under Dr. Bammel's able leadership, much of the early groundwork was started. Because of other pressing obligations, Dr. Bammel resigned from the Commission, and in April 1981 Dr. Louis A. Iozzi of Rutgers University was appointed by 1981-82 NAEF President Craig B. Davis to replace her as chairperson of the NCEER.

A second organizational meeting of NCEER members was conducted at the NAEF Tenth Annual Meeting at Kentucky Dam Village, Land Between the Lakes, Kentucky, in May 1981. Another invitation was extended to the membership to attend that meeting to learn about the Commission's activities and to offer suggestions regarding the Commission's future activities. Dr. Iozzi reported on the activities of the Commission and chaired the session.

Members of the Commission and their institutions include:

- Dr. Louis A. Iozzi, Chairman  
Rutgers - The State University of New Jersey
- Dr. Carl Bollwinkel  
University of Northern Iowa
- Dr. John Disinger  
Ohio State University
- Dr. Michael Gross  
University of Wisconsin
- Dr. Jody Hines  
University of Northern Iowa

Dr. Harold Hungerford  
Southern Illinois University

Dr. Clifford Knapp  
Northern Illinois University

Dr. R. Ben Peyton  
Michigan State University

Dr. Esther Railton  
California State University - Hayward

Deborah Simmons  
University of Michigan

Dr. Audrey Tomera  
Southern Illinois University

Dr. Richard Wilke  
University of Wisconsin - Stevens Point

Dr. Iozzi coordinated the activities of the NCEER which resulted in this publication. The Commission met as a team outside of Chicago, 4-5 September 1981. At that meeting, several important tasks were accomplished.

- assignment of journals and publications to be researched to NCEER members
- list of descriptors was finalized
- procedures to be followed were finalized
- abstract format and guide were finalized
- "Environmental Education Research" was operationally defined

Accomplishment of these tasks was considered critical to ensure that work of the nine teams of researchers--separated by vast distances--would be somewhat similar in format and style. Simply, all had to be on the "same channel" if the project was to succeed.

The NCEER met as a group for a second time in conjunction with the Midwest Regional Environmental Education Conference, 23-26 September 1981 at Wisconsin Dells. Since most NCEER members were attending the Conference, this meeting seemed most appropriate. At that meeting, NCEER members had an opportunity to compare notes and report on their activities and progress.

The abstracts included in this volume were subjected to three quality control/accuracy checks: the associate editors, Editor, and the ERIC Clearinghouse for Science, Mathematics, and Environmental Education. Final editing was done by the Commission Chairman/Editor.

Louis A. Iozzi  
Chairman/Editor

December 1981

RESEARCH IN ENVIRONMENTAL EDUCATION, 1971-1980

EDITOR

Dr. Louis A. Iozzi  
Assistant Professor of Science and  
Environmental Education  
Cook College  
Rutgers - The State University of New Jersey  
New Brunswick, NJ 08903

ASSOCIATE EDITORS

Dr. Carl Bollwinkel  
Department of Teaching  
University of Northern Iowa  
Cedar Falls, IA 50613

Dr. John F. Disinger  
Associate Director-Environmental  
Education  
ERIC Clearinghouse for Science, Mathe-  
matics and Environmental Education  
The Ohio State University  
Columbus, OH 43212

Dr. Michael P. Gross  
Associate Professor of  
Environmental Education  
University of Wisconsin at Stevens Point  
Stevens Point, WI 54481

Dr. Jody M. Hines  
Department of Teaching  
University of Northern Iowa  
Cedar Falls, IA 50613

Dr. Harold R. Hungerford, Professor  
Department of Curriculum,  
Instruction and Media  
Southern Illinois University at  
Carbondale  
Carbondale, IL 62901

Dr. Clifford E. Knapp, Director  
Lorado-Taft Field Campus  
Northern Illinois University  
Oregon, IL 61061

Dr. R. Ben Peyton, Assistant Professor  
Department of Fisheries and Wildlife  
Michigan State University  
East Lansing, MI 48824

Deborah Simmons  
School of Natural Resources  
University of Michigan  
Ann Arbor, MI 48109

Dr. Audrey N. Tomera  
Associate Professor  
Department of Curriculum,  
Instruction and Media  
Southern Illinois University at  
Carbondale  
Carbondale, IL 62901

Dr. Richard J. Wilke, Director  
Central Wisconsin Environmental  
Station  
University of Wisconsin at  
Stevens Point  
Stevens Point, WI 54481

Dr. Esther P. Railton  
Professor of Environmental Education  
California State University-Hayward  
Hayward, CA 94542

SPECIAL ASSISTANCE

Nancy Brzezinski  
Administrative Assistant  
Institute for Science, Technology  
and Social Science Education  
Center for Coastal and Environ-  
mental Studies  
Rutgers - The State University

Deborah Revord  
Department of Curriculum,  
Instruction and Media  
Southern Illinois University at  
Carbondale  
Carbondale, IL 62901

RESEARCH REVIEW TEAM

The editors thank those listed below who have generously participated in reviewing all of the documents included in this volume. Each was selected by one or more members of the NCEER because of his or her abilities as thorough and highly capable Environmental Education researchers. Some of those listed participated as Research Assistants and were "funded" by their respective institutions. Most, however, graciously volunteered their services in the spirit that has by and large become characteristic of environmental educators. To them, a special thank you.

California State University -  
Hayward

Marlynn B. Kaake

Cook College-Rutgers - The  
State University of New Jersey

Rebecca FarnJof  
Eric Gottfried  
Jean Strausky

Michigan State University

Dr. Steve Kinzel  
Lorraine Austin  
Kathy Boutin-Pasterz  
Randall Champeau  
Larry Gigliotti  
Tom Lagerstrom  
Connie Meyers  
Pete Pasterz  
Ann Maria Vliegenthart

Southern Illinois University

Jim Jordan  
Thomas Marcinkowski  
Archibald P.C. Sia  
Mike Squillo  
Trudi Volk  
Robert Joseph Wilson

The Ohio State University

Woodward Bousquet  
Diane Cantrell  
Robert Townsend

University of Michigan

Charles Ericson  
Cheryl Norton  
Leborah Simmons

University of Northern Iowa

Dr. Jody M. Hines

University of Wisconsin -  
Stevens Point

Jonathan Tulman



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- Dean Donald Beggs, College of Education - Southern Illinois University
- Dr. Lei Lane Burrus-Bammel, University of West Virginia
- Dr. Craig Davis, President-NAEE
- Dr. Michael Dingerson, Director of Research Development and Administration, Southern Illinois University
- Dr. Billy G. Dixon, Department Executive Officer, Department of Curriculum, Instruction and Media, Southern Illinois University
- Dr. Arthur Edwards, Associate Dean, Cook College, Rutgers University
- Dean William J. Johnson, School of Natural Resources, University of Michigan
- Dr. Norbert P. Psuty, Director, Center for Coastal and Environmental Studies, Rutgers University
- Professor A. Clay Schoenfeld, Past President-NAEE
- Dr. William G. Smith, Chairman, Department of Science, Environmental and Agricultural Education, Cook College, Rutgers University
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## DEFINITIONS

To help guide the research efforts of the nine teams of researchers, the Commission operationally defined the following terms:

### Research

Investigations employing systematic methods to study or interpret phenomena. It is data-based and employs valid observations with an intent to generalize results or build new models.

More specifically, the Commission agreed that

### Environmental Education Research

Includes components of efforts concerned with developing or analyzing environmental awareness, valuing, or problem-solving behavior.

DESCRIPTORS FOR RESEARCH IN  
ENVIRONMENTAL EDUCATION (EE)

All of the entries appearing in this volume are coded to the following descriptors:

EE GOAL LEVELS

ecology education  
issue awareness/knowledge of issues  
issue identification skills  
issue investigation/evaluation skills  
value clarification skills  
citizen action

EE FACILITIES

outdoor classroom  
environmental center  
community resource

EDUCATION LEVEL

elementary  
middle school  
secondary  
higher education  
continuing education  
teacher training inservice  
teacher training preservice

LEARNING DOMAIN

cognitive  
affective  
psychomotor

NATURE OF THE STUDY

program development  
program implementation  
program evaluation  
hypothesis generation  
model building  
instrument development

RESEARCH METHODS

historical research  
experimental research  
descriptive research  
theoretical research  
pre-experimental research  
ex post facto research  
unobtrusive research

EE METHODS

inquiry  
lecture  
field trip  
outdoor education  
individualized instruction  
games  
simulations  
case studies

EE CURRICULUM MODE

interdisciplinary  
multidisciplinary - infusion  
formal  
nonformal

EE LEARNER TRAITS

personality type  
cognitive style  
preferences  
educational background  
social background  
economic background  
urban  
rural  
citizenship  
ethnic group  
intelligence  
locus of control  
moral development  
attitudes  
beliefs  
values  
behaviors  
knowledge

EE CONTENT AREA

population education  
issue-based  
energy education  
marine education  
science education  
social science education  
language arts  
mathematics education  
citizenship education  
resource management education  
outdoor education  
conservation education

## FOREWORD: RESEARCH IN ENVIRONMENTAL EDUCATION 1971-1980

### Publications Reviewed

A variety of journals and other publications were reviewed during this phase of the Commission's work. The list that follows comprises all of the publications reviewed by teams of research scholars located at nine major universities across the nation. While all of the publications listed here were carefully examined, not all of them included articles considered to be "Environmental Education Research" as defined by the Commission (see operational definition of EE, page xiii). Hence, if the reader finds a publication listed here but does not find an abstract of an article from that publication in the body of this volume, it can be assumed that no Environmental Education research papers were identified in that publication during the period 1971-1980. Simply, the Commission members with the assistance of numerous colleagues identified the 26 publications listed as being "most likely" to include Environmental Education Research. Hence, while the list is not exhaustive, it includes the bulk of the literature in which one might find EE research,

### Journals

Behavioral Science  
Communications Research  
Environment and Behavior  
Human Communications Research  
Journal of Behavior Analysis  
Journal of Communication  
Journal of Conflict Resolution  
Journal of Consumer Research  
Journal of Educational Research  
Journal of Educational Psychology  
Journal of Environmental Education  
Journal of Environmental Ethics  
Journal of Interpretation (USA)  
Journal of Interpretation (Canada)  
Journal of Leisure Research  
Journal of Outdoor Education  
Journal of Research in Science Teaching  
Journal of Social Issues  
Natural Resources  
Public Opinion Quarterly  
Public Relations Journal  
Rural Sociology  
School Science and Mathematics  
Science Education  
The Biology Teacher  
The Science Teacher

### Yearbooks

Current Issues VI - The Yearbook of Environmental Education  
and Environmental Studies - 1980

Current Issues V - The Yearbook of Environmental Education  
and Environmental Studies - 1979

Current Issues IV - Current Issues in Environmental  
Education - 1978

Current Issues III - Current Issues in Environmental  
Education - 1977

Current Issues II - Current Issues in Environmental  
Education - 1976

Current Issues I - Current Issues in Environmental  
Education - 1975

### Dissertations

Monthly issues of Dissertation Abstracts International from January 1976 (Volume 36, Number 7) through December 1980 (Volume 41, Number 6) were scanned for entries appropriate to this compilation. Because Dissertation Abstracts International uses a key-word-in-title indexing procedure, terms parallel to those listed as descriptors for this compilation were utilized, along with "environmental-education-type" descriptors employed by the ERIC system. A total of 88 dissertations were selected for reporting in this volume, using the same criteria as were applied in the selection of journal papers. With permission of University Microfilms, Inc., publishers of Dissertation Abstracts International, author-written abstracts are reproduced in this volume. The same keyword listings were employed as for journal papers in the selection of descriptors.

### Fugitive Literature

A computer search of the ERIC data base, 1971-1980, listed a large number of papers meeting the criteria for inclusion in this volume. From that search, by personnel of the ERIC Clearinghouse for Science, Mathematics, and Environmental Education, 78 documents were selected for reporting. Modified ERIC abstracts, as printed in monthly issues of Resources in Education, were used as summaries, while previously-assigned ERIC descriptors were modified to be identical with those employed for journal papers and dissertations in this volume.

N C E E R

Operating Procedures

1. NCEER Supervisors assign tasks to Research Assistants and supervise all of the following steps:
2. Research Assistants
  - A. Identify articles for inclusion in publications
  - B. Complete Abstract Guide
  - C. Prepare Abstract Narrative
  - D. Submit Abstract to NCEER Supervisor
3. NCEER Supervisor
  - A. Review and approve abstract (also compare with abstract guide)
  - B. "Spot check" service articles to ensure accurate interpretation/understanding of article (e.g., compare abstract guide and abstract with actual article).
  - C. Forward "approved" abstracts to Iozzi
4. NCEER Chairman (Iozzi)
  - A. Review and adjust--as necessary--abstracts (for consistency, etc.)
  - B. Forward final abstracts to Disinger (Ohio State - ERIC)

ABSTRACT GUIDE (for entries 1-263)

DESCRIPTORS:

A. Bibliography and Indexing Information

1. Author(s) Name(s) (last name first)
2. Title of Article
3. Source (Journal)
  - a. year
  - b. volume
  - c. issue
  - d. month (or season)
  - e. pages
4. Statement of the problem, purpose, or given hypothesis
5. Independent variables
6. Dependent variables

B. Description of Subjects or Samples (complete all available)

1. Total number in study
2. Method of selection
3. Number of treatment groups
4. Response percentage
5. Experimental mortality
6. Age of subjects
  - a. children
  - b. adolescents
  - c. adults
  - d. elderly
7. Gender
  - a. male
  - b. female
  - c. males and females
8. Geographic region
9. Race of subjects/sample
10. Religion of subjects/sample
11. Education
12. Social class
13. Income
14. Occupation
15. Marital status

C. Research

1. Category
  - a. Experimental/quasi experimental/pre-experimental
    - pretest-posttest control group
    - posttest only control group
    - otherQuasi experimental
    - time series
    - nonequivalent control group
    - separate
  - b. Historical



- c. Descriptive
  - survey
  - case study
  - correlational
  - ex post facto

- d. Theoretical

2. Data Collection Techniques

Observing and Recording Behavior

a. Obtrusive measures

(1) Questionnaires

- (a) Likert
- (b) Semantic Differential
- (c) Psychophysical Scales
- (d) Combination
- (e) Other

(2) Interview

- (a) Open-ended
- (b) Closed

b. Unobtrusive measures

- (a) Archives
- (b) Physical Traces
- (c) Nonverbal
- (d) Combination

c. Both Obtrusive and Unobtrusive

d. Instruments

- (a) Specific scales, tests, apparatus used
- (b) Reliability
- (c) Validity

D. Results

1. Statistical methods used
2. Level of significance
3. Findings and/or conclusions
4. Implications of research noted
5. Recommendations for further research
6. Longitudinal or follow-up

E. Number of Listed References

## A NOTE TO THE USER...

This volume represents, to our knowledge, the most complete single collection of citations to the research literature of environmental education currently extant. It was developed by surveying the three most common sets of sources through which such information is reported -- professional journals, doctoral dissertations, and the fugitive literature as reported through the ERIC system. The National Commission for Environmental Education Research (NCEER), the team which conceived and implemented it, established a commonality of definition, an extensive set of descriptive key terms, and logical procedures for search, analysis, and reporting to facilitate its use by any and all who have interest in recent and ongoing research in environmental education.

A key feature of this volume is its multiple indexing system. Two indices have been developed, one alphabetically by key terms or descriptor (pp. 389-400), the other alphabetically by author (pp. 401-413). The citations themselves are organized in three sections depending on type of source, but the indices are not. This should make the volume easier to use, and ultimately more useful.

The casual user will immediately notice several characteristics of the literature reported in this volume. First, most of it is indexed as descriptive research -- 360 of the 429 entries carry such a tag. Second, The Journal of Environmental Education is the largest single source of citations, with 128 of the total entries.

Other characteristics will become apparent as the user delves more deeply into the volume. Many of the citations carry descriptors such as attitudes (175 entries), affective (100 entries), and values (42 entries), areas which many practitioners consider the key elements of the field. However, both cognitive (72 entries) and knowledge (93 entries) studies are represented, as are reports of experimental research (62 entries). The area of environmental issues is represented by four descriptors, with a number of reports keyed to each (issue awareness/knowledge of issues, 87 entries; issue-based, 48 entries; issue identification skills, 14 entries; issue investigation/evaluation skills, 19 entries). Both formal (80 entries) and non-formal (57 entries) audiences are keyed in the literature reported. Program development (46 entries), program evaluation (101 entries), and program implementation (18 entries) received considerable attention, as does instrument development (45 entries).

So, too, do several journals which are not commonly read by educators. For examples, 49 citations are made of papers from Environment and Behavior, and 15 of papers from The Journal of Applied Behavior Analysis.

Space does not permit, nor does logic suggest, further explication of the scope and organization of this volume. The user should discover for himself/herself how best it can be used to suit his/her needs.

The National Association for Environmental Education (NAEE) is to be commended for its sponsorship of this initial attempt at collecting and reporting the research literature of environmental education. Even more deserving of commendation are Dr. Iozzi and the members of the NCEER team, including their students, who did the actual work with severely limited financial resources and within an agonizingly short time frame. Their efforts will not end here; the NAEE is providing support for additional, more extensive, more comprehensive efforts during 1982-1983. The ERIC Clearinghouse for Science, Mathematics, and Environmental Education is pleased to have been involved in the production of this initial effort.

John F. Disinger  
Associate Director  
ERIC Clearinghouse for  
Science, Mathematics, and  
Environmental Education

December 1981

SUMMARIES--JOURNAL AND YEARBOOK  
PAPERS

1. Agras, W. Stewart, Rolf G. Jacob, and Melissa Lebedeck. "The California Drought: A Quasi-Experimental Analysis of Social Policy." Journal of Applied Behavior Analysis, 1980, 13(4):561-570.

**DESCRIPTORS:** attitudes, behaviors, conservation education, descriptive research, energy education, ex post facto, knowledge.

**INDEPENDENT VARIABLE:** Fines for failure to conserve water.

**DEPENDENT VARIABLE:** Water consumption.

**PURPOSE:** To evaluate the effects of fines for failure to conserve water during the California drought.

**SUBJECTS:** Three communities in the San Francisco Bay (Palo Alto, Mountain View, and Hayward) area were selected to provide a multiple baseline comparison of water consumption across communities. Thus, selection was not random. Palo Alto had a total of 1200 water accounts in a population of 55,000; Hayward 24,000 accounts in a population of 96,000; and Mountain View 12,000 accounts in a population of 55,000.

**RESEARCH DESIGN:** This descriptive research involved an ex post facto design where past data were analyzed. Hayward and Palo Alto had initiated penalty systems in 1977 for exceeding water consumption targets. Mountain View did not use penalties. Measures were studied on water consumption, individual fines and other nonspecific influences such as number of drought-related articles appearing in the local newspapers.

**RESULTS:** Water consumption levels in the period before the drought began were compared to the consumption levels during the drought. The data indicated that, on a community level, significant savings of water occurred regardless of whether fines were introduced or not. However, on an individual level, fines appeared to have an effect on private, as opposed to commercial or industrial, consumers who had received at least one fine. The largest water savings occurred during the two months before fines were introduced in Palo Alto, indicating that other variables were effective in producing water savings. Possible reasons for water conservation in the absence of fines were discussed within the framework of stimulus control. It was suggested that an area for future research should be the delineation of stimulus parameters involved in producing behavior change in entire communities.

**REFERENCES:** 13 cited.

2. Aird, Andrew, and Audrey Tomera. "The Effects of a Water Conservation Instructional Unit on the Values Held by Sixth Grade Students." The Journal of Environmental Education, 1977, 9(1): 31-42.

**DESCRIPTORS:** conservation education, experimental research, formal, knowledge, middle school, values, value clarification skills.

**INDEPENDENT VARIABLE:** Water conservation instruction unit.  
**DEPENDENT VARIABLE:** Value held on water conservation.  
**PURPOSE:** To investigate the effect of an instructional unit in water conservation on the clarification of sixth grade students' values on water conservation toward water use.

**SUBJECTS:** 50 sixth graders from two classes in similar area schools in Herrin, Illinois. Data were collected during the 1974-75 school year.

**RESEARCH DESIGN:** A pre-posttest control group design was used. Two weeks of instruction, composed of a composite expository-guided discovery teaching technique concerned with water, its use, misuse, and importance to man, served as the independent variable. An opinionnaire consisting of three items concerning water conservation was developed by the researcher and was used to measure the dependent variable. These items were reproduced in the report. Content validity, by jury system, and interscorer and test-retest reliabilities for the instrument were reported. The groups were equated on the basis of their pre-test scores.

**RESULTS:** Multiple linear regression analysis was used to interpret the data for items one and two ( $\text{Alpha} = .01$ ). Descriptive analysis was used for item three. Subjects were equated on pretest items. Results of both analyses indicated that use of the water conservation instruction significantly influenced pre to post test shifts of students' values toward water use. In all cases, the experimental group's value scores were significantly higher than those of the control group. "The data corroborated the growing concept that the amount of knowledge an individual has does have an effect on the values he places on the cognified knowledge."

**REFERENCES:** 8 cited.

3. Alaimo, Samuel J., and Rodney L. Doran. "A Longitudinal Study of Factors Influencing Value Preference In Environmental Problems." Current Issues VI, 1980, 311-326. ED 197 947.

**DESCRIPTORS:** citizen action, hypothesis generation, issue awareness, knowledge, locus of control, middle school, science education, theoretical research, value clarification skills, values.

**INDEPENDENT VARIABLE:** Time lapse between administration of pretest and posttest.

**DEPENDENT VARIABLES:** Concern about environmental problems, locus of control, knowledge of environmental problems, source of environmental information.

**PURPOSE:** Investigation of factors that potentially influence environmental value preferences and other self-perceived factors.

**SUBJECTS:** 145 junior high students from a large suburban school district in western New York, largely residential, predominately Caucasian, representative of wide ethnic background. Mortality of 37, or 25% of the original 145.

**RESEARCH DESIGN:** An Environmental Inventory Instrument was developed and administered by the investigator. The time lapse was two years between the pretest and posttest of this longitudinal study. Subjects were asked to respond to environmental problems, their occurrences (through use of slides), and to select one of five value-oriented solutions per problem. Validity was established by two reading specialists and by a group of students (who were not subjects) and environmental educators who reached 86 percent and 95 percent, respectively, agreement of items to appropriate value category.

**RESULTS:** A two-tailed test on the pre-post data was used to determine whether or not there was a time difference between the two group means (2 years of schooling). Analyses were computed by use of the Statistical Package for the Social Sciences. The .05 level was considered significant. A t-test was also calculated. Overall, no significant difference was observed between seventh grade and the same students in ninth grade concerning the dependent variables. Perhaps a more pessimistic view was held by the ninth graders. Science classes did appear to help students gain knowledge of environmental issues.

**REFERENCES:** 18 cited.

4. Alaimo, Samuel J., and Rodney L. Doran. "Students' Perception of Environmental Problems and Sources of Environmental Information." The Journal of Environmental Education, 1980, 12(1):17-21.

**DESCRIPTORS:** descriptive research, issue awareness/knowledge of issues, knowledge, locus of control, middle school, secondary.

**VARIABLES:** Values, knowledge, concern, locus of control and sources of information regarding environmental issues, grade level.

**PURPOSE:** To test the following hypothesis: "There is no relationship between environmental values and students' (a) concern for the environment; (b) locus of control; (c) knowledge about the environment; (d) sources of environmental information."

**SUBJECTS:** 15 seventh through twelfth grade students, drawn from the largest, ethnically diverse though predominantly Caucasian, suburban school district in western New York.

**RESEARCH DESIGN:** A standard questionnaire called the Environmental Survey was administered to the subjects while attending science class during the third and fourth weeks of September, 1977. The questionnaire consisted of five questions: one question each for the dependent variables, concern, knowledge and sources of information, with

two questions covering locus of control. Answer sheets were machine scored. Instrument validity and reliability scores were not reported.

**RESULTS:** Statistical tests were used to detect differences among grade levels on the following variables: knowledge, concern, locus of control and sources of information. No data were presented regarding the students' environmental values. The F-test was used to detect differences among grade level mean ratings on each of the four variables, with the significance level set at 0.05. Significant differences were found among the six grade levels on all questions. While greater concern was evidenced by the seventh and twelfth graders, both knowledge and locus of control scores appeared to increase toward the higher grade levels. All but one grade level indicated television as the greatest source of environmental information. To this, grades 9 through 12 added science class as a significant source. Finally, eleventh and twelfth grades added periodical literature (e.g., newspapers and magazines) to these as a significant source of information.

**REFERENCES:** 14 cited.

5. Allen, George H. "How Deep is Environmental Awareness?" The Journal of Environmental Education, 1972, 3(4):1-3.

**DESCRIPTORS:** descriptive research, economic background, knowledge, social background.

**VARIABLES:** Awareness of events, socioeconomic background, age.

**PURPOSE:** To assess the awareness of subjects concerning Environmental Awareness Week, May 1970.

**SUBJECTS:** 148 personal interviews were conducted at each subject's residence two weeks after Environmental Week. All residents were from Humboldt County, California. Residential areas included nonincorporated, suburban, city and campus locales. Subjects were picked by proximity to the interviewers' residences.

**RESEARCH DESIGN:** Subjects were placed into five approximate age categories: Pre-college student; college-associated student; young (age 35 or younger); middle-age and elderly. Presumed socioeconomic classes were also established: lower; lower-middle; middle; upper-middle; collegiate-on campus; and collegiate-off campus. Respondents were asked five specific questions, three of which were reported and analyzed. The questions were: (1) Were you aware that the Environmental Awareness Week Program was held in Humboldt County? (2) Did you know that an Earth Fair was being held? (3) Did you visit the Environmental Fair? Neither validity nor reliability were reported.

**RESULTS:** The data were presented as percent affirmative responses by socioeconomic and age categories. Within the socioeconomic categories, the highest awareness and attendance were established by the collegiate groups, followed by the middle income level. The lowest levels of



awareness and attendance were attained by those in the lower and upper-middle economic brackets. By age categories, the highest awareness and attendance were achieved by the college-associated students, followed by the pre-college students. The lowest awareness and attendance were recorded by middle-aged persons. The author suggested that the reason for the high awareness and attendance by the college and pre-college students lay in the large number of in-class activities held in conjunction with Environmental Awareness Week. He further suggested that canvassing of the study area by college students the week before, in response to the Cambodian invasion, may have affected the results. No level of significance was established.

REFERENCES: 2 cited.

6. Altnoff, Phillip, and William H. Greig. "Environmental Pollution Control Policy-Making: An Analysis of Elite Perceptions and Preferences." Environment and Behavior, 1974, 6(3):259-288.

DESCRIPTORS: behaviors, descriptive research, issue-based, issue investigation/evaluation skills, knowledge, preferences.

VARIABLES: Occupational background, perceptions and preferences concerning environmental pollution control systems.

PURPOSE: To examine the political perceptions and preferences of industrialists as well as elected and appointed public officials in terms of the technical, financial, or administrative aspects of environmental pollution control systems.

SUBJECTS: 169 adults from five random samples including 53 feedlot operators, 48 manufacturers, 26 politicians, 14 EPA officials, and 28 state government officials. All subjects were from the state of Kansas.

RESEARCH DESIGN: In this descriptive study a questionnaire was personally administered to the respondents during a scheduled interview. The questionnaire was divided into two sections: (1) five hypothetical environmental pollution control systems were designed and presented to respondents for comments; and (2) eight environmental pollution control areas. Reliability and validity coefficients were not reported.

RESULTS: All groups support state level control of regulatory responsibilities in the environmental pollution control area. Roles to be played in curbing environmental pollution by federal and state governments and by industries have yet to be clearly defined. Politicians have assumed a middle-of-the-road position.

REFERENCES: 57 cited.

7. Althoff, Phillip, and William H. Greig. "Environmental Pollution Control: Two Views from the General Population." Environment and Behavior, 1977, 9(3):441-456.

**DESCRIPTORS:** descriptive research, issue awareness/knowledge of issues, issue-based, knowledge.

**VARIABLES:** Pollution control, attitudes, socioeconomic background  
**PURPOSE:** To explore some of the relevant opinions of the general public in one state in terms of pollution control policymaking.

**SUBJECTS:** 800 Kansans from eight representative counties. Rural Polk directories and census data were utilized so sample would be representative of populations in each county. Mortality of 329. Response rate of 59 percent was reported.

**RESEARCH DESIGN:** A four-page questionnaire designed so that almost any potential respondent would be able to answer was administered. Questions included those on pollution controls, socioeconomic background, and opinions on pollution. Variable clusters relevant to 1) concern for current state of environment; 2) trust in government and industry; 3) willingness to support future policies to protect the environment; and 4) personal commitment to solving environmental problems. Reliability and validity coefficients were not reported.

**RESULTS:** Suggest the existence of two opinion groupings--based upon geographical location and class--relevant to pollution control. This dichotomy of opinion is related to respondent's socioeconomic characteristics. Respondents exhibited concern about pollution control, a low level of trust in government and industrial efforts to solve the pollution problem, a low level of dedication to environmental protection, and some degree of commitment to personally aid in solving the pollution problem. Institutes which aid the individual in opinion formation have failed, authors conclude.

**REFERENCES:** 20 cited.

8. Anderson, Richard W., and Mark W. Lipsey. "Energy Conservation and Attitudes toward Technology." Public Opinion Quarterly, 1978, 42:17-30.

**DESCRIPTORS:** attitudes, behaviors, descriptive research, preferences, social background.

**VARIABLES:** Social background, attitudes toward technology, attitudes toward the energy crisis, conservation behavior.

**PURPOSE:** To explore the relationship of general attitudes toward technology to conservation behavior and attitudes during the energy crisis in the winter of 1973-74. In addition, they compared college students with residents of a small urban community in their regard for technology and energy conservation.

**SUBJECTS:** Two samples constituted the population for this research. The community sample was selected using a two-stage process. 200 names were randomly drawn, half from the Claremont, California telephone directory, and half from that city's roster of homes from which garbage was collected. 94 percent of the households contacted by phone agreed to participate and were sent questionnaires. From the returned questionnaires, second-stage sampling was used, based on respondent-selection keys (family size, age and sex composition) to select respondents from within each household in proportion to their frequency in the city's population. The total population in the community sample returning completed questionnaires was 155, a response rate of 78 percent.

The college sample was drawn from a list of 150 names randomly selected from the directory of registered undergraduates at the Claremont Colleges. 100 students returned questionnaires and constituted the second part of the research population, a response rate of 67 percent. Eighty percent of the community sample had at least one year of college, and nearly all respondents were between the ages of 31-65. In contrast, 90 percent of the students were between 18-21 years old. Males and females were equally represented in both samples; 67 percent of the community and 61 percent of the students indicated a yearly family income of over \$15,000.

**RESEARCH DESIGN:** The questionnaire consisted of 92 items, only some of which were specifically reported by the authors. To measure the respondents' evaluations of technology, semantic differential ratings on five adjective pairs were employed. An additional three items (closed questions with three possible responses) evaluated the benefits of science and technology, the rate of change they produce, and their potential for solving future problems. Two items presented opposing approaches to solving the energy crisis and allowed responses of agree/not sure/disagree. To assess the use of technological applications on a day-to-day basis, subjects were asked to rate the desirability of owning certain household appliances and devices. Respondents were asked to indicate the effects of the energy crisis that they had personally experienced, including both voluntary conservation and involuntary social and economic pressures. They were also asked to indicate the extent to which they thought the energy crisis was real or a hoax. Neither validity nor reliability were reported.

**RESULTS:** The five adjective pairs were dichotomized to separate the most extreme enthusiasts from those with less positive reactions. The five items underwent factor analysis, using a principal factors solution with varimax rotation. The two emergent dimensions, utility and effect, were used to construct a matrix which placed respondents into one of three groups: (1) high enthusiasts (high utility/high affect), 2) ambivalent (high utility/low affect), and 3) low enthusiasts (low utility/low affect). A fourth group with low utility and high affect was extremely small and was excluded from further analysis. These distinctions reflected degrees of positive response with only high

enthusiasts giving unqualified support. Chi-square was performed to compare the three attitude groups with their assessment of technological development and possible energy solutions, and the extent to which they viewed the energy crisis as being genuine or a hoax. ANOVA was used to compare the three attitude groups with other items on the questionnaire. F-ratios and levels of significance were reported.

High enthusiasts were a plurality in both samples, and were much more likely to indicate that science and technology had changed life "for the better," that the rate of change was either "too slow" or "about right," and that they would solve future problems. They were significantly more favorable to space exploration, atomic energy, computers and automation. When rating the desirability of household appliances, the distinctions between the attitudes groups was neither as consistent nor as strong. Further, the two samples showed different response patterns.

Sixty percent of the community sample reported four or more voluntary energy conservation measures, compared to 40 percent of the student sample. The authors noted that this may be the result of differences in living situations, whereby the students had less opportunity to control energy use for heating their living quarters, preparing their meals, and in the use of cars. The two samples did not differ significantly in their perception of the energy crisis, both being inclined to think its seriousness had been exaggerated.

There was no significant relationship between the efforts to reduce energy consumption and attitudes to technology, both high and low enthusiasts reporting equal frequencies of conservation behavior. The authors noted that this may have reflected both groups' belief that the energy crisis was exaggerated. The high enthusiasts, however, were more in favor of a technological solution to the energy crisis, as opposed to a behavioral solution, than the low enthusiasts.

Though the student sample was somewhat less positive than the community sample in their general attitudes toward technology, the authors concluded that the reputed emergency of opposition to the "technological society" on the part of educated youth in the United States did not receive support in this study. The data are not generalizable beyond the sample area, given the size and nature of the samples.

REFERENCES: 21 cited.

9. Arbuthnot, Jack. "The Roles of Attitudinal and Personality Variables in the Prediction of Environmental Behavior and Knowledge." Environment and Behavior, 1977, 9(2):217-232.

DESCRIPTORS: affective, attitudes, behaviors, descriptive research, ecology education, knowledge, personality type.

VARIABLES: Personal characteristics, environmental knowledge and attitudes.

PURPOSE: To explore in greater depth the relationships among

selected attitudinal and personality characteristics, attitudes toward environmental problems, environmental knowledge, and behavioral commitment.

**SUBJECTS:** 85 known users of a community recycling center in Athens, Ohio, and 60 members of three relatively conservative churches in rural Athens. A third sample, included only in the second part of the study, consisted of 69 students enrolled in introductory and social psychology courses at Ohio University.

**RESEARCH DESIGN:** Hollingshead and Meyers' two-factor Index of Social Position was used to compute socioeconomic scores. A three-part questionnaire was utilized: (1) demographic and environmental behavior questions; (2) attitude and personality items (7-point Likert-type answer and response format); and (3) an environmental knowledge scale.

**RESULTS:** Response rates to questionnaires were 94 percent for recyclers, 78 percent for church members, and 88 percent for students. Responses to all items except those from demographic, behavioral, and knowledge sections were subjected to factor analysis. Analysis produced seven rotated orthogonal factors accounting for about 37 percent of the variance. Factorially derived scale scores were computed for each subject by assigning unit weights to all items in each factor. Loadings of .35 or higher. Seven scales resulted (scales largely free of overlap). Recyclers' behavioral commitment appears to be generalized across various types of related activities. Recyclers were also younger and more likely to belong to a higher social class, scored lower on conservation factor, and lower on the lack of personal control factor.

**REFERENCES:** 20 cited.

10. Arnsdorf, Val. "A Report on the Nature and Status of Environmental Education." Current Issues, 1975, 63-70. ED 119 982.

**DESCRIPTORS:** descriptive research, ecology education, program evaluation.

**VARIABLES:** Nature and status of environmental education in schools in 33 states.

**PURPOSE:** To determine the state of environmental education in school practice.

**SUBJECTS:** Schools K-12 in 33 states.

**RESEARCH DESIGN:** Curriculum guides and instructional resources prepared by commercial organizations, government agencies, schools, and other institutions were collected for study. A schedule of direct observations and interviews was arranged in schools reported to have exemplary environmental studies programs. Eight curriculum questions were used to structure the collection of environmental studies data.

**RESULTS:** Study indicates that environmental education programs are very slowly growing in the "right" direction. Findings are detailed in eight areas determined by the curriculum questions mentioned earlier.

**REFERENCES:** None cited.

11. Asch, Joseph, and Bruce M. Shore. "Conservation Behavior as the Outcome of Environmental Education." The Journal of Environmental Education, 1975, 6(4):25-33.

**DESCRIPTORS:** behaviors, conservation education, experimental research, field trip, formal, hypothesis generation, middle school, unobtrusive.

**VARIABLES:** Environmental education program, conservation behaviors.  
**PURPOSE:** To determine if a group of children exposed to a formal program of environmental education would demonstrate more conservation behaviors than a group not exposed to the environmental education program. Hypotheses: (1) The experimental group would show a higher frequency of conservation behavior than the control group, (2) The experimental group would demonstrate less destructive behavior, (3) The control group would show equal amounts of conservation and destructive behavior, and (4) The experimental group would show more conservation than destructive behavior.

**SUBJECTS:** There were 24 subjects. The 12 experimental subjects were randomly selected from 31 fifth grade boys. The principal researcher taught in a Montreal innercity school during the 1970-71 school year. The subjects were primarily from working class families. The 12 control group subjects were randomly selected from 29 sixth grade males from another innercity school.

**RESEARCH DESIGN:** A posttest only control group design was used. Experimental subjects were given a program in environmental education during the 1970-71 school year. The control group was not exposed to the environmental education program. Both groups were subjected to field trips in the Laurentian Mountains north of Montreal during the summer, 1971. At the nature center, both groups visited specially prepared sites where they participated in planned activities. Raters used an unobtrusive method to observe and evaluate each group's behaviors during the activities. Six trained raters, unaware of the exact nature of the study, were used during the data collection process. Teams of four students and two raters visited each location separately. Raters were given lists of criteria for evaluation of behaviors during each activity. An interscorer agreement of 93.5 percent was established between pairs of observers using calculations from raw data scoring sheets.

**RESULTS:** Each four-member team's performance was obtained by adding the frequencies recorded independently by its two observers during each task. The total performance for each task was then obtained by adding

the frequencies of the three teams, keeping conservation and destruction behaviors separate. The hypotheses were tested using the chi-square statistical test. All results exceeded critical values at an established alpha level of .05. Hypotheses 1, 2 and 4 were statistically supported. Hypothesis 3 was rejected, but the significant difference observed was in the direction even more strongly supporting the overall aims, that is, the control group exhibited more destructive than conservational behavior. The researcher points out that more emphasis should be placed on behavior measures than attitude measures or experienced opinions to demonstrate contributions that can be made by environmental education activities.

REFERENCES: 5 cited.

12. Askham, Leonard R. "Student Behavior and Participation in Outdoor Education Programs." The Journal of Environmental Education, 1974, 6(1):7-15.

DESCRIPTORS: behaviors, community resource, elementary, experimental research, nonformal, outdoor education.

INDEPENDENT VARIABLE: Demographics, indoor or outdoor instructional site treatment, and treatment sequences.

DEPENDENT VARIABLE: Student behaviors as classified according to Flanders Interaction Analysis scale.

PURPOSE: To discover whether interaction analysis could be used as a tool for measuring the effects of certain stimuli (in this study, plants and geometric objects) on children in nonclassroom-like settings.

SUBJECTS: 100 students were randomly selected from fourth, fifth and sixth grade classes participating in the Botanical Garden's outdoor education program. The Garden is located on the University of California at Berkeley campus.

RESEARCH DESIGN: This experiment utilized a modified posttest-only control group design with treatment rotation. Each selected student was assigned to an interviewer, examined for color blindness and escorted to one of two test sites. In the first sequence, subjects were tested in the interviewer's office before being tested in the out-of-doors. In the second sequence, testing sites were reversed. At one test site the testing apparatus consisted of 20 plants from the desert regions of California established in the Garden as a semi-natural assemblage of flora. Each plant was discernible as a distinct unit, contained certain attributes (e.g., size, shape, color), and was both visually and physically accessible from the gravel path surrounding the assemblage. The investigator's office served as a second test site and was intended to simulate a classroom-like setting. Here students were presented 16 geometrically-shaped objects patterned after testing apparatus used in Inhelder's and Piaget's study. These objects were painted with bright colors and numbered for identification. In order to prompt verbal

communication about the objects used during the test and to disguise the true reason for the test, the students were urged to 'classify' each set of objects presented through a series of 'open-ended' questions. If the subjects did not understand what it meant to 'classify,' the interviewer provided a simple operational description of what it meant to 'classify.' Each interviewer was equipped with a portable tape recorder to document each subject's responses. Subsequently, the data were transcribed and tabulated using a modified (i.e., eight category) Flanders interaction analysis scale. Procedures for tabulating data were presented, including the construction of two time lines to depict interactions during each treatment exposure. Instrument validity was questioned by the authors. The authors report establishing the reliability of the questioning strategy.

**RESULTS:** With alpha set at .001, no significant differences were found between students when Test One scores were compared with Test Two scores. No significant differences were found between Test One and Two, or their respective applications. The authors suggested that the amount of time used by students to classify plants outdoors was significantly greater than time used to classify objects indoors. However, no differences were associated with the number of ways students classified objects in either treatment setting, nor with the variables age, race and gender. Yet 7 significant differences were found out of 28 comparisons between age and the interaction behavior categories. Data tables, conclusions and explanations were reported.

**REFERENCES:** 19 cited.

13. Ayers, Jerry B. "Rural Elementary Children's Attitudes Toward the Energy Crisis." School Science and Mathematics, 1976, 76(3):238-240.

**DESCRIPTORS:** affective, attitudes, descriptive research, elementary, energy education, formal, issue awareness/knowledge of issues.

**VARIABLES:** Students' attitudes toward the energy crisis.

**PURPOSES:** (1) to modify an attitude measure designed for high school students so that it could be used with elementary school children; (2) to measure the attitudes of children enrolled in grades 5 through 7 in a rural area toward the environmental impact of electrical power generation; and (3) to compare differences in attitudes toward the energy crisis between genders and among grade levels.

**SUBJECTS:** 496 students (256 males and 240 females) from 5 rural school systems in Middle Tennessee (120 fifth, 303 sixth and 73 seventh graders).

**RESEARCH DESIGN:** In this descriptive study, a 17-item instrument originally designed for use with secondary students was administered in a pilot study to 50 fifth graders. Results indicated modification of



one question. The author indicated that instrument validity was not affected. The modified instrument was then administered to all subjects. Mean scores and standard deviations for each item were calculated. Reliability of the instrument was not discussed.

**RESULTS:** The chi-square technique was used to determine differences in response between genders and among grade levels. Alpha level was not reported. There were no significant differences between genders or among grade levels. Attitude scores of all subjects indicated some understanding of the long-term problems associated with the energy shortage. Educational implications for curriculum development are discussed.

**REFERENCES:** 5 cited.

14. Bailey, George Arthur. "The Public, the Media, and the Knowledge Gap." The Journal of Environmental Education, 1971, 2(4):3-8.

**DESCRIPTORS:** descriptive research, economic background, educational background, issue awareness/knowledge of issues, knowledge, social background.

**INDEPENDENT VARIABLES:** Demographics, political activism, information source.

**DEPENDENT VARIABLE:** Level of information.

**PURPOSE:** To trace the diffusion of information about Earth Day 1971 as it related to the independent variables listed above.

**SUBJECTS:** 279 teenagers and adults picked at random, nonreplacement, from telephone listings in Madison, Wisconsin. The subjects were from two separate samples: pre-Earth Day (N = 160) and post-Earth Day (N = 119). In the pre-sample, males = 34 percent, females = 66 percent. In the post-sample, males = 35 percent, females = 65 percent.

**RESEARCH DESIGN:** Closed interview surveys were conducted five weeks prior to (N = 160) and one week after (N = 119) Earth Day 1971. Questions asked for information on subjects' age, sex, occupation, political activism, educational level, information awareness concerning Earth Day, and the source(s) of their information. The pre- and post-samples were compared on the basis of the independent variable demographics and were judged identical. Responses for level of information and political activism were scaled 1-5, and 1-4, respectively. Age and occupation were divided into five subgroups, and education was divided into four subgroups. Neither reliability nor validity were reported.

**RESULTS:** Means of information level for each subgroup and for each independent variable as a whole were reported. Information was not related to sex, was positively related to age and occupation at the extremes only, was positively related to education and political activism on a linear basis. Newspapers and interpersonal contacts were

the most important information sources for both the pre- and post-samples. No level of significance was reported.

The researcher concluded that education interacts with the age and occupation variables, that public information campaigns widen the knowledge gap that exists between various social groups. Data are not generalizable beyond the population sampled.

REFERENCES: None cited.

15. Baker, Earl J., Stephen G. West, Dennis J. Moss, and James M. Weyant. "Impact of Offshore Nuclear Power Plants: Forecasting Visits to Nearby Beaches." Environment and Behavior, 1980, 12(3):367-407.

DESCRIPTORS: affective, attitudes, behaviors, cognitive, descriptive research, issue awareness/knowledge of issues, issue-based.

VARIABLES: Beach attendance, subjective impact of offshore nuclear power plants.

PURPOSE: Attempts to forecast certain probable behavioral effects of offshore floating nuclear power plants upon beach use and attendance.

SUBJECTS: 600 visitors at each of the four following beach areas: Panama City-Ft. Walton Beach area in Florida; Clearwater-St. Petersburg Beach area, also in Florida; the south shore of Cape Cod, Massachusetts; and the Atlantic County-Ocean County Beach areas of New Jersey. Multi-stage cluster sampling was used to choose respondents. Individuals within each cluster chosen by a spatially systematic procedure with random starts.

RESEARCH DESIGN: This investigation employed a number of research methods to minimize the possible bias associated with any one method. The three general methods included: analogous situations, intention to avoid beach, and beach attribute tradeoffs. Reliability and validity coefficients were not reported.

RESULTS: "Intention-to-avoid" responses ranged from 22.8 to 26.5 percent across the four beach areas. These responses may not be reliable for reasons listed in detail in the text. Results from the information-integration method consistently and clearly showed that proximity of a beach to a floating nuclear plant was far less important in determining the attractiveness of a beach than were attributes such as a closeness to one's home, cleanliness, etc. Stresses importance of multiple method approach in order to project behavioral impacts related to technological or social innovations.

REFERENCES: 31 cited.

16. Baker, Milton R., Rodney L. Doran, and Alfred A. Sarnowski, Jr. "An Analysis of Environmental Values and Their Relation to General Values." The Journal of Environmental Education, 1978, 10(1):35-40.

**DESCRIPTORS:** affective, descriptive research, formal, instrument development, secondary, values.

**VARIABLES:** General values, environmental values and demographic data.  
**PURPOSE:** (1) to develop an instrument for measuring an individual's environmental values, and (2) to test the following null hypothesis: There is no relationship between general values and environmental values.

**SUBJECTS:** 555 students from three schools were selected to reflect urban (N = 170), suburban (N = 232), and rural areas (N = 153) in western New York during the spring of 1975. Within each group, students were surveyed in ninth and twelfth grade English and social studies classes.

**RESEARCH DESIGN:** From the literature the authors identified a Study of Values (SOV) inventory developed by Allport, Vernon and Lindzey which was based upon the theoretical work of Spranger. These were selected as the basis for investigation of concurrent and construct validity of the instrument constructed in this research. Five categories of general values were used as the basis for generating five categories of environmental values: theoretical, economic, aesthetic, social, and political values. The religious category was dropped on basis of previous research findings. The instrument developed by the authors, the Environmental Value Inventory (EVI), was developed on a problem-based format. Twenty individual problems were presented and a set of five choices were provided for each problem that reflected categorical value positions. The statements were validated by a jury of college, secondary and preservice teachers. This instrument and the second standardized general value instrument (SOV) were given to the subjects. Approximately 2.5 hours were required of each respondent to complete all of the questionnaires and inventories. The data collection process extended over a period of one week in each of the three schools.

**RESULTS:** Multivariate statistics were used to analyze the data obtained from both SOV and EVI instruments. A Cooley-Lohnes routine was used to compute a full set of canonical correlations among the two sets of variables. The aspect of procedures for construct validation entailed the existence, nature, and strength of determinations of relationships within the two instruments as determined by a multiple analysis program. The results from the canonical analysis indicated that there were three pairs of canonical factors which had statistically significant correlations, and these accounted for about 23 percent of the variance. The authors suggested that on this evidence the null hypothesis could not be supported. The results of the second analysis included mean scores, standard deviations and correlations among the five categories of each instrument. Though means and standard deviations for the SOV and EVI value categories did not appear different, differences were

noted when value categories were assigned preferential ranks. Thus the calculated Spearman rho rank order correlation value did not satisfy the minimum correlation standard for significance. In a subsequent correlation matrix, the relatively consistent positive correlations between the same value categories on the two instruments indicated that the value categories of one were respectively related to the same value categories of the other. According to the authors, similarities in factor loading provided additional support for E'I construct validity. The authors concluded that the underlying structure of both instruments was based upon a parallel loading on the common value categories. A discussion of the results was presented.

REFERENCES: 10 cited.

17. Bammel, Gene, and Lei Lane Burrus-Bammel. "Analysis of Morgantown's Personal Rapid Transit System." Current Issues VI, 1980, 126-137. ED 197 147.

DESCRIPTORS: descriptive research, higher education, program evaluation.

VARIABLES: The use of the Personal Rapid Transit System.

PURPOSE: Analysis of the rapid transit system.

SUBJECTS: Students enrolled in both sections of Forestry 140 (Resources of West Virginia) at West Virginia University. These students were selected because this course draws a representative group and, secondly, because the course is taught at a campus which, for some students, requires transportation. 320 students, sophomores to seniors, participated.

RESEARCH DESIGN: A 25-item Likert-type questionnaire was distributed to these students and a response rate of 40 percent (N = 128) was achieved. Answers were grouped according to the average score for males and average score for females and a total average was attained.

RESULTS: The significant difference was computed for male versus female responses and each question was analyzed. The overall attitude toward the PRT was favorable.

REFERENCES: 11 cited.

18. Barker, M. L. "Information and Complexity: The Conceptualization of Air Pollution by Specialist Groups." Environment and Behavior, 1974, 6(3):346-377.

DESCRIPTORS: attitudes, behaviors, cognitive style, continuing education, descriptive research, issue-based, issue identification skills, knowledge.

VARIABLES: Occupational background, conceptualization of air pollution.

**PURPOSE:** To examine the psychological structures of potential environmental decision makers, using the theoretical framework of cognitive theory.

**SUBJECTS:** 125 male students in their final year of minimum professional training at the University of Toronto: 25 medicine, 20 law, 33 engineering, 19 economics, 28 geography.

**RESEARCH DESIGN:** The research design included a series of semi-projective measures of cognitive characteristics, a test of information about air pollution, and indexes of social and educational characteristics. A modified form of the Kelly Role Matrix provided measures of differentiation and discrimination, as well as sampling the range of concepts used to describe air pollution roles. Reliability and validity coefficients were not reported.

**RESULTS:** Found significant variations in the conceptualization of air pollution, and the ways in which this information was organized among the five professions. Did not differ in their definition of or concern for air pollution. Views about their potential contribution to air quality management differed among the five groups. The two variables of complexity and information were unrelated in medicine, law and economics, and among geography and engineering students there was a weak positive relationship. Results reproduced in text. Recommendations for further research were listed.

**REFERENCES:** 26 cited.

19. Barnes, Buckley, Roberta Rivner, Mildred Smith, and Linda Waln. "Environmental Education Generalizations in Middle Grade Social Studies Series." The Journal of Environmental Education, 1978, 10(2):12-17.

**DESCRIPTORS:** cognitive, descriptive research, formal, middle school, program evaluation, social science education.

**VARIABLES:** Environmental generalizations in fourth, fifth and sixth grade social studies textbook series.

**PURPOSE:** To determine the extent to which environmental generalizations are included in fourth, fifth and sixth grade social studies textbook series.

**SUBJECTS:** Not applicable.

**RESEARCH DESIGN:** A list of 50 generalizations on environmental concepts and issues were presented to 120 K-12 Wisconsin teachers for validation; 44 were deemed valid. Of these, 20 were selected by the researcher for use in the study and divided into three areas: (1) Economics and Culture, (2) Ecology, and (3) Management. At the same time, a survey of 24 state social studies specialists was conducted. The specialists were asked to rank order the most commonly used textbook series. The top

five from these data were analyzed for environmental generalization using a scorer trained by the researcher.

**RESULTS:** All series analyzed contained some environmental generalizations. They ranged from a high of 1,733 in Silver Burdett (1972) to a low of 415 in Harcourt, Brace, Jovanovich (1970). It was concluded that the treatment of environmental topics is extremely uneven within any given series as well as among series. On the whole, students who used most of the series received considerable exposure to environmental ideas related to economics and culture and ecology. However, important environmental management generalizations are relatively absent from the five widely used series that were analyzed.

**REFERENCES:** 7 cited.

20. Bart, William M. "A Hierarchy among Attitudes toward Animals." The Journal of Environmental Education, 1972, 3(4):4-6.

**DESCRIPTORS:** attitudes, descriptive research, model building, preferences.

**VARIABLE:** Attitudes toward animals.

**PURPOSE:** To indicate a hierarchy among attitudes toward animals.

**SUBJECTS:** 78 volunteer graduate and undergraduate students from the College of Education, University of Minnesota; 35 of the subjects were males, aged 20-45, and 43 were females, aged 19-45. (Reviewer's note: Elsewhere in the article, the author stated that the total number of subjects was 88, as compared to the 78 indicated above. Which total is correct could not be determined.)

**RESEARCH DESIGN:** Subjects were tested in group sessions of unspecified size. They were given a list of 30 animals found in the United States. Next to each animal, the words LIKE and DISLIKE appeared. Each subject circled the appropriate word to indicate his/her like or dislike. Neither reliability nor validity were reported.

**RESULTS:** Responses were coded '1' for like and '0' for dislike, yielding for each subject a 30-item response pattern of 1's and 0's in a bivalued form. Tree theory analysis was performed on the data to determine the attitudinal hierarchy.

Data were presented in two forms. First, a table listed both the percent 'like' response for each animal, and each animal's rank in the hierarchy. Second, a graph illustrated the actual hierarchy of attitudes toward the animals; the author stated that this indicated that the like of one animal implied the liking of a second animal, or conversely, the like of the second was a prerequisite for liking the first.

The author noted that various animals that are rare and endangered, such as the alligator, hawk and wolf, had low percentages of like responses

and ranked low in the hierarchy. The author suggested that the data could be used to develop more effective curricula where the objective is to change attitudes toward rare and endangered species from negative to positive.

The data are not generalizable beyond the population sampled.

REFERENCES: 9 cited.

21. Bart, William M. "A Hierarchy Among Attitudes Toward the Environment." The Journal of Environmental Education, 1972, 4(1):10-14.

DESCRIPTORS: attitudes, behaviors, descriptive research, model building, preferences.

VARIABLE: Environmental attitudes.

PURPOSE: To indicate a hierarchy among environmental attitudes based on ordering theory.

SUBJECTS: 60 female volunteer graduate students (ages 19-45) and 40 male volunteer graduate students (ages 20-52) from the College of Education, University of Minnesota.

RESEARCH DESIGN: A 20-item questionnaire, each item reflecting an ecological attitude drawn from the literature of organizations such as Audubon and the Sierra Club, was given to the subjects. Each item could be answered yes or no. Depending upon the wording of each item, either a yes or no response was indicative of a positive ecological response. Neither reliability nor validity were reported.

RESULTS: Responses were coded '1' for a positive ecological response and '0' for a negative ecological response, yielding for each subject a 20-item response pattern of 1's and 0's in a bivalued form. Ordering theory analysis was performed on the data to determine the attitudinal hierarchy.

Data were presented in two forms. First, a table listed both the percent positive ecological responses for each item, and each item's attitudinal rank. Second, a graph illustrated the actual hierarchy of the attitudes; the author stated that this indicated which attitudes implied other attitudes, or conversely, which attitudes stood as prerequisites to other attitudes.

The author concluded that (1) attitudes relating to personal behaviors formed a linear hierarchy independent of attitudes referring to public activity, and (2) attitudes indicating restrictions on personal freedom and purchasing patterns scored the lowest percent positive ecological responses.

The author felt that studies of this type would be useful in curriculum development where the objective would be the attainment of positive

ecological attitudes. The data are not generalizable beyond the sample population.

REFERENCES: 8 cited.

22. Bavec, Nancy, Glen M. Broom, and A. Clay Schoenfeld. "The Environmental Education Voice of the Oil and Forest Industries, 1958-1977." The Journal of Environmental Education, 1979/80, 11(2):41-45.

DESCRIPTORS: conservation education, descriptive research, issue identification skills, resource management.

VARIABLES: The character of oil and forest industry advertisements in Newsweek, Sports Illustrated, Business Week, and Natural History.

PURPOSE: To analyze the content of oil and forest industry advertisements found in the magazines listed above for the years 1958-1977 in order to ascertain the trends of environmentalism. The researchers made no attempt to: (1) determine the accuracy of the information presented; (2) evaluate the ecological soundness of the information; (3) analyze the motives of the industries involved; (4) measure the effects of the messages on audiences; or (5) analyze the dollar cost of the advertising.

SUBJECTS: Not applicable.

RESEARCH DESIGN: Advertisements by two industries apparently involved in natural resource development and environmental degradation were identified in four national circulation magazines for the years 1958-1977. A stratified random sample consisting of 305 advertisements was identified for analysis. For analytical purposes, the 20-year advertising period under investigation was broken down into three phases reflecting the evolution of environmentalism: Phase I: 1958-1965; Phase II: 1966-1971; and Phase III: 1972-1977. The sample of industrial advertisements were subsequently analyzed for the content and tenor of their environmental message. Validity and reliability estimates were not reported.

RESULTS: For the American industry as a whole, Peters had earlier found that industrial ads featuring an environmental theme never exceeded 1.7 percent in 1965, 1970 or 1972. In this survey, the authors reported that 29 percent of the 305 ads reviewed could be termed environmental: 31 percent for the oil and 25 percent for the forest industry. Quantitative changes in this environmental dimension were observed and reported: for the oil industry, from about 20 percent (Phase I) to nearly 50 percent (Phase III), and for the forest industry, from nearly 8 percent (Phase I) to about 52 percent (Phase III). In response to a question asking if either industry had ceased encouraging product consumption, the authors reported a dramatic turnabout: for the oil industry's ads, a decrease from 32 percent (Phase I) to about 9 percent



(Phase III), and for the forest industry's ads, a decrease from nearly 72 percent (Phase I) to a little over 4 percent (Phase III). Results and apparent trends were discussed for each industry and time phase.

REFERENCES: 13 cited.

23. Bazan, Eugene G. "Environmental Simulation Games." The Journal of Environmental Education, 1976, 8(2):41-51.

DESCRIPTORS: descriptive research, formal, games, higher education, issue-based, issue investigation/evaluation skills, program evaluation, simulations.

VARIABLES: Four simulation games, game variables (limited player participation and lack of economic relationships), players (actors).

PURPOSES: (1) to address two problems associated with environmental simulation games: (a) limited participation, and (b) lack of economic relationships; and (2) to outline a framework within which further game development and evaluation may take place.

SUBJECTS: Participants in the games which were used in a 10-week introductory course in Man-Environmental Relations at the Pennsylvania State University.

RESEARCH DESIGN: The author developed four simulation games and presented them in the following sequences: (1) The Externalities Game, (2) The Agricultural Policy Game (3) The Location Game, and (4) The Environmental Management Game. Each game was to be played in two sessions. During the first session, students were to become familiar with their roles and problems generated by the system. During the second session selected policies were to be implemented and game results to be evaluated. In a formal project based upon the games, students were asked to outline their strategies for survival, to deal with the concept of game validity, and to suggest improvements to the game. Reliability associated with data was not reported.

RESULTS: The framework followed by the author modeled both the ecological and economic systems in the four sequenced simulation games developed. Up to 40 players were successfully involved in the games. It was reported that larger groups can participate allowing further role specialization. The games produced high group interaction and involvement. The games simulated the behaviors, problems and conditions of producers, consumers, farmers, agricultural policymakers, and the actors of a complex economic system. The author suggested that the lessons of these games when considered as a whole, were highly visible and self-evident. The actors came away with a distinct impression that all is not well with human socioeconomic systems. The inability to supply quick and easy answers impressed on the group the difficulty of understanding and manipulating complex systems. The actors concluded that one cannot and should not draw lessons from the simulations which

cannot be applied to the real world. The author took this conclusion as implying the need to validate games, both internally and externally. Although the games were reported to be the most popular part of the course, their effectiveness over alternate formats for developing the same topics has not been tested formally.

REFERENCES: 17 cited.

24. Becker, Robert H. "Dredge Spoil: An Identity Not a Terminology Problem." The Journal of Environmental Education, 1980, 12(1):36-39.

DESCRIPTORS: attitudes, behaviors, citizen action, community resource, descriptive research, economic background, issue identification skills, knowledge.

VARIABLES: Instrument terminology revealing the source of dredge-spoil sand banks, attitudes toward recreation on dredge-spoil sand banks.

PURPOSE: The purpose of the Great River Environmental Action Team was to study and develop a river system management plan for select sections of the Mississippi River. The Recreational Work Group of that team undertook an investigation of the recreational resources of the river corridor relating to the overall study and plan. The purpose of this study was to identify characteristics associated with recreation users of the river, and to study the effects of a questionnaire terminology shift upon user attitudes toward river recreation.

SUBJECTS: In 1977, a total of 1,783 questionnaires were distributed to and collected from riverway recreational users by the Iowa Conservation Committee; of the 1,651 responses prepared for analysis at the University of Wisconsin, respondents were predominantly local residents, maintained moderate to high incomes, and were familiar with the river resource.

RESEARCH DESIGN: The questionnaire was distributed in two sets, marked by a change in terminology. The 'dredge-spoil' questionnaire received 789 responses while the 'dredge material' questionnaire received 862 responses. Responses to a variety of riverway use activities and user attitudes were recorded forming the basis for between-group comparisons. Identical demographic information was solicited by each set of questionnaires.

RESULTS: A chi-square test for independence between groups revealed that the two questionnaire samples groups responded differently to questions regarding riverway enjoyment. These findings were significant at the 0.001 level. The results of the student's t-test, conducted to detect differences between the means of the two samples on questions regarding riverway enjoyment, revealed no significant differences between groups.

REFERENCES: 6 cited.

25. Belak, Edmund R., Jr. "The Outdoor Magazines Revisited." The Journal of Environmental Education, 1972, 4(1):15-19.

DESCRIPTORS: descriptive research, preferences.

VARIABLES: Natural parameters, cultural parameters, environmental coverage.

PURPOSE: The author determined the environmental coverage of three outdoor magazines (Field and Stream, Outdoor Life, and Sports Afield) from 1968-1970, and also 1908 and 1934.

SUBJECTS: The number of articles reviewed for this research was not reported. Sample issues were selected nonrandomly so that for each magazine, at least one issue per season was included per year. Within each issue, the first and then every third and fourth article were used, excluding articles of less than two pages. Each paragraph within the articles was used as the coding unit.

RESEARCH DESIGN: Articles were classified into four broad categories: Hunting, Fishing, Outdoor and Conservation-Environment. Paragraphs were classified into 10 opposing-pair categories, the 10 pairs representing two broad classes: Natural and Cultural Parameters. The opposing pairs under Natural Parameters were: General-Fish and Game, Universal-Interior, Multi-regional-Regional, and Urban-Rural. The opposing pairs under Cultural Parameters were: Aesthetic-Nonaesthetic, Quality-Quantity, Action-Apathy, Intergrate-Subjugate, Humanistic-Utilitarian, and Noneconomic-Economic.

RESULTS: The data were generally reported in narrative form, with some specific data in the narrative. For the years 1968-1970, the author devised an Environmental Quotient, which was the number of parameter references per magazine for each year and for the three-year period.

The author concluded that the magazines centered the majority of their environmental information around fish and game issues, but noted that there was a trend for them to cover broader areas of environmental concern. The greatest lack of coverage, he stated, was in those areas dealing with cultural issues, such as population growth and urban problems.

REFERENCES: None cited.

26. Blackwood, Larry, and Edwin H. Carpenter. "The Importance of Anti-urbanism in Determining Residential Preferences and Migration Patterns." Rural Sociology, 1978, 43(1):31-47.

DESCRIPTORS: attitudes, behaviors, descriptive research, rural, urban.

**VARIABLES:** Population size, potential for migration.  
**PURPOSE:** To evaluate anti-urbanism as a measure for determining preferences for living on less-populated areas.

**SUBJECTS:** 1,416 residents of Arizona (represents 71 percent return of questionnaire) were randomly selected from names on state's auto registration list from each postal region in proportion to number of inhabitants of that region.

**RESEARCH DESIGN:** A cross-sectional survey design was utilized in the research. Most of the test items used in the questionnaire are reported. No validity or reliability coefficients were reported.

**RESULTS:** Multivariate differences were analyzed through the method of log-linear contingency table analysis ( $p < .10$ ). Population size proved to be an important factor in selection of community and those concerned with population size showed a greater tendency to prefer smaller-size places.

**REFERENCES:** 19 cited.

27. Bluhm, William J., and Harold R. Hungerford. "Modifying Preservice Elementary School Teachers' Perspectives." The Journal of Environmental Education, 1976, 7(4):14-17.

**DESCRIPTORS:** experimental research, formal, knowledge, science education, teacher training preservice.

**INDEPENDENT VARIABLE:** Environmental Education Instruction.

**DEPENDENT VARIABLE:** Preservice students' ability to define environmental education, and students' acquisition of concepts concerning ecology.

**PURPOSE:** To determine the effects of an environmental education instructional model on preservice science teachers. More specifically, the hypotheses under study were: (1) as a function of instruction in an elementary school science methods course, preservice teachers will make a statistically significant improvement in their ability to define environmental education; and (2) as a function of instruction in an elementary school science methods course, preservice teachers will make a statistically significant improvement in their acquisition of concepts concerning ecology.

**SUBJECTS:** 60 preservice elementary science methods students at Southern Illinois University-Carbondale. During spring quarter of 1975, 44 students were exposed to the experimental treatment. The control group consisted of 16 students.

**RESEARCH DESIGN:** A pre-post control group design was used in this study. Randomization was assumed to be a function of registration into the sections of science methods in the study. Groups were equated on the basis of the dependent variables. A simple, phenomenological instrument was devised to test Hypothesis 1. A 17-item multiple choice/short answer instrument was devised to test Hypothesis 2. Instrument validity estimates were established for the multiple choice instrument by comparing the instrument items of instructional model for correspondence, and by the approval of content by experts in the field. The authors report a test-retest reliability correlational value of .9249 (N = 18). They also suggested that test-retest reliability was indicated by the F value obtained for the comparison of the pretest and the retest for the control group (F obtained = 0.0476; F critical = 7.56; df = 1.30; N = 16). Following the experiment, the control group was treated with the same instructional model used in the experimental group treatment.

**RESULTS:** Pre and posttest results were analyzed for both sections of the research instrument. Group membership data were dummy coded, and a multiple regression analysis was run on the data. Results indicate that both research hypotheses were accepted with a high level of confidence. Results are given in table form in the article.

**REFERENCES:** None cited.

28. Borden, Richard J., and Andrew P. Schettino. "Determinants of Environmentally Responsible Behavior." The Journal of Environmental Education, 1979, 10(4):35-39.

**DESCRIPTORS:** attitudes, behaviors, environmental action skills, ex post facto, knowledge.

**VARIABLES:** Factual knowledge and feelings about environmental issues, and actual or verbal commitment to environmentally responsible action.

**PURPOSE:** (1) to test the assumption that factual knowledge and feelings about environmental issues are variables independent of one another, and (2) to investigate the extent that each variable contributes to environmentally responsible action.

**SUBJECTS:** The subjects were 203 male and 327 female undergraduates enrolled in introductory psychology courses at Purdue University during the 1976 fall semester.

**RESEARCH DESIGN:** The Maloney, Ward and Braucht Revised Environment Test was administered to each subject. This test contains four subscales: Affect, Knowledge, Actual Commitment, and Verbal Commitment. Median scores for the Affect and Knowledge variables were used to divide respondents into two groups. Analysis of variance was conducted using the Affect and Knowledge scores as independent variables and subjects' Actual Commitment and Verbal Commitment scores as dependent variables.

**RESULTS:** Using a Pearson correlation coefficient, the Affect and Knowledge subscales showed no indication of correlation,  $r = .01$ , n.s. According to the ANOVA results, both environmental knowledge and feeling had a strong positive effect on actual commitment to responsible action. In determining actual commitment, an individual's level of knowledge accounted for slightly more than 4 percent of the variance while approximately 8 percent of the variance was accounted for by strength of feelings. In determining verbal commitment, environmental knowledge had a slight influence while feelings had a much higher influence on environmentally responsible action. In determining verbal commitment toward environmental action, knowledge accounted for less than 1 percent of the variance while over 12 percent of the variance was attributed to feelings. No significant differences existed between genders for actual commitment while females were significantly more verbally committed ( $p = .03$ ) than males toward the solution of environmental problems.

**REFERENCES:** 17 cited.

29. Born, Ted J., and Nelson E. Wieters. "Non-Reactive Measurement of Orientation toward the Natural Environment." The Journal of Environmental Education, 1978, 10(1):41-43.

**DESCRIPTORS:** affective, continuing education, descriptive research, instrument development, outdoor education.

**VARIABLES:** Individual awareness of the natural environment.

**PURPOSE:** To develop a word association test designed to measure the degree to which a person is aware of and oriented toward the out-of-doors and the natural environment.

**SUBJECTS:** 102 participants in four environmental and acclimatization workshops during the spring of 1976 at George Williams College in Downers Grove, Illinois.

**RESEARCH DESIGN:** The National Environmental Awareness Test (NEAT) was constructed using 400 words that evoked either environmental or nonenvironmental responses. This list was subjected to two revisions using students in undergraduate college classes and teachers participating in an environmental awareness workshop. A final list of 75 words were accepted for the test. To these, 25 neutral words were added, establishing the final form of the instrument. The instrument was then administered to participants in four environmental education and acclimatization workshops, with a pretest-posttest format at the start and close of the two-day workshops. In addition, on the last day participants were also given the Wilderness-Urbanism test and the Revised Scale for the Measurement of Ecological Attitude and Knowledge. Data were scored by trained staff whose interscorer reliability was established to be  $r = .98$ .

**RESULTS:** Pearson's correlation coefficient was used to compare the test scores. The degree of association between the NEAT posttest and the affect component of the Revised Scale was compared using a nonparametric statistic, gamma. Finally, a Pearson  $r$  was used to measure the

correlation between the NEAT posttest scores and the Wilderness-Urbanism test scores. The correlation between pretest and posttest NEAT measures was  $r = .69$  ( $N = 102$ ). The correlation between the NEAT and Wilderness-Urbanism Test was  $r = .36$  ( $N = 87$ ,  $p < .001$ ). The association between the NEAT and the affective component of the Revised Scale was  $.49$  ( $N = 86$ ). Educational uses of the NEAT were discussed.

REFERENCES: 6 cited.

30. Borton, Thomas E., and Katherine P. Warner. "Involving Citizens in Water Resources Planning: The Communication-Participation Experiment in the Susquehanna River Basin." Environment and Behavior, 1971, 3(3):284-306.

DESCRIPTORS: citizen action, descriptive research, hypothesis generation, program development, program evaluation, program implementation, resource management education.

VARIABLES: Six-month Susquehanna River Basin Study (10-county subarea), communication-participation.

PURPOSE: To investigate the means of achieving more effective two-way communication between technical planners and the affected publics when designing and implementing water resource plans.

SUBJECTS: An unspecified number of local basin residents and agency planners. All subjects were adults.

RESEARCH DESIGN: In this descriptive study, pre and posttest opinionnaires were distributed to residents at eight community leader-planner workshops. Four public forums were also held. Water resource opinion leaders were chosen through interviews and questionnaires. Public information on the plan was widely distributed. A preliminary and post questionnaire was administered to agency planners. Testing was carried out over a six-month period. A summary of selected test items was reproduced in the text. Reliability and validity coefficients were not reported.

RESULTS: Responses to opinionnaires and questionnaires were correlated and participation was found to be high. 50 percent of the respondents attended either a workshop or a forum, 93 percent indicated having read public information distributed, and only 4 out of 215 respondents had not been active in expressing opinions. The need and support for more effective communication-participation programs involving communities in local planning was confirmed. Recommendations for further research were discussed.

REFERENCES: 21 cited.

31. Bottinelli, Charles A. "A Brief Summary of the Status of Secondary Environmental Education in Colorado." The Journal of Environmental Education, 1976, 7(4):38-45.

**DESCRIPTORS:** . descriptive research, formal, secondary.

**VARIABLES:** Status of secondary environmental education (EE) in Colorado.

**PURPOSE:** To determine the status of environmental education in the State of Colorado.

**SUBJECTS:** Colorado's 181 school districts were partitioned into four geographic regions: the plains (P) the front range strip (FR), the central mountains (CM), and the western slope (WS). A stratified random-sampling technique was employed to select 51 districts for use (28.2 percent of the 81); 42 districts (82 percent) responded.

**RESEARCH DESIGN:** In this descriptive study, a 23-item survey instrument entitled "Status of Secondary Environmental Education in Colorado" was used. The instruments were mailed to the superintendents of the participating school districts in March of 1975. Instrument validity and reliability estimates were not reported.

**RESULTS:** An SPSS computer program was used to obtain descriptive statistics for the 139 variables contained on the questionnaire. Two cross-tabulations, percent of secondary students enrolled in environmental education programs and per capita budget allocation for enrollees were obtained. Spearman's r's were computed on selected pairs of program objectives, and an attempt was made to ascertain statewide priorities regarding relative objective emphasis. Slightly over one-half (53.7 percent) of all Colorado school districts include some kind of environmental education in their secondary curricula. An extensive list of major findings which further define the school districts which offer environmental programs are presented in the article.

Compared to the results of a 1969-70 NEA national survey, this study indicates that on some major findings, Colorado's secondary environmental programs exhibit the characteristics of the national majority. However, obvious dissimilarities exist between Colorado's environmental program and the national majority of programs on: evaluation of attitudinal change, types of outdoor lab site facilities, use of federally-distributed materials, employment of part or full-time resource persons, and inservice teacher/staff training opportunities. FR districts include EE as part of the learning experiences for their secondary students more than any other state region.

In programmed districts, the trend was toward diffusion of environmental modules into existing curricula, mainly science and social studies. According to the researcher, Colorado's secondary schools display considerable diversity in environmental content. An increased emphasis placed on major world environmental problems, as well as state and local issues was needed. Responses to questions regarding additional teacher training programs in EE and in using classroom materials related to local and state issues indicate a need for assistance in these areas. The researcher emphasizes the need to improve Colorado's environmental education programs.



REFERENCES: 3 cited.

32. Bowman, James S. "American Daily Newspapers and the Environment." The Journal of Environmental Education, 1978, 10(1):2-11.

DESCRIPTORS: affective, descriptive research, issue awareness/knowledge of issues, issue investigation/evaluation skills, knowledge.

VARIABLES: Attitudes toward issues, national newspaper editors.

PURPOSE: To survey the nature, extent and factors influencing press coverage of environmental questions.

SUBJECTS: 138 of the largest American daily newspapers were selected; 90 usable surveys were returned by editors.

RESEARCH DESIGN: A Likert-type questionnaire was developed by adapting three prior survey instruments. The final instrument contained four sections which were: (1) the extent of coverage of environmental questions, (2) editorial policies and advertising effects, (3) special problems in reporting environmental issues, and (4) attitudes toward issues and towards future solutions of those issues. The surveys were mailed out anonymously with return envelopes. Returned responses were tallied and percentages calculated.

RESULTS: Data regarding the environmental issues perceptions indicated that natural resource problems are not being overlooked by the editors. Also, editors state that their papers have consistent editorial policy concerning environmental quality and economic growth. The article also discusses data concerning news coverage of ecological issues, objectivity of environmental news reporting, and editorial opinions regarding the causes, solutions and future of environmental problems. Numerous tables and response frequencies are presented. Extensive discussion of results as compared to other similar studies are presented.

REFERENCES: 17 cited.

33. Bowman, James S. "Public Opinion and the Environment." Environment and Behavior, 1977, 9(3):385-416.

DESCRIPTORS: behaviors, beliefs, descriptive research, higher education, issue awareness/knowledge of issues.

VARIABLES: Awareness and concern about environmental issues.

PURPOSE: To gauge contemporary public opinion concerning environmental issues.

SUBJECTS: 325 university freshmen at the University of Wyoming. Sample found to be representative of entire freshman class when compared to demographic data.

**RESEARCH DESIGN:** A questionnaire was administered to measure awareness of the environmental crisis, causes of the environmental crisis, sources of environmental awareness, what to do about the environmental crisis. Reliability and validity coefficients were not reported.

**RESULTS:** Students deeply committed to environmental quality believe that fundamental cultural values have been a basic cause of ecological problems, and that present public or private institutions are unlikely to bring about reform. Sixty percent of the sample agreed that industrial growth and environmental quality are compatible; 43 percent believe that the ecological crisis can be solved by the application of technology. Areas for further research discussed.

**REFERENCES:** 61 cited.

34. Bowman, Mary Lynne. "Assessing College Student Attitudes toward Environmental Issues." The Journal of Environmental Education, 1974, 6(2):1-5.

**DESCRIPTORS:** attitudes, beliefs, higher education, instrument development, issue awareness/knowledge of issues, resource management education.

**VARIABLES:** Attitudes towards environmental issues.

**PURPOSE:** (1) to validate the assumption that R.E. Roth's 112 environmental management concepts could be placed in one of four categories: biophysical, sociocultural, management, and change; (2) to have a panel of experts individually rate the five highest concepts from each of the four areas identified above in an attempt to generate environmental issue items for inclusion in an attitudinal assessment instrument; (3) to conduct a pilot study for the purpose of test construction and item revision for that instrument; and (4) to field test the instrument. The purpose of the study was to develop a valid and reliable instrument for measuring attitudes towards environmental issues.

**SUBJECTS:** Roth's list of environmental management concepts was submitted to a panel of experts representing 13 disciplines. The field test instrument was administered to 331 college students enrolled in two courses at The Ohio State University during the spring quarter of 1972.

**RESEARCH DESIGN:** In developing the instrument, the author adopted four major areas in environmental decision making from a definition of environmental management education proposed by W. Stapp and others: biophysical, sociocultural, management, change. Then, Roth's 112 environmental management concepts were submitted to panel of experts and a Q-sort was performed. A consensus was reached regarding the placement of the concepts in four major areas, and the selection of five concepts deemed most important to humans in each area. These 20 important concepts served as the basis for developing environmental issue items to

be included in the attitudinal assessment instrument. A panel was used to relate each item to the concept and to check each item for content validity. Each item was rated by a panel as to whether the person agreeing with that item would favor society or the individual as the determinant of the issue. A neutral position was also included. Items rated by the panel as neutral were included in the instrument but not in the scoring procedure. A five-step form of the Likert measuring technique was used as the response scale. A pilot study was conducted for the purpose of test construction and item revision. Logical and empirical approaches were used to establish some measure of construct validity. The resulting instrument was field tested.

**RESULTS:** An item analysis study yielded Kuder-Richardson estimates of reliability and item statistics which indicated that the instrument was measuring on the proposed dimensions (estimate range: 0.660 to 0.824). The following conclusions were drawn from the results of field testing the instrument: (1) Student attitudes towards determinants of environmental issues did change significantly as a result of an introductory environmental management course, and (2) there was no significant difference in attitudinal changes between the lecture-discussion methodology or the simulation study methodology utilized within the experimental group as a result of experiencing the environmental management courses. Implications and recommendations were described.

**REFERENCES:** 6 cited.

35. Bowman, Mary Lynne. "State Certification of Environmental Educators: A Survey." The Journal of Environmental Education, 1978, 9(4):51-54.

**DESCRIPTORS:** descriptive research, formal, program development, teacher training preservice.

**VARIABLES:** Opinions of state coordinators regarding certification of environmental educators.

**PURPOSE:** To survey the state coordinators' opinions toward three proposed certification requirements for environmental educators.

**SUBJECTS:** 56 coordinators of environmental education in the 50 states, District of Columbia, and American possessions were the sample group; 50 usable surveys were completed and returned.

**RESEARCH DESIGN:** Three proposed plans for certification of environmental educators composed the survey. The options presented included certification for: (1) supervisors only, (2) environmental education majors only, and (3) all education majors. These options were placed in a questionnaire designed to survey their opinions toward these options. Respondents were asked to rank the options and to comment on the options.

**RESULTS:** Data were tabulated and rank frequencies, means and standard deviations calculated. Results indicated that in general little interest was expressed in the idea of certification at all. Of the three options, 80 percent of the coordinators chose the third option, in which all education majors would be required to take a certification class. Discussion of data and respondents' comments is presented.

**REFERENCES:** 1 cited.

36. Bridgeland, William M., and Andrew J. Sofranko. "Two Assessments of Community Environmental Quality: The Mayor and the Environmental Activist." Environment and Behavior, 1978, 10(1):89-108.

**DESCRIPTORS:** attitudes, descriptive research, educational background, issue awareness/knowledge of issues, social background, values.

**VARIABLES:** Political background, attitudes.

**PURPOSE:** To examine the alternative views of majors and environmental activists relative to various aspects of the environmental quality issue.

**SUBJECTS:** 124 mayors and 124 activists in cities of 10,000 to 50,000 population were chosen from the State of Illinois. "Highly committed and informed" activists were selected with the help of The Students for Environmental Concerns, or from groups such as the Sierra Club, Izaak Walton League and Audubon Society. All but one of the mayors were 39 or over, while 11 activists were 18 or under and 10 were 58 or older. Amount of schooling was similar between both sets: between two to four years of college. Mayors resided in their community much longer, on the average, than did the activists. Mayors are predominantly male and of a managerial occupation. Activists are heavily professional (teachers) and more are female.

**RESEARCH DESIGN:** Descriptive Survey. The two groups were interviewed by phone and by mailed questionnaires. Yes/no/don't know and semantic differential scales ranking levels of concern, effectiveness and seriousness were administered. Reliability and validity tests were not reported.

**RESULTS:** The findings appear to contradict traditional assumptions. Mayors and activists were not shown to hold widely divergent views on community environmental conditions. Limitations of these results are discussed as well as implications for further research.

**REFERENCES:** 23 cited.

37. Brogdon, Richard, and Robert Rowsey. "Some Effects of an Interdisciplinary Environmental Education Effort." The Journal of Environmental Education, 1977, 8(3):26-31.

**DESCRIPTORS:** affective, attitudes, descriptive research, field trip,

formal, interdisciplinary, outdoor classroom, teacher training preservice.

**VARIABLES:** Preservice Science Orientation vs. Preservice Social Studies Orientation (Factor A); semester course was taken, i.e., Winter 1975 vs. Spring 1975 (Factor B); participation in 'Students Toward Environmental Participation' (STEP) field trips; STEP Field Trips.

**PURPOSE:** To compare the attitudes of two separate groups of science and social studies preservice students during the winter and spring quarters of 1975 toward activities that were included on a STEP (i.e., environmental/ecological) field trip.

**SUBJECTS:** The sample (N = 41), all college seniors, consisted of 20 prospective science teachers and 21 prospective social studies teachers. The winter quarter had 22 college senior participants (science: 4 males, 5 females; social studies: 6 males, 7 females). The spring quarter had 19 college senior participants (science: 4 males, 7 females; social studies: 4 males, 4 females).

**RESEARCH DESIGN:** Preservice science and social studies teachers attended a combined science and social studies methods course for one week. Four selected STEP activities designed for developing environmental awareness and sensitivity were included in an environmental/ecological field trip. A modified semantic differential instrument was developed and given to the students after the field trip to determine their attitudes toward the four activities. Instrument validity and reliability scores were not reported.

**RESULTS:** An analysis of variance was used to determine if there were significant differences between the means of the two independent factors mentioned above. An analysis of the interaction between Factors A and B was also done. Alpha level = .01. There was no significant difference in mean scores between the attitudes of prospective science and social studies teachers after participating in STEP field trip activities. However, a significant difference at .05 level was found between the winter quarter and spring quarter participants. Inferences regarding these findings were reported. Educational implications were discussed.

**REFERENCES:** 8 cited.

38. Brown, Jerry L. "Evaluating the Impact of a Professional Journal." The Journal of Environmental Education, 1976, 8(2):12-18.

**DESCRIPTORS:** cognitive, experimental research, issue awareness/knowledge of issues, population education.

**INDEPENDENT VARIABLE:** Exposure to a special issue of Social Education featuring coverage of population education.

**DEPENDENT VARIABLE:** Population education awareness level of NCSS members; their understanding of some dimensions of the content base for population education; and

degree of time devoted by NCSS members to population education.

**PURPOSE:**

To evaluate the short-term impact of an education journal (Social Education) which devoted an entire issue to the topic of population education on the knowledge and teaching practices of educators.

**SUBJECTS:** 300 randomly selected members of the National Council for the Social Studies (NCSS) comprised the overall sample. This represented about 3 percent of the NCSS membership in 1972. Sixty percent of the members of the baseline group returned questionnaires; 62 percent of the members of the comparison group returned questionnaires. Of the combined groups who returned questionnaires, 52 percent were teaching in senior high schools, 16 percent in junior high schools, 18 percent in elementary schools, junior college and college, and 14 percent were not teaching. Members of the sample were randomly divided into two groups of unequal size: a baseline group (N = 100) and a comparison group (N = 200). Demographic and teaching characteristics were similar for both group.

**RESEARCH DESIGN:** A separate sample pretest/posttest design was used. Members of the NCSS were randomly selected and assigned to one of two groups: a baseline or a comparison group. The baseline (i.e., pre-issue) group was sent a questionnaire intended to assess NCSS members' awareness of the concept of population education and the degree to which those NCSS members who were teachers actually taught about population. This baseline data collection was undertaken one month prior to the publication of a population education edition of Social Education in April, 1972. That edition contained 12 articles about population education, population dynamics, resources and teaching suggestions for the social studies. The comparison (i.e., post-issue) group was sent a post-edition questionnaire in May, 1972. Questions on this questionnaire were similar to those on the first questionnaire. A comparison of responses from the baseline and comparison groups provided an indication of the effectiveness of this special edition in meeting four specified goals. Instrument validity and reliability estimates were not reported.

**RESULTS:** Percentages were calculated for the data, and chi-square tests were used to detect differences between the two groups. For the awareness variable, post-issue group responses were significantly higher than pre-issue responses ( $X^2 = 26.99$ ,  $p < .001$ ). For the characterization variable, post-issue members were more likely to respond. They also gave a wider range of responses. Slight differences were detected between groups ( $X^2 = 8.16$ ,  $p < .10$ ). No significant differences emerged between groups on the amount of time devoted to teaching about population issues ( $X^2 = 3.80$ ,  $p < .30$ ). Forty-six percent of baseline and 48 percent of comparison group respondents taught population as an integral part of their course. Finally, no significant differences emerged between groups on the type of population topics taught. Respondents in both groups seemed to reflect a 'problem orientation.' The authors concluded that the issue did not assist in producing a consensus regarding the nature of population education

content, and did not influence time devoted to nor instructional treatment of population education.

REFERENCES: 1 cited.

39. Bruvold, William H. "Belief and Behavior as Determinants of Environmental Attitudes." Environment and Behavior, 1973, 5(2):202-218.

DESCRIPTORS: affective, attitudes, beliefs, descriptive research, resource management education.

VARIABLES: Attitudes and beliefs toward public use of reclaimed water from domestic sewage.

PURPOSE: To provide a systematic approach to the study of environmental attitudes that may stimulate more integrated research. Case study presented.

SUBJECTS: 98 adults and children, mortality of 6. Selected from an unincorporated area surrounding recreational facilities utilizing reclaimed water, in California. A two-step sampling procedure utilizing the serpentine line and random-start systematic sampling was employed.

RESEARCH DESIGN: In this descriptive study questionnaires and interviews were utilized. Interviews were conducted as follows: usage of golf course, park, and pool assessed by structured questions covering respondents' behavior; beliefs assessed by three open-ended questions; attitude toward reclaimed water assessed by use of a single Thurstone scale based upon Remmer's stems. First-order correlation coefficients were 0.11 for belief and behavior; 0.30 for behavior and attitude; and 0.28 for belief and attitude. Reliability and validity coefficients were not reported.

RESULTS: Independence of belief and behavior classifications was assessed by a chi-square contingency analysis. Analysis assessing joint relation between number of positive beliefs and behaviors with attitude made by stepwise multiple regression. Conclude that attitude toward reclaimed water in community studies was related to several belief and behavior variables.

REFERENCES: 15 cited.

40. Bryant, Covey K., and Harold R. Hungerford. "An Analysis of Strategies for Teaching Environmental Concepts and Values Clarification in Kindergarten." The Journal of Environmental Education, 1977, 9(1):44-49.

DESCRIPTORS: cognitive, elementary, experimental research, formal, program implementation, value clarification, values.

INDEPENDENT VARIABLE: Kindergarten instructional unit on three environmental problems.

**DEPENDENT VARIABLE:** Knowledge of environmental problems; value positions of kindergartners; knowledge of value position of other people.

**PURPOSE:** To gather and evaluate data related to the following research questions: (1) Will kindergarten children who have experienced the environment unit identify a significantly greater number of environmental problems than children receiving a control treatment? (2) Subsequent to the identification of environmental problems they perceive as important, will kindergarten children be able to verbally communicate personal responsibilities (value positions) relative to those problems? and (3) Subsequent to the identification of environmental problems they perceive as important, will kindergarten children be able verbally to communicate the responsibilities of other people (value positions) relative to the specific problems?

**SUBJECTS:** 34 kindergarten pupils were divided into two groups of 17. All subjects were enrolled in a Carbondale public elementary school during the 1975-76 school year.

**RESEARCH DESIGN:** An Introductory Module (IM) was presented to both groups during the first week of the experiment. Subsequently, a modified pre-post rotation design, consisting of two phases, permitted each group to act as both a control and an experimental group. During the first phase, one group received three weeks of special EE instruction consisting of three segments (i.e., experimental treatment). The second group received three weeks of typical kindergarten instructional activities. Upon completion of the first phase, the groups were rotated with respect to treatments, and the second phase of the experiment was begun.

**RESULTS:** T-tests were used in data analysis. Alpha level = .01. With the exception of one calculated t value for the second treatment group, all t values supported a positive response to the three research questions stated above. (Explanations for these results were reported by the authors.) The data indicated that kindergarten children can form concepts concerning environmental issues, and citizenship responsibility with respect to those issues. Educational implications were stated.

**REFERENCES:** None cited.

41. Buckhout, Robert. "The War on People: A Scenario for Population Control." Environment and Behavior, 1971, 3(3):322-344.

**DESCRIPTORS:** behaviors, descriptive research, economic background, ethnic group, higher education, issue awareness/knowledge of issues, population education, social background.



**VARIABLES:** Demographic background, attitudes toward population control.

**PURPOSE:** To investigate attitudes toward population growth and control.

**SUBJECTS:** 267 college students (22 years old) stratified by race: white 80.9 percent; black 9.1 percent; and chicanos 9.8 percent. Equal number of male and female participants. The median income level of students' parents was \$10,000-\$12,000. Religious preference was 26.6 percent Catholic, 3.0 percent Jewish, 34.6 percent Protestant, 5.2 percent other, and 28.8 percent no preference.

**RESEARCH DESIGN:** Questionnaire designed by peers was administered. Probability and preference scales were used with values ranging from 0-10. Questionnaires were filled out by peer interviewers of the same race, during individual interviews. Reliability and validity coefficients were not reported.

**RESULTS:** Cumulative probability graphs were constructed showing number of children desired to be 2.6. Probability of using artificial birth control was found to be high (86 percent whites; 79 percent Blacks; 84 percent Chicanos). Attitudes toward population control policy varied. Resistance to population control was found among Blacks and Chicanos who viewed it as genocide. Further research and guidelines on educating individuals were suggested.

**REFERENCES:** 22 cited.

42. Bultena, Gordon L., David L. Rogers, and Karen A. Conner. "Toward Explaining Citizens' Knowledge about a Proposed Reservoir." The Journal of Environmental Education, 1977, 9(2):24-35.

**DESCRIPTORS:** citizenship, descriptive research, issue awareness/knowledge of issues, nonformal.

**VARIABLES:** Personal characteristics (i.e., age, income, education, occupation, social status index); general attitudes (environmental commitment and perceived political efficacy); perceived impacts of reservoir (collective personal gain/loss); personal involvement; knowledge about the proposed project.

**PURPOSE:** (1) to determine citizens' knowledge about the proposed reservoir project, (2) to test the relationship between knowledge of the project and personal assessments of its desirability, and (3) to examine the importance of selected variables for differential knowledge levels.

**SUBJECTS:** 267 respondents were selected through a screening interview and randomly sampled. Persons 21 years of age or older, living in the area to be most directly affected by the proposed reservoir, were eligible respondents.

**RESEARCH DESIGN:** Respondents' knowledge about the reservoir was determined by a set of seven questions. From responses to these questions a knowledge score was calculated and assigned points. Indices were developed to measure several variables other than knowledge. Validation and reliability coefficients were not reported.

**RESULTS:** A Pearson correlation was used to measure the zero-order relationships between the first 11 variables listed above and knowledge about the reservoir ( $\alpha = .05$ ). Stepwise regression was used to determine the cumulative relationship of those variables to the knowledge variable. Eighty-one percent of respondents were aware of the project proposal; 65 percent were accurately informed of the current status of the reservoir project. Of persons aware that a reservoir had been proposed, more expressed opposition (49 percent) than support (27 percent). Some (24 percent) were undecided about its desirability of the hypothesized relationships (i.e., for first 11 variables with knowledge), and all but one were confirmed. The hypothesized relationship between anticipated personal gains and knowledge was not supported. The strongest relationship was discovered to be between personal involvement in the reservoir issue and knowledge ( $r = .59$ ). In total, the 11 independent variables accounted for 47 percent of the variance in knowledge scores.

**REFERENCES:** 25 cited.

43. Burgess, Robert L., Roger N. Clark, and John C. Hendee. "An Experimental Analysis of Anti-Litter Procedures." Journal of Applied Behavior Analysis, 1971, 4(2):71-75.

**DESCRIPTORS:** attitudes, behaviors, experimental research, knowledge, urban, values.

**INDEPENDENT VARIABLE:** Anti-litter procedures.

**DEPENDENT VARIABLE:** Percent of the total litter in theater deposited in trash cans.

**PURPOSE:** To determine if anti-litter behavior could be developed that would increase the frequency of picking up litter.

**SUBJECTS:** Children who attended the Saturday matinees in two neighborhood theaters on 14 different occasions. Average attendance was 160 children in one theater and 220 in the second theater.

**RESEARCH DESIGN:** A pre-experimental design was used. Six different anti-litter procedures were used to encourage individuals in attendance at the theater to pick up litter and deposit it properly. These were: providing litterbags, providing litterbags plus instructions in their use, providing extra trash cans, showing an anti-litter film, and providing incentives. The experimental conditions were imposed on 14 different occasions, alternating treatments with days of no treatment to establish a trash baseline. The percent of the total litter returned by the audience after each of these treatments was measured. No reliability measures were reported.

**RESULTS:** In the absence of any anti-litter procedures only 17.5 percent of the total litter was properly disposed of. The anti-littering film increased the returned litter to 23 percent. Litter bags alone increased that to 31 percent. Litter bags plus instructions resulted in a 57 percent return of litter. (No levels of significance were reported by the authors.) The observations suggest that the level of littering might be reduced if immediate positive consequences contingent on anti-litter behavior could be scheduled.

**REFERENCES:** 3 cited.

44. Burrus-Bammel, Lei Lane. "Information's Effect on Attitude: A Longitudinal Study." The Journal of Environmental Education, 1978, 9(4):41-50. (This paper also appeared, in slightly different form, in Current Issues III, 1977, 197-210. ED 150 018.)

**DESCRIPTORS:** affective, attitudes, ecology education, knowledge, nonformal, outdoor classroom, outdoor education, pre-experimental.

**INDEPENDENT VARIABLE:** Week-long instruction at a forest industry youth camp.

**DEPENDENT VARIABLE:** Attitude toward and knowledge of forest ecology; the relationship between attitude and knowledge.

**PURPOSE:** (1) measure the effect of instruction at a forest industry youth camp on the participants' attitudes and knowledge of forest ecology, and (2) examine the degree to which these participants retained these attitudes and knowledge over time.

**SUBJECTS:** The sample populations consisted of four groups: two experimental and two control. The experimental groups were selected on the basis of recommendations to the West Virginia Forestry Industry Camp during 1975 and 1976. In the first year, 29 males in the age range of 16 to 20 were used. The second year the population consisted of 29 male and 7 females in the same age range. Equivalent control groups were designed (N = 23 and N = 29, respectively) from persons who applied to the camp but were not accepted for participation in those years. Subjects were predominantly rural residents from West Virginia.

**RESEARCH DESIGN:** A Likert-type attitude scale developed from the literature and an objective knowledge test were given to each experimental group in a pretest-posttest format. The same tests were given in a posttest only format to the control groups. The treatment consisted of lectures and small group instruction in ecology of the forest. Instruction was designed to reflect the forest industry's perception of the forest. This treatment process was repeated for each year's experimental group. Then, at a six-month interval (1976 group) and a one and one-half year interval (1975 group) following treatment both instruments were sent to experimental and control groups.

**RESULTS:** T-test comparisons were made between the experimental and control group posttest scores and within individual experimental groups from pre to post to delayed posttest on both dependent variables. For both years the pretest and posttest scores were significantly different for the experimental groups at the .01 level. In all cases the control groups' scores were significantly lower than the experimental groups' scores at the .01 level. In addition, the experimental groups for both years scored significantly higher on the retention measure than the control groups. Linear regression with ANOV was used to determine correlations. No significant relationship was found between attitudes and knowledge.

**REFERENCES:** 25 cited.

45. Burrus-Bammel, Lei Lane. "Measuring Attitudes toward Environmental Issues: The Semantic Differential Technique. The Case of Hunting." Current Issues VI, 1980, 265-280. ED 197 947.

**DESCRIPTORS:** attitudes, beliefs, case studies, descriptive research, instrument development.

**VARIABLES:** Attitudes, beliefs, environmental attitudes. The efficiency of the semantic differential in studies determining environmental attitude.

**PURPOSE:** To determine whether or not the semantic differential is useful for environmental attitude studies, and to determine if hunters', nonhunters', and anti-hunters' responses to a possible object of a hunt and the activity of hunting vary.

**SUBJECTS:** 134 West Virginia University students (hunters, N = 49; nonhunters, N = 47; anti-hunters, N = 38).

**RESEARCH DESIGN:** A 100-item semantic differential questionnaire was administered. Standardized techniques were utilized to determine reliability and validity. Profile analysis was used to manipulate data, chi-square frequency was used to determine group differences on polar word pairs and concepts and the significant indication, if any, of varying attitudes. Plotted average, evaluative, potency, and activity values for each group yield a semantic space model. Chi-square, again, tests for significance between group differences. A linear distance formula can be computed by inserting the three factor values to establish between group and between concept differences.

**RESULTS:** The semantic differential can be useful in a study of this type. All three groups had similar overall responses to "deer" although there was significant variance for a number of hypothetical reasons.

**REFERENCES:** 21 cited.

46. Burrus-Bammel, Lei Lane, and Marlene Hanson. "Puppetry and Environmental Education: A Retention Study." Current Issues IV, 1978, 169-174. ED 167 407.

**DESCRIPTORS:** affective, attitudes, cognitive, elementary, experimental research, knowledge.

**INDEPENDENT VARIABLE:** The teaching method (puppetry for experimental group and traditional lecture for control group).

**DEPENDENT VARIABLE:** Knowledge and attitude.

**PURPOSE:** To determine whether or not puppetry is an effective way to communicate environmental messages.

**SUBJECTS:** 27 fourth-grade students from Morgantown, West Virginia were chosen for the research, 13 in the control group and 14 in the experimental group.

**RESEARCH DESIGN:** A pretest-posttest control group design with a retention test three weeks later was the experimental procedure employed. Knowledge questions were of a true-false and multiple-choice nature. Pictorial attitude scores were used for the attitude questions.

**RESULTS:** Knowledge data were analyzed with a paired "t" and attitude scales by chi-square. The experimental group scored significantly higher (.05) on the knowledge posttest. The retention test displayed no meaningful difference. Attitude scores of both groups showed a significant difference from the pretest, however.

**For further study:** The involvement of larger numbers, variety of grade levels and ages, extended retention time, increased duration of the presentation, including more than one puppet session per unit of environmental material.

**REFERENCES:** 17 cited.

47. Burrus-Bammel, Lei Lane, William E. Kidd, and Gene Bammel. "Expected Consequences, Enjoyability, and Other Evaluation Scales." Current Issues VI, 1980, 295-310. ED 197 407.

**DESCRIPTORS:** descriptive research, ecology education, nonformal, outdoor classroom, program implementation, resource management education.

**INDEPENDENT VARIABLE:** Attitudes, knowledge, actual consequences.

**DEPENDENT VARIABLE:** Enjoyability, expected consequences, organization.

**PURPOSE:** To determine the relationships and correlations between the independent and dependent variables and to determine the usefulness of the profile data.

**SUBJECTS:** The staff and 36 participants (16-20 years of age, predominantly from rural high schools) of the West Virginia Forest Industries Camp.

**RESEARCH DESIGN:** A written objective test was administered at the beginning of the week in order to determine attitudes, conceptual knowledge, factual knowledge and expectations. A Likert-type instrument was used to determine attitude (numerical values assigned to response), and a true/false multiple-choice test was administered to evaluate knowledge. The reliability coefficient was .84 for the Likert test and .90 for the knowledge test. Validity, established by a panel of three experts, was .92. Two enjoyability measures were calculated (Enjoyability I--"How enjoyable was camp experience, 0 (low) - 100 (high)?" and Enjoyability II--averaging responses to specific activities). Expectations and actual happenings were found by averaging responses to 23 questions before and after the week was over. Organization was determined by rating (1 (low) - 5 (high)) several points (one general, four specific) of the camp.

**RESULTS:** Percentages transformed to arcsin values, "t" test, standard deviation. The mean, F-ratios, and linear regression with ANOV were used to determine correlations between the variables. Each specific variable was analyzed in a positive way and the tests were found to be useful.

**REFERENCES:** 7 cited.

48. Buttell, Frederick H. "The Environmental Movement: Consensus, Conflict, and Change." The Journal of Environmental Education, 1975, 7(1):53-63.

**DESCRIPTORS:** beliefs, descriptive research, educational background, hypothesis generation.

**VARIABLES:** Public environmental concern; respondents' educational achievement level and the size of place of residence.

**PURPOSE:** To identify stability and change in the social basis of support for the environmental movement during its growth and decline as a major issue among Wisconsin's citizens. It was hypothesized that overall support for the environmental movement has declined since 1970.

**SUBJECTS:** Wisconsin residents, 21 years of age or older, were chosen as respondents. Samples of respondents were drawn using multi-stage probability sampling technique. Data were collected by the Wisconsin Survey Research Laboratory during the summers of 1968, 1970 and 1972. The numbers of adults sampled were: 573 in 1968, 619 in 1970, and 841 in 1972. Housing units on military reservations and adults in institutions or group quarters were not included in the sample.

**RESEARCH DESIGN:** Three statewide surveys of Wisconsin residents were taken. Survey questions used to measure the variables were identically constructed in the 1968 and 1970 surveys, while the 1972 survey questions differed slightly and therefore required a different operation. The two survey questions included in the 1968 and 1970 surveys asked respondents to identify the one most important problem which faces the State of Wisconsin, and to identify other major problems

in the state. Respondents were then dichotomized according to whether environmental problems were listed as either the first or second most important problem. The 1972 survey included two questions which asked respondents what they personally felt were the most important problems which the national government in Washington should try to remedy, and what were the most important problems which the state government in Madison should remedy. Respondents were dichotomized according to whether environmental problems were mentioned in the responses. Instrument validity and reliability estimates were not reported.

**RESULTS:** 1968 findings show the greatest relationship between education and environmental concern. 4.8 percent of grade school educated respondents expressed concerns for environmental matters. Yet, college graduates were much more likely (34 percent) than other levels of educational groups to feel that environmental problems were worthy of government action. Also, rural nonfarm persons were much more likely (22.9 percent) to be concerned with environmental problems than rural farm residents (9.4 percent). The EE movement was reported as not based in large urban areas in 1968. In 1970, Wisconsin residents, were generally more than twice as likely (40.4 vs. 16.8 percent) to be concerned with environmental problems. Persons with high school educations were just as likely to be concerned about environmental problems as college graduates, but the grade school educated group remained relatively unchanged from 1968. As of 1970, the environmental movement had spread to relatively large urban areas, hence environmental concern among residents of large cities exceeded concern among residents of small cities and towns (44.6 vs. 39.4 percent). Major differences between rural nonfarm and rural farm residents persisted in 1970. The 1972 data indicate that the college-educated group was much more likely (27.5 percent) to be environmentally concerned than the other educational groups. Residents of large cities were less concerned than residents at small cities (11.9 vs. 17.3 percent). Rural nonfarm families continued to be more concerned than rural farm families. A further discussion of the findings was reported.

**REFERENCES:** 23 cited.

49. Buttel, Fredrick H., and William L. Flinn. "Conceptions of Rural Life and Environmental Concern." Rural Sociology, 1977, 42:544-555.

**DESCRIPTORS:** attitudes, beliefs, descriptive research, economic background, hypothesis generation, inquiry, population education, values.

**VARIABLES:** Environmental concern, age, education, political liberalism, size of place of residence.

**PURPOSE:** Hypothesis tested: Ruralism (anti-urban philosophy) is more strongly associated with environmental concern than is agrarianism (yearning for self-sufficiency, idea that moral virtues are attached to farming).

**SUBJECTS:** 548 adults (21 years of age and older) from Wisconsin were picked using multi-stage probability sampling technique.

**RESEARCH DESIGN:** Personal interviews were carried out using six agrarianism and ruralism statements. Respondents were asked to agree or disagree with each statement using 1-5 point, Likert-type format. The same Likert-type index was used when measuring environmental awareness and political liberalism. Education, age, and size of place of residence were determined through direct questioning. Product-moment correlation coefficients were calculated for interrelationships of all variables.

**RESULTS:** Both agrarianism and ruralism exhibit only small negative correlations ( $r = -.056$  and  $-.045$  respectively) with environmental problems. However, data from the upper-middle class of the population were more in accordance with the hypothesis to be tested; agrarianism correlation with environmental problems  $r = .174$ , while ruralism's correlation was even more significant at  $r = .218$ .

**REFERENCES:** 33 cited.

50. Duttel, Frederick H., and William L. Flinn. "The Politics of Environmental Concern: The Impacts of Party Identification and Political Ideology on Environmental Attitudes." Environment and Behavior, 1978, 10(1):17-36.

**DESCRIPTORS:** attitudes, descriptive research, economic background, educational background, hypothesis generation, social background, social science education.

**INDEPENDENT VARIABLE:** Party identification and political ideology.

**DEPENDENT VARIABLE:** Environmental concern.

**PURPOSE:** To examine the issue of the alignment of political party identification and environmental concern among mass publics and to consider the liberal-conservative attitudes of respondents which are not tapped by political party identification and how these sociopolitical ideologies relate to environmental attitudes.

**SUBJECTS:** The data for this study were collected by the Wisconsin Survey Research Laboratory in a statewide survey during the fall of 1974. In this sample, only adults 18 years of age and older were chosen as respondents. Housing units on military reservations and adults in institutions or group quarters were not included. There were 548 respondents in the total sample.

**RESEARCH DESIGN:** Descriptive Correlational Study. This study was based on the data of a past survey. It examines relationships between selected independent variables and environmental concerns, between Republican and Democratic Party preference and environmental concern among selected educational variables, between anti-laissez-faire liberalism and environmental concern among educational categories and standardized regression coefficients for the regression of environmental



concern on selected independent variables, among the total sample and low education and high education subsamples. The operational definitions of all variables in this study are detailed in an Appendix. Validation and reliability coefficients are not reported.

**RESULTS:** A zero-order correlation coefficient and third-order partial correlation coefficient were used. Significance at the .001 level or greater was found. The study found no major relationship between party preference and environmental concern and what relationships that do exist are primarily explained by political ideology. Two measures of sociopolitical liberalism are related to environmental concern. The multivariate analysis clearly emphasized the importance of education as a predictor of concern with environmental degradation. Sociopolitical attitudes are clearly most efficacious as predictors of environmental concern among the college-educated stratum.

**REFERENCES:** 35 cited.

51. Buttel, Frederick H., and William L. Flinn. "Social Class and Mass Environmental Beliefs: A Reconsideration." Environment and Behavior, 1978, 10(3):433-450.

**DESCRIPTORS:** attitudes, descriptive research, economic background, educational background, social background, values.

**INDEPENDENT VARIABLE:** Education-income-occupation-age and place of residence (social class).

**DEPENDENT VARIABLE:** Awareness of environmental problems and support for environmental reform.

**PURPOSE:** To re-examine the relationships between social class and mass environmental beliefs.

**SUBJECTS:** Respondents were chosen by use of randomized selection tables as part of a statewide survey undertaken by the Wisconsin Survey Research Laboratory during the fall of 1974. Only adults 18 years of age or older were chosen as respondents. Housing units on military reservations and adults in institutions or group quarters were not included. 548 respondents were in the total sample. A multistage probability sampling technique was employed.

**RESEARCH DESIGN:** Descriptive correlational study. This study was based on the data of a past survey. Awareness of environmental problems and support for environmental reform were operationalized as summated Likert scales. Constituent items of each dependent variable are listed. The scale on awareness had a Cronbach's alpha coefficient of .806. Support for environment reform exhibited an alpha coefficient of .768. A quartimax-rotated factor analysis between two dependent variables showed a zero-order correlation of .247 in the total sample. Independent variable categories were determined through direct questions.

**RESULTS:** The study utilizes multiple classification analysis. An F-test established the eta coefficient as statistically significant at the .05 level or beyond. The study found the relationship between

social class and mass environmental beliefs to be less pervasive than the bulk of the relevant literature would suggest. The combined net effects of the three major indicators of social class-education-income and occupation are "quite meager." Age and place of residence variables were found to be better predictors of both awareness of environmental problems and support for environmental reform. Implications of the research are discussed as they relate to the sociology of environmental problems theory.

REFERENCES: 42 cited.

52. Buttel, Frederick H., and William L. Flinn. "The Structure of Support for the Environmental Movement, 1968-1970." Rural Sociology, 1974, 39(1):56-69.

DESCRIPTORS: beliefs, descriptive research, economic background, educational background, issue awareness/knowledge of issues, rural, urban, values.

VARIABLES: Pollution concern, concern with the preservation of natural habitats, educational achievement, total family income, occupation, size of residence, rural farm, rural nonfarm, urban, and political affiliation.

PURPOSE: To determine the educational, income, occupational and political correlates of environmental concern and how these correlates may have changed over time.

SUBJECTS: Original sample size was not reported. The sample size was different for each variable due to missing data in certain areas by some respondents. A multistage probability sampling technique was employed. All subjects were adults 21 years of age or older, and from Wisconsin.

RESEARCH DESIGN: The survey was descriptive research. Respondents were asked (interview): "As you see it, what is the one most important problem which faces the state of Wisconsin today?" This survey was conducted in three statewide surveys during the summers of 1968, 1969 and 1970 (approximately 600 statewide surveys each year).

RESULTS: There was an increasing expression in the period 1968-1970 that pollution was an important problem but natural resource preservation as a major problem remained a distinct minority and showed no appreciable change. Education, income, occupation, farm residence, and nonfarm residence (both rural and urban) were related to environmental concern while political affiliation was not, except when education was held constant. Class and status interests are suggested to be important determinants of environmental concern.

REFERENCES: 27 cited.

53. Buttel, Frederick H., and Donald E. Johnson. "Dimensions of Environmental Concern: Factor Structure, Correlates, and Implications for Research." The Journal of Environmental Education, 1977, 9(2):49-64.

**DESCRIPTORS:** affective, beliefs, descriptive research, nonformal.

**VARIABLES:** Support for economic growth; welfare state liberalism-conservatism; community structure; political liberalism-conservatism; Democratic Party identification; respondent's education attainment level; business employment; environmental concerns (i.e., amelioration or social redirection).

**PURPOSE:** To investigate the multi-dimensionality of environmental beliefs and resulting implications for research.

**SUBJECTS:** The respondents were 231 community elites in 32 small and medium-sized Wisconsin communities. They were chosen by a combination of "positional" and "reputational" methods of selecting community leadership. The 10 counties comprising the study area ranged in median family income (in 1970) from \$7,199 to \$9,924.

**RESEARCH DESIGN:** Five Likert-type items were used for the attitudinal measures of environmental concerns: ameliorative versus societal redirective modes of environmental reforms. For the remaining variables, data were obtained by the use of: three-item attitudinal indexes, direct questions, and Census Bureau data.

**RESULTS:** Results of a factor analysis (with a quartermax rotation) indicated that when the ameliorative and societal redirective environmental concerns were summed into two indices they were correlated at a low level ( $r = .267$ ). The seven independent variables used in this study were all differentially correlated with the two dimensions of environmental concern. The authors concluded that the amelioration-versus-redirection distinction was only an issue among the middle class. Weaknesses of the present research, a partial replication and elaboration, as well as implications for future research, were stated.

**REFERENCES:** 29 cited.

54. Calvin, James S., John A. Dearing, and Mary Ellen Curtin. "An Attempt at Assessing Preferences for Natural Landscapes." Environment and Behavior, 1972, 4(4):447-470.

**DESCRIPTORS:** affective, attitudes, descriptive research, higher education, hypothesis generation, preferences.

**VARIABLES:** Environmental perceptions, psychological characteristics and perceptions.

**PURPOSE:** To examine ways of describing human experience and reaction to the natural environment.

**SUBJECTS:** 139 adult introductory psychology students, randomly divided into two groups of 70 and 69 persons. There was a mixture of male and female students.

**RESEARCH DESIGN:** Students were shown a set of 15 scenes. Each scene was viewed for three minutes and students were asked to judge each scene on 21 semantic differential scales. Mean scale values were calculated for each scene and scale. Between scale correlation coefficients were calculated and the correlation matrix was reproduced in the text (for Group 1 only). A principal components factor analysis was used on the correlation matrix, and the resulting factor structure was rotated by using the varimax procedure. Reliability and validity coefficients were not reported.

**RESULTS:** Consistency among the two groups was striking. Three factors emerged: natural scenic beauty (62 percent of total variation among scenes--13.117 variance); natural force (24 percent of the variance between scenes--5.139 variance); and a third possible factor, natural starkness (5 percent of the variance between scenes--1.256 variance). Analyses were based on subjective impressions. Before concluding that judgments are describable in three dimensions more research to repeat variations of this investigation is needed.

**REFERENCES:** 23 cited.

55. Carlson, John E., and David Baumgartner. "The Effects of Natural Resource Camps on Youths." The Journal of Environmental Education, 1974, 5(3):1-7.

**DESCRIPTORS:** attitudes, issue awareness/knowledge of issues, nonformal, outdoor classroom, outdoor education, pre-experimental research, program evaluation, resource management education.

**INDEPENDENT VARIABLE:** One week of instruction on natural resources.

**DEPENDENT VARIABLE:** Attitudes toward natural resource management.

**PURPOSE:** To test the effectiveness of a natural resource camp experience in changing attitudes toward natural resource management.

**SUBJECTS:** 130 boys between 13 and 19 years of age attending either the Inland Empire Natural Resources Youth Camp held near Plummer, Idaho, or the Resource Management Camp of Youth of Western Washington held near Aracortes, Washington, during the spring of 1970. The boys were selected on the basis of demonstrated leadership in school or community activities and an interest in natural resources.

**RESEARCH DESIGN:** A three-part questionnaire was administered to those attending the camp both at the beginning and end of their stay. Part A consisted of a series of six statements which asked the types of activities the respondents would allow on land under multiple-use. In addition, they were asked to determine how they would define the concept of multiple-use management. Part B consisted of 15 semantic differential items regarding attitudes towards various dimensions of multiple-use and other aspects of natural resources. Part C consisted of socioeconomic background questions. Instrument validity and reliability scores were not reported.

**RESULTS:** For the attitudinal analysis, Kruskal's Koppa was used to analyze the strength of the relationship between the independent and dependent variables. A dependent t-test was used to analyze the pre and posttest scores. The results of the definition of multiple-use management focused upon lending equal consideration to all uses of a given area at either a particular time (28 percent) or at the same time (20 percent). Pretest scored activities most commonly alluded to included: (1) for protected watersheds, foot traffic and removal of diseased and fire-killed lumber, (2) for wildlife management, the hunting of males of either large wild animals or pests/varmints, (3) for forest recreation, timber production on land unsuited for recreational use, and vice versa, and common timber/recreational use, (4) for timber harvestry, cutting of diseased, fire-killed or overmature trees, and (5) for range management, providing forage for wild animals and replanting areas used by ranchers. In general, posttest attitude shifts were significant at or beyond the .05 probability level; were more favorable toward all aspects of multiple use; and for most aspects became more homogeneous. Effects of occupation level and residence on attitudes were also analyzed and reported.

**REFERENCES:** 2 cited.

56. Carp, Frances M., Rick T. Zawadski, and Hossein Shokrkon. "Dimensions of Urban Environmental Quality." Environment and Behavior, 1976, 8(2):239-264.

**DESCRIPTORS:** attitudes, descriptive research, hypothesis generation, instrument development, preferences, urban.

**VARIABLES:** Noise, environmental quality, neighbors, safety, annoyances, mobility.

**PURPOSE:** To define environmental quality and develop an instrument for its measurement.

**SUBJECTS:** 2,541 subjects 18 years or older who lived within one mile of a BART structure (San Francisco Bay Area) were randomly sampled.

**RESEARCH DESIGN:** A 100-item questionnaire was individually administered to the respondents in their own homes. Interviewers read each item aloud. Respondents were asked to evaluate their own residential area in terms of the 100 items. Reliability and validity coefficients were not reported.

**RESULTS:** A principal components factor analysis was performed on the correlation matrix. Factors were rotated orthogonally, using Kaiser's varimax method; 20 factors emerged. Five of the dimensions concerned noise (15.2 percent of the variance). Aesthetic quality of the environment emerged in another five factors (14.8 percent of the variance). A third cluster of dimensions related to neighbors (10 percent of the variance). Safety (7.7 percent of the variance), mobility (3.5 percent of the variance), and annoyances (5.1 percent of

the variance) also emerged as factor clusters. Implications for use by planners were discussed.

REFERENCES: 35 cited.

57. Champeau, Randall, Michael Gross, and Richard Wilke. "An Assessment of Teachers' Understanding the Use of 'Goals for Curriculum Development in Environmental Education'." Current Issues VI, 1980, 218-226. ED 197 947.

DESCRIPTORS: descriptive research, formal, hypotheses generation, nonformal, teacher training inservice.

INDEPENDENT VARIABLE: Grade level, area of instruction.

DEPENDENT VARIABLE: Teacher comprehension of the goals, teacher attitude toward the goals, teacher ability to accomplish the goals.

PURPOSE: Assessment of teacher comprehension of "Goals for Curriculum Development in Environmental Education" and assessment of whether teachers felt schools should be responsible for the goals. Also, assessed was whether teachers felt they had the ability to accomplish the goals.

SUBJECTS: 300 K-12 teachers were randomly chosen (random numbers table) from 3,100 teachers in 24 public and private school districts located in CESA 7 (serves 8 central Wisconsin counties).

RESEARCH DESIGN: A 30-item Likert-type instrument was used to gather information. Of the 300 teachers surveyed, 129 usable questionnaires were returned (43 percent). Frequency distributions were calculated for each item, and chi-square statistic was used to compare grade level and area of instruction to responses on the assessment items. Mean response for grade level and area of instruction was also calculated for each item.

RESULTS: Most teachers comprehend the goals and feel they are important. Neutral or negative answers showed a teacher tendency of lacking the ability to help students in achieving the goals. They felt teacher workshops were necessary.

REFERENCES: 5 cited.

58. Chapman, Clyde, and Todd R. Risley. "Anti-Litter Procedures in an Urban High-Density Area." Journal of Applied Behavior Analysis, 1974, 7(3):377-383.

DESCRIPTORS: behaviors, economic background, ethnic group, experimental research, social background, urban.

INDEPENDENT VARIABLE: Anti-litter procedures.

DEPENDENT VARIABLE: Amount of litter on randomly selected yards.

**PURPOSE:** To see repeated measures of the amount of litter on randomly selected yards in an urban low-income housing project; to evaluate the effectiveness of a series of anti-litter procedures directed at children residing in the project.

**SUBJECTS:** 132 children from a low-income housing project located in an urban high-density area of Kansas City. All subjects were black and ranged in age from 4-13 years. Children self-selected themselves as subjects by volunteering to pick up litter. The test yards in the neighborhood were randomly selected.

**RESEARCH DESIGN:** A pre-experimental design was employed. Experimental conditions were imposed over a five-month period involving three basic treatments to get children to pick up litter from designated yards. They were: (1) verbal appeal, (2) payment for volume, and (3) payment for clean yards. Among these three experimental conditions were interspersed times when no payment was involved in order to establish a baseline. Data were collected on both the volume of litter turned in by children and on the presence of litter in the experimental yards. Reliability of the sampling procedure had a mean of 80 percent for the entire study.

**RESULTS:** Of the three experimental conditions (verbal appeal, payment for volume, and payment for clean yards), all but the first were effective in reducing the amount of litter present in sample yards. Payment for clean yards was shown to be the most effective procedure. Under no conditions did the level of cleanliness remain stable after payment ceased. No levels of significance were reported by the author. The author suggests that with yard assignments children can be employed to maintain a relatively clean urban neighborhood for a total cost of less than one dollar per month per unit.

**REFERENCES:** 6 cited.

59. Childress, Ronald B. "Public School Environmental Education Curricula: A National Profile." The Journal of Environmental Education, 1978, 9(3):2-11.

**DESCRIPTORS:** descriptive research, elementary, formal, middle school, program evaluation, secondary.

**VARIABLES:** Grade level involvement; program/project justification; program/project objective; personnel involved in content selection; factors influencing content selection; curriculum organization; source of content and subject matter; sources of instructional materials; instructional strategies; staff utilization/organization; curriculum development constraints.

**PURPOSE:** To identify, describe and analyze general characteristics of a selected national sample of public school environmental education curricula at both elementary and secondary levels.

**SUBJECTS:** 536 directors or coordinators of public school environmental education programs or projects were identified from a national listing of programs. Of the total number of questionnaires administered, 302 were returned as usable responses.

**RESEARCH DESIGN:** Results of a literature search, including an ERIC search, were used to develop a draft survey instrument using a questionnaire format. The instrument was validated by a national panel of 11 experts in the field of environmental education and was then sent to the sample, using a direct mailing system.

**RESULTS:** Data from completed questionnaires were tallied and percentages calculated. Analyses of the data indicated that grade level programs and projects were greatest at grades five, six, ten, eleven and twelve, and lowest in kindergarten. Major influences in a majority of programs and projects were "Ecological," "Educational," and "Conservationist" justifications. Objectives focused on helping students become knowledgeable about their environment and its associated problems, and developing an appreciation of environmental resources, were considered of more importance in a majority of programs and projects than were those objectives focused on helping students actually solve environmental problems and develop problem-solving skills. Additional findings were discussed.

**REFERENCES:** 3 cited.

60. Christenson, James A. "Individual Versus Public Rights: Implications of Support for Landuse Planning and Control." The Journal of Environmental Education, 1978, 9(3):50-57.

**DESCRIPTORS:** affective, attitudes, behaviors, descriptive research, economic background, educational background, ethnic group, issue awareness/knowledge of issues, rural.

**VARIABLES:** Support for individual or public property rights; level of educational attainment; knowledge about landuse; various background, political and situation variables.

**PURPOSE:** To empirically test the impact of various demographic, political, and situational variables on the structure of support regarding landuse planning and zoning issues (individual or public property rights perspective).

**SUBJECTS:** In spring, 1975, mail questionnaires were sent to 5,082 heads of households drawn from telephone listings in North Carolina. Due to attrition, 587 households were deleted. Of the remaining 4,502 potential residents, 3,054 returned questionnaire (68 percent response rate).

**RESEARCH DESIGN:** The questionnaire was composed of two questions selected to assess support for landuse planning (a public rights perspective), and two questions selected to assess opposition to zoning (an individual rights perspective). No validity or reliability estimates were stated.



**RESULTS:** Data regarding demographic, situation and political variables were analyzed using Gamma Coefficients for ordinal level variables and Cramer's V for nominal level variables. Multivariate regression analyses were also completed to determine the relative importance of the variables. Support for landuse planning and zoning (a public rights perspective) is found among the educated, the more well-to-do, the urban, the politically liberal, and the small or nonland owners. Opposition comes from large landowners, especially farmers, the rural, and those with lower levels of income and education. The findings also indicate that (self-reported) knowledge had impact on favorableness of response toward the issue, but that participation at landuse meetings had little impact.

**REFERENCES:** 18 cited.

61. Clark, Roger N., Robert L. Burgess, and John C. Hendee. "The Development of Anti-Litter Behavior In A Forest Campground." Journal of Applied Behavior Analysis, 1972, 5(1):1-5.

**DESCRIPTORS:** affective, behaviors, citizenship education, elementary, environmental action skills, middle school, pre-experimental research.

**INDEPENDENT VARIABLE:** Incentive procedure designed to induce litter collection.

**DEPENDENT VARIABLE:** Number of pieces of planted litter collected by children.

**PURPOSE:** To evaluate the effectiveness of an incentive procedure designed to induce litter collection.

**SUBJECTS:** 26 children (6-14 years of age) selected from seven families camping in Wenatchee National Forest.

**RESEARCH DESIGN:** The pre-experimental design included baseline measures of amount of litter under normal conditions and the amount of litter when incentives were provided for picking up litter. Data were gathered on two consecutive weekends. Four types of litter were planted to provide constant level on both weekends and to provide data on differences in the pickup of various types of litter.

**RESULTS:** The incentive procedure resulted in a decline in all four types of litter planted in the campground. No alpha levels were given. The author states the study suggests that scheduling positive consequences contingent on litter collection may be effective in combating the litter problem of environmental areas. Recommendations were given for further research concerning the age group upon which such programs might be effectively focused, what types of incentives should be offered, how can the procedure be most effectively implemented and what are the costs and effectiveness of this program as compared to others.

**REFERENCES:** 12 cited.

62. Clark, Roger N., John C. Hendee, and Robert L. Burgess. "The Experimental Control of Littering." The Journal of Environmental Education, 1972, 4(2):22-28.

DESCRIPTORS: behaviors, experimental research.

INDEPENDENT VARIABLE: Littering control methods.

DEPENDENT VARIABLE: Littering behavior.

PURPOSE: To study the effects of various methods on the control of littering. (Reviewer's Note: This article described four different experiments. They are reported separately.)

#### EXPERIMENT 1--

SUBJECTS: An unspecified number of children attending Saturday movie matinees in two theaters.

RESEARCH DESIGN: The experiment covered 14 weeks. Littering was measured under baseline conditions and under the following experimental conditions: (1) additional conspicuously placed trash cans, (2) an anti-litter cartoon shown prior to the main feature, (3) litter bags handed out, (4) litter bags combined with firm instructions to use them, (5) a reward of 10 cents for every full litter bag, and (6) a reward of a free ticket to a special movie for every full bag. In addition, littering was measured at the free special movie with no experimental procedures being used. Only children who earned the free tickets were allowed to attend the movie.

RESULTS: Data were presented in graph and narrative forms, based on the percent of litter returned. The first two treatments produced no appreciable effect over the baseline figures of 16 and 19 percent litter returned at the two theaters. Treatments 3-6 produced return rates of 31, 57, 94 and 95 percent, respectively. At the special movie showing, the return rate was 40 percent.

#### EXPERIMENT 2--

SUBJECTS: An unspecified number of family campers at the Lake Kachess Forest Campground, Wenatchee National Forest, Washington.

RESEARCH DESIGN: Two classes of litter were measured over a two-week period: planted, to ensure a constant level and to determine which types of litter are likely to be picked up, and natural litter left by campers. During the first week, no anti-litter incentives were offered; this established the baseline data. During the second week, the children were offered a variety of rewards, including a Smokey Bear shoulder patch, a junior Forest Ranger patch, gum, and others in return for picking up litter.

RESULTS: Data were presented in graph and narrative forms, based on the number of litter pieces left on the ground and the types of litter

pieces left. During the baseline week, the total planted pieces remaining on the ground dropped from 160 on Thursday to 56 on Monday morning. During the incentive week, the number of planted litter pieces dropped from 160 to 6. During the baseline week, the most frequently picked up planted litter by type were deposit bottles, followed by nondeposit bottles, bags, and nondeposit cans. Natural litter increased throughout the baseline week, and had a general increase with a temporary drop during the incentive week.

#### EXPERIMENT 3--

**SUBJECTS:** An unspecified number of visitors using a 2-1/3 mile long special interest trail in Mt. Ranier National Park.

**RESEARCH DESIGN:** Litter levels along the trail were monitored before, during and after the treatment period. Children at the trailhead were offered small unspecified incentives to pick up litter.

**RESULTS:** Data were presented in narrative form based on the percent litter reduction. With the incentive system, litter was reduced 80 percent. Without it, litter increased appreciably.

#### EXPERIMENT 4--

**SUBJECTS:** An unspecified number of campers in the Taneum Canyon dispersed car camping area, Wenatchee National Forest.

**RESEARCH DESIGN:** Children campers were offered unspecified incentives to pick up litter. No specific monitoring of the litter levels was reported.

**RESULTS:** Data were presented in narrative form. A 75 percent reduction in litter was observed.

In all experiments, neither reliability, validity, nor level of significance were reported.

The authors concluded that traditional methods of litter control such as litter bags, fines, and appeals to citizenship are grossly ineffective compared to the incentive system. They noted in Experiment 2 that the cost of the incentives to reduce litter was \$3.00 and two manhours compared to 16-20 manhours to have picked up an equivalent amount of litter. They suggest that research be done to investigate using the incentive system for other ecological problems.

**REFERENCES:** 17 cited.

63. Clausing, Jane. "The Ecological Message of the Outdoor Magazines." The Journal of Environmental Education, 1971, 2(4):10-12.

**DESCRIPTORS:** descriptive research, preferences, values.

**VARIABLES:** Environmental information, recreational preferences, hunting and fishing values.

**PURPOSE:** Rated changes in the variables listed below in three outdoor magazines (Field and Stream, Outdoor Life, Sports Afield) from 1966-1968.

**SUBJECTS:** 201 articles of length greater than one page were chosen at random from 38 issues. These issues represented one-third of all issues published by the three magazines during the period covered. The method of issue selection was not reported.

**RESEARCH DESIGN:** For the variable environmental information, the following pairs of opposing categories were established: universal-terrestrial, urban-rural, and comprehensive-fish and game. For the variable recreational preferences, the following pairs of opposing categories were established: primitive-mechanized, natural-managed, and appreciative-consumptive. For the variable hunting and fishing values, the following categories were established: man-earth, recreation, sportsmanship/skill, trophy/competition, and meat. Articles were divided into paragraphs, and each paragraph was then rated and placed into appropriate categories. For the first two variables, the method of rating (Likert, forced-choice, etc.) for the opposing categories was not reported. Neither reliability nor validity were reported.

**RESULTS:** No statistical information was reported. From 1966-1968, no change in the amount or breadth of environmental information covered by the magazines was found. No change in hunting and fishing values was found. There was a shift in recreation preferences from natural to managed.

**REFERENCES:** 1 cited.

64. Cohen, Martin J., and Joseph Petrillo. "Environment Study with Buckminster Fuller's Geometry." Science Education, 1972, 56(4):519-527.

**DESCRIPTORS:** elementary, interdisciplinary, mathematics education, program implementation, teacher training inservice.

**VARIABLES:** Relevancy of mathematics and geometry through demonstrated applications, and how they may be used to express relations among environmental phenomena.

**PURPOSE:** To enhance students' understandings of the environment by introducing them to some fundamental patterns in it.

**SUBJECTS:** Small samples of randomly selected students from a suburban elementary school in Sonoma County, California took part in a two-week long experimental program in geodesics and energetic and synergetic geometry. Experimental program was tested on students in grades 3, 4 and 5.

**RESEARCH DESIGN:** Topics to study included pattern recognition, basic structures, natural forms, geodesics and dome buildings.

Students built models of elementary structures, listened to illustrated discussions, watched and discussed films, collected samples of patterns in their environment, and helped assemble a geodesic dome 17 feet in diameter.

Pretesting consisted of identification of geometric forms and their attributes and recognition of geometric and mathematical patterns.

Posttesting consisted of questions related to specific objectives of the program and was administered to a sample of students present during the two-week session.

**RESULTS:** In grades 4-5, behavioral objectives, pre-established as identification and construction of polyhedra, recognition of physical patterns in the environment, familiarity with vector representations of physical forces and understanding of the derivation of geodesic structures, were met.

The program did not work as well with the third grade students, possibly because of their lower level of general readiness little experience with the study of geometry, scheduling of classes during experiment, and class size.

**REFERENCES:** 9 cited.

65. Cohen, Michael R. "Environmental Information Versus Environmental Attitudes." The Journal of Environmental Education, 1973, 5(2):5-8.

**DESCRIPTORS:** affective, attitudes, cognitive, descriptive research, formal, knowledge, secondary.

**VARIABLES:** Environmental information, environmental attitudes, demographics.

**PURPOSE:** (1) to identify subgroups of high school students possessing either a high or low degree of environmental information as determined by scores on an environmental information scale, and (2) to compare the environmental attitudes expressed by members of these two groups.

**SUBJECTS:** 454 high school students from seven high schools.

**RESEARCH DESIGN:** A 75-item questionnaire was distributed to the overall sample. It contained 35 environmental information items and 35 environmental attitude items. The latter were measured on a five-point Likert scale. Based upon responses to the environmental information items, high and low environmental information subgroups were identified. Subsequently, the researchers compared the scores for the high and low subgroups on the environmental attitude scale items. Sixteen of the original 35 attitude items were selected for comparison given that at least 40 percent of the members of one of the subgroups selected the same response to it. Instrument validity and reliability scores were not reported.

**RESULTS:** The responses on each of the 16 items' scales were presented in tables in a percentage format. It was expected that the high environmental information subgroup would select similar attitudinal responses, while the low information subgroup would randomly distribute their responses. There did appear to be differences between the two groups on responses to individual items as well on patterns of responses. The high information subgroup appeared more inclined to select a polarized position and less inclined to select a 'no comment' position than the low information subgroup. Implications for EE and recommendations for further work were presented.

**REFERENCES:** 8 cited.

66. Cohen, Michael R., and Joan K. Austin. "Developing and Interpreting Environmental Messages with Transactional Analysis." The Journal of Environmental Education, 1979/80, 11(2):31-37.

**DESCRIPTORS:** affective, attitudes, cognitive, instrument development, issue identification skills.

**VARIABLES:** Transaction analysis ego state functions and environmental attitude.

**PURPOSE:** To determine whether or not a valid attitude instrument could be developed which presented environmental messages in language characteristic of the Transaction Analysis (T.A.) ego state functions.

**SUBJECTS:** Three professional T.A. clinicians and members of the Indianapolis Institute of Transactional Analysis agreed to participate in the study as a validity panel.

**RESEARCH DESIGN:** The authors selected T.A. as a framework for structuring environmental attitude items. Ten environmental messages were selected for this study. From these messages 69 environmental attitude items were constructed in an attempt to state each message in language characteristic of each of the T.A. ego state functions: nurturing parent, critical parent, adult, adaptive child and free child. The authors presented operational descriptions of each state as well as examples of environmental attitude items associated with them. Three professional T.A. clinicians were introduced to the purpose of the study and asked to judge whether 46 items (i.e., of total of 69 items) were characteristic of one of the five ego states. Approximately two weeks later the remaining 23 items were mailed to the judges with instructions to categorize them according to the ego state functions, or as miscellaneous.

**RESULTS:** At least two of three judges agreed on the category rating of 57 of the 69 environmental attitude items according to ego state functions. The agreement between judges for each ego state function/category was measured using a variation of J. Cohen's Kappa,

with results significant beyond the .05 level for items in all but the nurturing parent category. However, the agreement between the judges' classifications and those intended by the authors held for only 36 of the 69 items. The author indicated that while the judges did not agree with the authors on the categorization of the remaining 33 items, they had often agreed with each other. The authors concluded that the ego state functions of T.A. were valuable in the construction of environmental attitude items, and that 83 percent of the items written by the authors were reliably categorized by the judges. A discussion of the results was reported.

REFERENCES: 25 cited.

67. Cohen, Michael R., and David K. Hollingsworth. "Environmental Beliefs and Educational Ability." The Journal of Environmental Education, 1973, 5(2):9-12.

DESCRIPTORS: beliefs, cognitive, descriptive research, formal, knowledge, secondary.

VARIABLES: Environmental information, demographics.

PURPOSE: (1) to identify subgroups of high school students possessing either a high or low degree of environmental information as determined by scores on an environmental information scale, and (2) to determine the character of the environmental beliefs expressed by each subgroup.

SUBJECTS: 454 high school students from seven high schools. Scores on an environmental information scale were used to identify high (N = 84) and low (N = 116) environmental information subgroups.

RESEARCH DESIGN: A 75-item questionnaire was distributed to the total sample. It contained 35 environmental information and 35 environmental attitude items. The sample means for correct responses to the 17 correct-incorrect instrument items were used to separate the high and low subgroups from the total sample. Individuals with scores falling at least one standard deviation above the sample mean were included in the high information group. Those with scores falling at least one standard deviation below the sample mean were included in the low information subgroup. A comparison between these two subgroups was made, using responses to all 35 environmental information questions. The Kuder-Richardson reliability for the 17 correct-incorrect item section was .42. Instrument validity procedures were not reported.

RESULTS: Analysis of demographic information revealed that those in the high information group tended to be more male than female, and were from a variety of schools. Those in the low information subgroup tended to be females from urban schools. Responses to several of the 35 items were presented in tables in a percentage format. For knowledge on three questions regarding DDT and pesticides, the high information group consistently scored a greater number of correct responses than either the low information group (55 percent to 60 percent more), or the overall sample (30 percent more). Forty percent or more of the low

information group selected the same response for 8 of the 35 questions. The specific responses to those questions were analyzed, providing insight into the nature of low information subgroup beliefs.

REFERENCES: 5 cited.

68. Collins, M.A.J. "Questionnaires and Changing Students' Attitudes toward Animals." The Journal of Environmental Education, 1976, 8(2):36-40.

DESCRIPTORS: affective, attitudes, conservation education, descriptive research, formal.

VARIABLES: Male and female biology students' attitudes towards animals.

PURPOSE: (1) to test the assumption that Bart's two-choice questionnaire (like/dislike) to determine students' attitudes toward animals is oversimplified, prompting the author to use a third category of choice (i.e., neutral); and (2) to test the following aspects of attitudes toward animals: the universality of the responses by students, and the possibility of differences in attitudes between male and female students.

SUBJECTS: 127 students in one second-year and three first-year biology classes in Newfoundland completed the questionnaire. The sample consisted of 64 males and 63 females. The researcher did not state whether the students were high school or university students.

RESEARCH DESIGN: A questionnaire was constructed in which students were asked to indicate whether they liked, disliked, or were neutral to each of 30 animals. These animals were both common in Newfoundland and relatively well-known. Responses were categorized into three groups and assigned the following point values: like = 1, neutral = 0.5, and dislike = 0. Validity and reliability coefficients were not reported.

RESULTS: For comparative purposes, the author reproduced the results of Bart's study of attitudes toward 13 animals common to both studies. The data confirmed the assumption that Bart's two-choice questionnaire is an oversimplification by indicating that 26.4 percent of the responses were neutral. The similarities of response between Bart's Minnesota and the writer's Newfoundland students' attitudes toward 13 animals used in both studies was reported ( $r = 0.95$ ). Differences in attitudes between genders were noted, with males expressing more positive attitudes to a wider range of animals than did females. Some implications were stated.

REFERENCES: 1 cited.

69. Collins, Thomas A., C. Neil Herbkersman, Lynn A. Phelps, and Gary W. Barrett. "Establishing Positive Attitudes toward Energy Conservation in Intermediate-Level Children." The Journal of Environmental Education, 1978, 10(2):18-23.



**DESCRIPTORS:** affective, elementary, energy education, experimental research, field trip, middle school, nonformal.

**INDEPENDENT VARIABLE:** Field trip presenting energy principles.

**DEPENDENT VARIABLE:** Attitude toward conservation and use of energy resources.

**PURPOSE:** To determine the effects of a field trip presentation of energy principles on the attitudes of intermediate level students toward conservation and the use of energy resources.

**SUBJECTS:** All students participating were from Preble County, Ohio. 455 students made up the experimental group, with 282 in the fourth, 102 in the fifth, and 47 in the sixth grade. The control group was composed of 22 fourth and 31 sixth graders. There was a mortality of 24 participants.

**RESEARCH DESIGN:** A field trip program was developed based upon six energy principles: energy sources, trophic levels, energy conservation, net energy, recycling, and the second law of thermodynamics. Three learning activities were planned for each energy principle and these activities were presented in differing time contexts (past, present and future). A semantic differential scale was developed based upon the energy principles. A factor analysis (varimax rotation) of a pilot test conducted with similar students indicated reliability estimates ranging from .84 to .99. The final revised scale was administered to both experimental and control groups on a pretest-posttest basis. Treatment for the experimental group consisted of the field trip program. The control group students had no exposure to energy-related instruction during the duration of the study.

**RESULTS:** The data were analyzed using analysis of variance. The control group showed no significant change in attitude between the pretest and posttest means ( $p < .05$ ). The experimental group exhibited a significant difference in their scores from pretest to posttest ( $p < .001$ ). No significant difference was found on pretest comparisons between control and experimental groups. Further analysis revealed no significant attitudinal differences ( $p < .05$ ) regarding sex, grade level, or community type. In addition, there were no significant interactions ( $p < .05$ ) among sex, grade level, and community type.

**REFERENCES:** 17 cited.

70. Costantini, Edmond, and Kenneth Hanf. "Environmental Concern and Lake Tahoe: A Study of Elite Perceptions, Backgrounds, and Attitudes." Environment and Behavior, 1972, 4(2):209-241.

**DESCRIPTORS:** affective, attitudes, descriptive research, issue-based, issue identification skills.

**VARIABLES:** Sociodemographic background, environmental decision-making perceptions, environmental concern.

**PURPOSE:** Examines decision makers of the Lake Tahoe Basin area in terms of variations in levels of environmental concern.

**SUBJECTS:** 218 adults, mortality of 15. Procedure used in constructing sample was a modified "snowball" technique. All subjects lived either in or around the Lake Tahoe Basin area. Subjects were middle class.

**RESEARCH DESIGN:** In this descriptive study subjects were interviewed (approximately 1.5 hours) and asked both structured and unstructured questions concerning the context and substance of environmental decision making in and for the basin. At the close of each interview respondents were given questionnaires composed of 84 four-point Likert-type statements designed to probe perception of environmental problems and possible means of solution, as well as social-psychological and political attitudes. Item analysis was performed and items on the scale were found to be internally reliable. Item-scale correlations were listed. Reliability and validity coefficients were not reported.

**RESULTS:** It was found that those displaying a high level of environmental concern were better educated, were professionals or government officials, were less likely to be permanent residents of the basin, held more liberal views, were more cosmopolitan, were more likely to be appreciative of aesthetics and rural values, and were likely to be more critical of the impact of technology on society, than were those displaying low-level environmental concern. There was a 90 percent response rate to the questionnaire. Limitations of this kind of static study were discussed and recommendations for more dynamic studies were proposed.

**REFERENCES:** 12 cited.

71. Crump, S. Larry, Dennis L. Nunes, and E. K. Crossman. "The Effects of Litter on Littering Behavior in a Forest Environment." Environment and Behavior, 1977, 9(1):137-146.

**DESCRIPTORS:** behaviors, experimental research, issue-based, issue investigation/evaluation skills, unobtrusive.

**INDEPENDENT VARIABLE:** Amount of litter present.

**DEPENDENT VARIABLE:** Littering behavior in littered and nonlittered areas, difference between.

**PURPOSE:** To determine the effects of littered and nonlittered areas on littering behavior in a forest environment.

**SUBJECTS:** Picnickers using the Hanging Rock Picnic Complex (attracts as many as 30 persons at one time).

**RESEARCH DESIGN:** The study was conducted for a period of four successive Fridays during the month of June. First and third Fridays were used to obtain an estimate of amount of litter accumulated after areas were cleaned of litter. Second and fourth Fridays littered condition in effect. On first and fourth Fridays an observer was

present to count the number of persons using areas. The observer was positioned unobtrusively. The number of pieces of litter was counted each Saturday morning for two hours. U.S. Forest Service personnel cooperated by not picking up any litter and by not encouraging others to do so.

**RESULTS:** Following nonlittered conditions a total of 47 pieces of litter were found in the east area during week one and 46 pieces during week three. Following littered conditions, during week two, the east area had 23 pieces, while 32 pieces were counted in the west area. In week four, east and west areas contained 26 and 27 pieces, respectively. Amount of litter counted on Saturday mornings following littered conditions was always less than the amount counted following a nonlittered condition. Results indicate that antecedent stimuli can exert significant control over littering behavior.

**REFERENCES:** 8 cited.

72. Davis, Elaine L., Rodney L. Doran, and S. David Farr. "An Analysis of the Environmental Awareness of YCC Campers--Summer 1979." Current Issues VI, 1980, 327-337. ED 197 947.

**DESCRIPTORS:** attitudes, descriptive research, ecology education, knowledge, outdoor classroom, outdoor education, program evaluation.

**VARIABLES:** Environmental awareness, effects of camping experience.

**PURPOSE:** Assessment of environmental awareness of YCC campers before and after their 1979 camp experience.

**SUBJECTS:** A sample of nationwide YCC camps, 194 camps and 9,855 campers for pre-camp tests and 194 camps and 9,850 campers for post-camp tests. This represented 44 percent of the YCC population for 1979; 165 cases were eliminated; 14,796 campers were represented: 7,635 pre-camp and 7,161 post-camp.

**RESEARCH DESIGN:** A camper/item matrix sampling plan was designed whereby each camper answered a questionnaire of 40-50 questions of the available 481. Fifty-one partially overlapping test forms were distributed, covering 1-4 of the 11 domains of goals developed. Item means, variances and covariances were calculated to take into account missing data. Total score estimates were computed. Item parameters were utilized to approximate two psychometric properties of the item sets. Reliability of the tests and homogeneity of the domain were estimated.

**RESULTS:** Each domain was represented by 2,400 pre-camp subjects and 2,200 post-camp subjects. The results of each domain were reported as total scores based on all items from the survey. A t-test was calculated for each domain with a precamp/postcamp difference. Six content domains showed significant differences and so did the attitude domain.

**REFERENCES:** 2 cited.

73. Davis, Millard C. "Some Factors Affecting Natural History Interests." The Journal of Environmental Education, 1974, 5(3):8-11.

**DESCRIPTORS:** descriptive research, elementary, environmental center, formal, knowledge, nonformal, outdoor education, secondary.

**VARIABLES:** Periodical literature articles of personal interest, categories of natural history interests, personal learning interests according to natural history categories of various student and nature center visitor groups.

**PURPOSE:** The purposes of the first survey were: (1) to identify which Ranger Rick articles were read, enjoyed and used by Ranger Rick Nature Club and School Club members, and (2) to categorize those responses by their natural history focus (i.e., fish, birds). The purpose of the second survey was to have a sample of students identify those things they would like to learn most about in an outdoor education program (i.e., elementary students) or by their own exploration (i.e., secondary students) via the natural history interest categories resulting from first survey. The purpose of the third survey was to have nature center visitors identify those things they would most like to learn about at the Nature Center via the same categories used in the second survey.

**SUBJECTS:** In the first survey, 1,228 paid members of Ranger Rick's Nature Club or School Class Club were entrants in a 1971 Ranger Rick's Nature Magazine 'Ranger Rick's Nature Club Contest.' For the second survey 2,395 elementary and secondary students in the Hopewell Valley School District in October of 1972 (1,260 for ages 7-12 and 1,135 ages 13-18). For the third survey, 650 visitors at the Washington Crossing State Park Nature Education Center during the summer of 1972 (223 ages 6-12, 124 ages 13-19, 303 older persons).

**RESEARCH DESIGN:** Paid members of Ranger Rick's Nature Club or School Class Club were invited to participate in a 'Nature Club Contest' advertised in the November, 1971 issue of Ranger Rick's Nature Magazine. They were asked to identify from any issue of that magazine an article or story they had read, enjoyed and used. In that November issue, a wide variety of possible uses were suggested to stimulate reflection and participation. From the entry blanks received, the children's responses fell into 13 natural history categories: man, mammals, birds, reptiles, amphibians, fish, lower animals, higher plants, lower plants, ecology, environmental, earth science problems (including geology and weather), and other (i.e., a miscellaneous category). School, class or class assignments were identified as a category by approximately 30 percent of the respondents. For use in the second and third surveys, earth science, other, and school categories were dropped, while geology and weather were given separate category status in the instrument.

Subsequently, the instrument was distributed to Hopewell Valley students and the Nature Center visitors. The instruments distributed to students and nature center visitors had a different introduction and slightly different set of instructions. Instrument validity and reliability scores were not reported.

**RESULTS:** The authors reported that for the first survey all of the age groups responding to the Ranger Rick contest displayed a high interest in environmental concerns (i.e., an average of 36.2 percent). Approximately 19 percent of all respondents in the first survey concentrated on four articles related to environmental problems. Content results were categorized by natural history fact, and are listed above. Ranger Rick respondents' degree of environmental concern contrasted sharply with those of the Hopewell Valley School, where nearly 9 percent of respondents expressed concern by their choices, and of the Nature Center, where nearly 5 percent of respondents expressed concern by their choices. For the school and visitor samples very low concern scores (3 to 4 percent) for 7 to 10-year-olds were contrasted to those of 10 to 12-year-olds (8 to 17 percent). Explanations for these differences among and within sample results were reported. Natural history category response frequency for the three samples was presented in table form. Conclusions and implications were presented.

**REFERENCES:** None cited.

74. Delprato, Dennis J. "Prompting Electrical Energy Conservation in Commercial Users." Environmental and Behavior, 1977, 9(3):433-440.

**DESCRIPTORS:** energy education, experimental research, higher education, issue awareness/knowledge of issues, unobtrusive.

**INDEPENDENT VARIABLE:** Prompting posters.

**DEPENDENT VARIABLE:** Percentage of times the lights in a group of rooms were on when the rooms were unoccupied.

**PURPOSE:** To determine if a behavioral procedure could be used to modify energy conservation behavior.

**SUBJECTS:** Men using the 10 restroom facilities during the 44 days of the experiment.

**RESEARCH DESIGN:** An observer made three visits to each room on each of the 44 days of the experiment, and each observation was coded according to room unoccupied and light on, room unoccupied and light off, room occupied. Poster was prominently displayed in each restroom urging user to shut off light when room was not in use. A multiple-baseline design across situations and time was used to evaluate intervention effects. Reliability and validity coefficients were not reported.

**RESULTS:** Implementation of intervention produced marked reductions in the percentage of times lights were on in all groups. Recommendations for further research were listed.

**REFERENCES:** 4 cited.

75. DeLuca, Frederick P., Luther L. Kiser, and Kenneth F. Frazer. "Environmental Education and the Interrelationships among Attitude, Knowledge, Achievement, and Piagetian Levels." Current Issues IV, 1978, 186-192. ED 167 407.

DESCRIPTORS: affective, cognitive, elementary, experimental research, middle school, program evaluation, secondary.

INDEPENDENT VARIABLE: Standard achievement scores, Piagetian levels, gender.

DEPENDENT VARIABLE: Knowledge of the environment, attitude toward the environment.

PURPOSE: Evaluation of Project ECO (Environmental Curriculum Opportunity).

SUBJECTS: Subjects consisted of a stratified random sample by gender and grade. 3,408 students, grades four through twelve, from two school systems participated. Average sample size was 100 females and 100 males from each grade level 4-9 and 75 males and 75 females from each grade level 10-12. The Ames Community School System, Ames, Iowa, conducted the environmental education classes while a nearby school served as a control group.

RESEARCH DESIGN: A test for environmental knowledge and a test for attitude toward environment was given at each level (elementary 4-6, junior high 7-9, high school 10-12). The "R-20 coefficients of reliability were used for all three levels. Six Piagetian tasks were administered to 358 students. Stanford achievement test scores were available for grades 4-8 in the Project ECO school system and Iowa test scores were available for grades 9-12 in both systems.

RESULTS: A multiple analysis of variance of data between school systems indicated significant differences between the school systems in favor of Project ECO. No baseline data were available to assess initial differences that might have existed between the two communities. Correlations were drawn between the different variables.

REFERENCES: 8 cited.

76. Dennis, Everette E., and James McCartney. "Science Journalists on Metropolitan Dailies: Methods, Values and Perceptions of Their Work." The Journal of Environmental Education, 1979, 10(3):9-15.

DESCRIPTORS: descriptive research, educational background, language arts, personality type.

VARIABLES: Work patterns, demographic profile, and perceptions of newspaper science journalists.

PURPOSE: To survey science journalists concerning their perception of work in science journalism.

**SUBJECTS:** 75 science journalists from 52 separate metropolitan daily newspaper organizations in the U.S. responded to a questionnaire sent to 196 science journalists. The journalists' average age was 39 years and 93 percent were college graduates; 73 percent of the respondents were males.

**RESEARCH DESIGN:** A 19-item questionnaire was sent to science journalists at all metropolitan daily newspaper organizations. In most of the questions journalists were asked to choose specific responses, yet several were open-ended. Several science journalists discussed the draft questionnaire before a final version was developed.

**RESULTS:** Most of the science journalists report on science assignments full time or nearly full time. Of the topics reported to the public, heaviest concentrations were in medical reporting (39 percent) and environmental and energy reporting (27 percent). Most journalists (69.4 percent) were not familiar with research concerning readership preferences for types of articles read. There seemed to be an increase in the number of articles dealing with environmental hazards and consumer issues. Journalists saw science writing improving both in quality and quantity.

**REFERENCES:** 12 cited.

77. Ditton, Robert B., and Thomas L. Goodale. "Water Quality Perceptions and Attitudes." The Journal of Environmental Education, 1974, 6(2):21-27.

**DESCRIPTORS:** attitudes, behaviors, beliefs, descriptive research, issue awareness/knowledge of issues, issue identification skills, knowledge.

**VARIABLES:** Recreational activity, description of water quality, perception of water quality problems, and attitudes toward water quality improvement.

**PURPOSE:** (1) to determine the type, extent and location of recreational users of Green Bay, and (2) to determine selected perceptions of and attitudes toward local water quality related issues and water quality improvement.

**SUBJECTS:** From a random sample of 3,000 households in 200 clusters throughout the five-county study area adjacent to the Green Bay area (Brown, Doar, Kewaunee, Marinette and Oconto Counties), 2,458 household heads were contacted, and 2,174 completed usable schedules received (88.4 percent of those actually contacted). The refusal rate was 7.6 percent, with the remaining 4 percent of responses either incomplete or unusable. According to the authors, the sample was an accurate reflection of the population, and data were, therefore, representative.

**RESEARCH DESIGN:** In August and early September, 1971, an extensive survey of the marine recreational uses of the Bay was conducted over the five-county area. Interview schedules were administered to residents of randomly selected households. The interview consisted of questions

associated with the recreational use of, perception of water quality and water problems of, and attitudes toward the improvement of the water quality of the Bay of Green Bay. Concerning water quality problems, each interviewee was given two sheets--physical characteristics and water quality characteristics. On each sheet, they were asked to identify the biggest problem for those using the bay. Validity and reliability scores were not reported.

**RESULTS:** The three most popular water-based recreational activities included fishing (53 percent), swimming (44 percent) and boating (34 percent), though not all took place on the Bay. Of the 2,174 heads of households interviewed, nearly 50 percent (1,072) regarded the Bay as 'dirty,' 21 percent as 'somewhat dirty,' about 16 percent as 'reasonably dirty,' and less than 5 percent as clean. The remaining 9 percent said their rating would depend upon the specific location. Significant differences were detected through a chi-square analysis between swimmers' responses (i.e., dirtier) and responses by fishermen and boaters (i.e., less dirty). The physical problems which were rated highest included unpleasant smell (46.7 percent) and junk on the bottom (20.5 percent). The water quality problems which were rated highest by respondents included dead fish (45.5 percent) and harmful bacteria (16.1 percent). The percentages of responses for each of the four categories regarding water quality improvement were: none (20.7 percent); a little (32.4 percent); quite a bit (26 percent); and a lot (20.9 percent). Of eight potential federal sources of reallocated funds for water quality improvement, most (46.6 percent) agreed that the money source should be the space program. Educational implications were discussed.

**REFERENCES:** 14 cited.

78. Donaldson, George W., and Donna Schmidt. "An Investigation Into the Desirable Eco-Education Site." The Journal of Environmental Education, 1975, 6(4):58-62.

**DESCRIPTORS:** descriptive research, ecology education, outdoor classroom, outdoor education.

**VARIABLES:** Characteristics desirable in an eco-education site.

**PURPOSE:** To (scientifically) determine the characteristics which are desirable in a site to be used for eco-education purposes.

**SUBJECTS:** Participants were selected from Leaders in Outdoor Education. Persons with titles which suggested involvement in environmental, conservation and outdoor education were selected. A total of 247 persons in the U.S. and Canada were questioned as to their willingness to participate: 194 persons (78 percent) responded affirmatively. Of these, 163 actually returned the rating sheets; 138 (71 percent) responded by the April 30 cutoff date set by the investigators.

**RESEARCH DESIGN:** Following a review of literature and conferences with knowledgeable colleagues, the investigators designed an opinionnaire containing 38 characteristics. A modified Likert scale was used to



elicit responses as to the desirability of each of the characteristics (E = Essential; HD = Highly Desirable; D = Desirable; S = Satisfactory; U = Unacceptable). A mailing procedure was used to collect the data.

RESULTS: Multipliers were applied as follows to raw scores to yield weighted scores: E = 4 points; HD = 3 points; D = 2 points; S = 1 point; U = 0 points. Weighted scores were divided by 138 (i.e., the number of respondents) to yield a mean point value for each characteristic. The characteristics and their respective point values are listed in the article in order of value. The jurors placed 29 characteristics at or above the point value of 2 (Desirable). Nine characteristics fell below a point value of 2. None fell below 1. The investigators state that, according to the findings, the site should be large, over 200 acres. They also state that there is probably no such thing as an ideal outdoor site for eco-educational purposes. In the opinion of the jurors there are no essential characteristics for such a site. Recommendations are made for additional investigations.

REFERENCES: 7 cited.

79. Donohue, G.A., C.N. Olien, and P.J. Tichenor. "Communities, Pollution, and Fight for Survival." The Journal of Environmental Education, 1974, 6(1):29-37.

DESCRIPTORS: attitudes, citizenship, descriptive research, issue awareness/knowledge of issues, issue-based, knowledge.

VARIABLES: Knowledge and attitudes toward local environmental issues of community members from various community types.

PURPOSE: (1) to collect and analyze data from select members of four different communities concerning their knowledge and attitudes toward three local environmental issues; and (2) to compare the results of the responses on the initial 1970 survey to those on the 1972 follow-up survey.

SUBJECTS: In 1970, random samples of the adult populations (i.e., 21 years and older) of Duluth (pop. = 100,000; N = 102), Ely (pop. = 4,084; N = 109), Silver Bay (pop. = 3,500; N = 98), and Grand Rapids (pop. = 7,247; N = 119) were drawn for use in the study. In the 1972 follow-up study, different samples selected by the same procedure were interviewed: (Duluth, N = 131; Ely, N = 102; Silver Bay, N = 96; Grand Rapids, N = 117). Ely and Silver Bay were the most homogeneous communities, with the least occupational differentiation and fewer sources of economic support. Silver Bay was basically a one-industry community (i.e., taconite). Duluth was more diverse occupationally and in economic support base.

RESEARCH DESIGN: Three communities were faced with immediate, highly relevant, and unresolved environmental issues in 1970: (1) in Duluth, air pollution control standards for a steel plant; (2) in Silver Bay, water pollution from taconite tailings discharge; and (3) in Ely, the question of mineral exploration in the Boundary Waters and Course Area (BWAC). Grand Rapids was selected as a comparison/control for reasons

stated by the authors. Random samples from these four communities were used in data collection during 1970 and again in 1972. The two phases of data collection involved gathering background information on the three issues and four communities. Also, demographic, knowledge and attitudinal responses related to the selected issues were gathered via personal interviews. Interview validity and reliability estimates were not reported.

**RESULTS:** The following conclusions were drawn from the results of the 1970 survey: (1) there was a widespread belief in the technologic ethic; (2) there was a general reluctance to accept severe restrictions on the use of technology and electrical power; (3) attitudes on specific environmental issues varied according to perception of self-interest oriented consequences; (4) the most highly informed showed strongest opposition to environmental restrictions; i.e., increased information did not necessarily lead to a positive environmental position; (5) despite apparent consensus about environmental protection, enforcement of environmental restrictions may influence and/or conflict with local beliefs and values related to self-interest; (6) the focus of community attitudes was based upon the degree of community pluralism/diversity. The authors subsequently reported upon changes in the three issues during the two years following the initial study. During those two years, there were marked changes in the level of familiarity with the issues, and in the way in which people saw and defined them. In general there was a decline in familiarity about the BWCA, the taconite plant, and the steel plant. The decline in knowledge for all issues was most evident in Duluth and Ely, while Silver Bay experienced a marked decline on the steel issue. Grand Rapids responses indicated the least change. Attitude shifts had also occurred during the two-year intervening period. They tended to agree that the pollution issue had received far more publicity than it was worth, and still held faith in technological resolution to the pollution crisis. They tended to agree that rationing electric power was a means of reducing pollution. They also tended to see the burden for resolving the environmental problems with corporate firms and public bodies rather than with individual citizens. An extensive discussion of responses to these and other questions and an analysis of overall differences among communities were reported.

**REFERENCES:** 2 cited.

80. Doran, Rodney L., Robert O. Guerin, and Alfred A. Sarnowski, Jr. "Assessing Students' Awareness of Environmental Problems." The Journal of Environmental Education, 1974, 5(4):14-18.

**DESCRIPTORS:** affective, attitudes, beliefs, descriptive research, issue awareness/knowledge of issues, issue identification skills, middle school, values.

**VARIABLES:** Students' perceptions beliefs, attitudes and values toward environmental problems.

**PURPOSE:** To develop instruments designed to measure junior high school students' level of awareness of environmental problems and the perception of possible solutions to those problems.

**SUBJECTS:** Junior high school age students. No other information was given.

**RESEARCH DESIGN:** The authors identified five categories of environmental problems: air, water, noise, and land pollution, and a miscellaneous category. They then selected twenty 35mm slides depicting selected environmental problems, with four slides representing each problem category. They also identified the four following affective constructs for the purpose of obtaining information related to these problems: (1) perception, (2) belief, (3) attitude, and (4) value. Based upon these constructs, the authors designed a series of five questions to measure students' affective responses to each slide. Each question had five potential responses. In the report, a critique of the five responses 'forced choice' format instrument was presented. Subsequently, a second instrument was developed which roughly paralleled the purpose of the first, yet included three 'open ended,' as opposed to 'forced choice,' questions. Due to the increase in time required to complete the second instrument, the number of accompanying slides was reduced from 20 to 10. A clarification of terms by the administrator and a set of practice questions preceded the students' actual scoring of the instrument. Finally, students' reactions to the survey instrument were obtained. Instrument validity and reliability estimates were not reported.

**RESULTS:** The reactions to the survey and instrument indicated that many students did not see the environmental significance of the scenes depicted in the slides. The authors concluded that these problems could be minimized by the selection of scenes that more explicitly portrayed the intended environmental situation. Common responses to the instrument's possible action questions included: 'We as individual students can't do much,' 'We're too young,' and 'No One Will.' The authors presented conclusions, and recommended that further development of the concepts, constructs and instrument designs be done as part of the continuing effort to measure student affective reactions to environmental problems.

**REFERENCES:** 14 cited.

81. Driver, B.L., and Richard C. Knopf. "Personality, Outdoor Recreation, and Expected Consequences." Environment and Behavior, 1977, 9(2):169-193.

**DESCRIPTORS:** descriptive research, personality type, preferences.

**VARIABLES:** Personality dimensions and favorite activity.

**PURPOSE:** Compares active and nonactive participants in selected activities and evaluates relationships between personality characteristics and personal meanings attached to recreation choice.

**SUBJECTS:** 50 recreationists per activity for 9 activities. Participants were divided into two groups: active recreationists and nonactive recreationists.

**RESEARCH DESIGN:** In this exploratory study the questionnaire included the complete 440-item Personality Research Form (PRF), 10 Desired Consequence Scales, and questions soliciting information days of participation. Biserial correlation coefficients were computed, relating the active and nonactive members to PRF scale scores; 55 of these biserial correlation coefficients were found to be significant and were reproduced in text.

**RESULTS:** There was a 95 percent response rate to the questionnaire. Research indicates that personality traits probably influence choice of a recreation activity, that selected personality variables are significantly related to amount of participation in a preferred activity, and that personality trait does influence how important different types of desired consequences are to recreationists when they decide to engage in preferred activities. Further research suggested.

**REFERENCES:** 42 cited.

82. Dunlap, Riley E. "The Impact of Political Orientation on Environmental Attitudes and Actions." Environment and Behavior, 1975, 7(4):428-454.

**DESCRIPTORS:** attitudes, behaviors, beliefs, descriptive research, higher education, issue-based.

**VARIABLES:** Political orientation and environmental attitudes.

**PURPOSE:** Examines the effects of party preference and political ideology on the environmental actions and attitudes of a sample of college students.

**SUBJECTS:** 300 college students, majority of 63. Subjects were selected randomly from the 1970 spring term registration list at the University of Oregon in Eugene. Sample was found to be representative of the student body.

**RESEARCH DESIGN:** In this study a questionnaire was mailed to subjects. Postcard reminders were sent out one week later to increase response rate. "Gamma," a nonparametric measure of association for ordinal variables, developed by Goodman and Kruskal, was utilized.

**RESULTS:** Results supported Tognacci, et al., findings that Democrats and Liberal-Left affiliations tend to be related to higher rates of pro-environmental attitudes and actions while Republicans and Conservatives tend to rate lower. A tentative finding was that, for Conservatives who perceive an "eco-catastrophe" as a possibility, pro-environmentalism increases to a rate equal to Liberals. The study concludes that while both political ideology and party preference are significantly associated with environmental concern, more research in the area is needed.

REFERENCES: 43 cited.

83. Dunlap, Riley E., and Don A. Dillman. "Decline in Public Support for Environmental Protection: Evidence from a 1970-1974 Panel Survey." Rural Sociology, 1976, 41(3):382-390.

DESCRIPTORS: attitudes, citizen action, descriptive research, preferences, values.

VARIABLES: Public preference for allocating tax funds in each of 15 government spending areas.

PURPOSE: To provide evidence on possible change since 1970 in public concern for environmental quality.

SUBJECTS: In the 1970 survey there were 3,101 respondents (reasonably representative of the state population in terms of demographic characteristics) and 1,634 of the original respondents were in the 1974 survey. All subjects were from Washington State.

RESEARCH DESIGN: The study was descriptive-longitudinal survey. Respondents were asked to indicate whether they would favor the government spending less, the same amount, or more money than the current amount being spent in 15 funding areas. (Reliability and validity were not reported.) The survey was administered by mail.

RESULTS: Overall, there was a substantial decline in public support for environmental protection from 1970 to 1974, as measured by priorities for allocating governmental funding among expenditure areas. Support for two areas--"pollution control" and "protection of forests and other natural areas for public enjoyment"--dropped significantly (not reported) in 1974. The authors proposed reason for the decline to be a feeling by the public that the environmental problems were being taken care of through the recently-passed laws and regulations.

REFERENCES: 17 cited.

84. Dunlap, Riley E., and Robert Bruce Heffernan. "Outdoor Recreation and Environmental Concern: An Empirical Examination." Rural Sociology, 1975, 40(1):18-30.

DESCRIPTORS: affective, attitudes, beliefs, ex post facto, hypothesis generation, preferences.

INDEPENDENT VARIABLE: Participation in outdoor recreational activities (appreciative and consumptive).

DEPENDENT VARIABLE: Environmental concerns.

HYPOTHESES: 1) There is a positive association between involvement in outdoor recreation and environmental concern; 2) The association is stronger between appreciative activities and environmental concern than between consumptive activities and environmental concern; 3) There is a stronger association between outdoor recreation

and concern with protecting aspects of the environment necessary for pursuing such activities than between outdoor recreation and other environmental issues such as air and water pollution.

**SUBJECTS:** Researchers used the results of a mail questionnaire sent to Washington state residents in 1970 concerning their priorities for the allocation of public funds. The data base included 3,101 respondents. No information was given on the total questionnaires sent, the return rate, or any description of the respondents.

**RESEARCH DESIGN:** This study was ex post facto and analyzed a portion of a much larger study. Outdoor recreation users were separated from the overall data base according to their yearly usage of 14 leisure activities on a list. The researchers were interested in 5 of the 14 activities, which they broadly grouped as appreciative and consumptive. Appreciative activities were: hiking, camping, and visiting state parks and scenic areas. Consumptive activities were: hunting and fishing. The authors then compared the outdoor recreation users as a group, and individually versus their ranking of general and specific environmental concerns (as receiving less, the same, or more expenditures in the future). The environmental concerns ranged from protecting forest and other natural areas for public enjoyment to preventing serious industrial pollution of water. There were a total of eight environmental concern categories.

**RESULTS:** Gamma was used to measure association. The researchers found weak support for the first hypothesis, while the second and third received substantial support. They strongly felt that the issue concerning the contribution of outdoor recreation to environmental concern deserves further investigation.

**REFERENCES:** 36 cited.

85. Dunlap, Riley E., and Kent D. Van Liere. "The 'New Environmental Paradigm'." The Journal of Environmental Education, 1978, 9(4):10-19.

**DESCRIPTORS:** affective, attitudes, beliefs, descriptive research, instrument development, issue-based.

**VARIABLES:** Public opinion on environmental world view; assessment ability of an instrument which measures a world view attitude.

**PURPOSE:** To develop an instrument, the New Environmental Paradigm (NEP), which could survey general world views of the environment, and to determine the public's acceptance of the content of the NEP.

**SUBJECTS:** Two separate samples of Washington state residents were used in the study. The first group consisted of a systematic probability

sample of 1,411 heads of household with 806 participants responding. The second group consisted of a systematic sample of 542 members of an environmental organization with 407 members responding.

**RESEARCH DESIGN:** Twelve statements which dealt with an environmental world view, e.g., limits to growth, steady state economy, were developed by the researcher. These were placed in a Likert-type format and interspersed among a list of 35 items concerning a range of environmental issues. Observations regarding the validity of the instrument are presented. Questionnaires were addressed to the head of the household, and in order to ensure equal representation of males and females, every other mailing was addressed to the adult female.

**RESULTS:** Percentages, correlations, and factor analysis were used to analyze the data. In general, the overall pattern of responses to the NEP items by the heads of household was positive toward the environment. Items ranged in acceptance from a low of 53.6 percent to a high of 95.6 percent. The environmental group responses were more positive than the household group on all items. Predictive validity was established through a correlation between the two groups. As expected, a significant difference was found between the groups ( $p < .001$ ). Construct validity was sought using comparisons with known variables of environmentalism, i.e., age, education, and political ideology. Significant correlations were found for each of the variables ( $p < .01$ ,  $p < .001$ ,  $p < .001$ , respectively). The internal consistency of the scale was confirmed by two measures. Cronbach's alpha was run, and resulted in scores of .813 for the household groups and .758 for the environmentalists. In addition, factor analysis accounted for 69.2 percent of the variance in the first group and 63.3 percent for the second. Further, all 12 items loaded high on the principal factor. A complete discussion of results is presented.

**REFERENCES:** 27 cited.

86. Dunlop, David L. "An Energy-Environment Simulator: Its Effects on Energy-Related Attitudes." The Journal of Environmental Education, 1979, 10(4):43-48.

**DESCRIPTORS:** attitudes, energy education, formal, issue awareness/knowledge of issues pre-experimental teacher training inservice, teacher training preservice.

**INDEPENDENT VARIABLE:** Energy-Environment simulator.

**DEPENDENT VARIABLE:** Energy-related attitudes of teachers and college students.

**PURPOSE:** To investigate the effects of an energy-environment simulator on the attitudes of its users.

**SUBJECTS:** 129 teachers and students participated. A stratified sampling technique was used to select the following four groups: 17 senior high science teachers, 68 elementary teachers, 19 elementary science methods students, and 25 arts and science college students.

**RESEARCH DESIGN:** A short opinion survey containing six Likert-type statements and one open-ended question was administered in a pre- and posttest single group design. The treatment consisted of a 30-minute introduction and demonstration of the simulator followed by 30 minutes of simulator use. The test-retest reliability was found to be 0.83. The content validity was found to be acceptable by two science educators familiar with the goals of the workshop.

**RESULTS:** The sign test was used to determine the probabilities associated with changes in group attitudes. Before treatment, 96 percent agreed there was an energy problem in the world and 88 percent felt that the average consumer could help reduce the problem. There were no pronounced differences in attitudes concerning technology solving the problem, population growth rate influencing energy-related problems, nor the use of coal as a long-term solution. After the use of the simulator, changes in attitudes in specific areas occurred in 41 groups. Changes were most common among elementary teachers and least common among high school science teachers. Over 90 percent did not change their overall view of the energy situation.

**REFERENCES:** 11 cited.

87. Dunwoody, Sharon, and Ellen Wartella. "A Survey of the Structure of Science and Environmental Writing Courses." The Journal of Environmental Education, 1979, 10(3):29-35.

**DESCRIPTORS:** descriptive research, formal, higher education, language arts.

**VARIABLES:** Types of resource materials used and writing assignments given in college science and environmental writing courses.

**PURPOSE:** (1) to inventory the content of selected science communication courses and programs found in the Directory of Science Communication Courses and Programs, and therefore, (2) to supplement the directory's information.

**SUBJECTS:** 58 colleges and universities listed in the directory were sent letters; 32 responded. Responses provided data on 50 courses in various science communication areas.

**RESEACH DESIGN:** A letter was sent to the instructors of pertinent courses listed in the directory asking for course syllabi as well as additional information about the course design. A follow-up letter was sent two months later.

**RESULTS:** Half of the course syllabi received dealt with science writing, with occasional forays into environmental or technical writing. Most of these were offered in the journalism or communication department. The primary objective of the courses was to teach students to interpret scientific information for the lay person. Technical writing courses comprised about 25 percent of the sample. These courses



were designed to teach students to effectively communicate technical material to fellow scientists and technical experts. The use of available science communication research was minimal. In general, most of the syllabi were incomplete, and varied greatly.

REFERENCES: None cited.

88. DuShane, Judy. "In-Service Programs for Teachers in Northwest Ohio." The Journal of Environmental Education, 1974, 5(3):12-14.

DESCRIPTORS: affective, cognitive, descriptive research, formal, nonformal, teacher training inservice.

SUBJECTS: Participants involved in in-service programs offered through the Environmental Studies Center at Bowling Green State University.

RESEARCH DESIGN: The Center uses a coordinating multi-faceted approach of in-service aid to teachers in Northwest Ohio through formal and informal seminars and workshops. The Center evaluated EE programs and resource groups in 1971 and found that (except for the Toledo School District) organized and comprehensive EE programs were not in evidence and teachers needed a unifying concept of what EE entails. In 1972 and 1973 mini workshops, four-week summer workshops, consultants and state-sponsored workshops were offered. Options can include graduate credit courses, formal or informal seminars, workshops, discussion sessions, community interactions, mini courses and consultations.

RESULTS: If in-service teachers are to effectively implement EE, they must receive reinforcement. A variety of interrelated, well-organized activities which build a power base of informed, concerned teachers will help produce a new generation of environmentally literate and effective citizens.

REFERENCES: 4 cited.

89. Eastman, Clyde, Alan Randall, and Peggy L. Hoffer. "How Much to Abate Pollution?" Public Opinion Quarterly, 1974, 38(4):574-584.

DESCRIPTORS: attitudes, descriptive research, ethnic group, preferences, simulations, social background.

VARIABLES: Willingness to pay, method of payment, social background.

PURPOSE: The authors sought to determine how willing subjects were to pay for pollution abatement.

SUBJECTS: Three subpopulations were established through stratified random sampling of the following populations, all located in the Four Corners Region of New Mexico and Arizona: 1) residents of Indian reservations, primarily Navajos (hereafter called Indians), 2) residents of nonreservation areas, primarily Anglo-Americans but also including Spanish-Americans, Indians and other minorities (hereafter called residents), and 3) users of national and state parks, forests and

monuments (hereafter called tourists). The final subject population included 71 Indians, 526 residents, and 150 tourists. All were adults representing households.

**RESEARCH DESIGN:** All subjects were personally interviewed. The interviewers were trained both formally and by practice in two separate, pretesting situations. As part of each interview, subjects participated in a simulation activity called "bidding games." Each subpopulation played a different game, and therefore, three different questionnaires were used. The methods and results of each bidding game will be described separately. However, the introduction to the bidding games was the same in all situations and is described immediately.

**INTRODUCTION:** Each subject was asked a series of unspecified questions about environmental matters. Each was then shown three sets of photographs of the coal mine/electric power plant complex located in the Four Corners area. Set A showed the highest level of environmental damage (maximum emissions, untreated spoil banks, and transmission lines crossing the landscape). Set B showed an intermediate level of environmental damage (reduced emissions, spoil banks leveled but not revegetated, transmission lines placed less obtrusively). Set C showed minimal environmental damage (emissions reduced to zero, spoil banks gone and revegetated, and transmission lines underground). Set A depicted realistically the situation eight years earlier, set B depicted the situation realistically at the time the research was done, and set C depicted a possible situation of the future.

For each game, set A was the starting point. The games were designed to elicit the highest amount of money a subject would pay to reach sets B and C. Yes and No answers were elicited to questions expressed in the form of "Would you pay amount X...?" The amount was raised until a NO answer was obtained, at which point the interviewer reduced the amount until a YES answer was obtained. The highest YES answer was recorded as the amount the subject was willing to pay.

Subjects were told that the method of payment used in the game was the only one possible. This was designed to reduce the number of zero bids as protests against the method of payment. If respondents indicated no willingness to pay, he was asked a series of questions to find out why. If the respondent indicated that he did not perceive his household to be harmed by the pollution, his response was considered a zero bid. If the respondent indicated that he protested the method of payment, his response was considered a nonresponse.

#### Game 1--Electricity Bill (residents only)

The method of payment was an addition to the subject's monthly household electricity bill. Data were presented only for the payments generated going from set A to set C. (The authors noted that for all games, the willingness to pay up to set C was approximately 40 percent smaller than the willingness to pay up to set B.) In this situation, only 6 percent of the respondents were not willing to pay anything.

#### Game 2--Sales Tax (residents and Indians only)

The method of payment was a regional sales tax to be collected in the Four Corners area. Five percent of the residents and 1 percent of the Indians bid zero; 32 percent of the residents and 37 percent of the Indians had nonresponses, indicating a protest against this method of financing pollution abatement. The Indians were willing to pay, on average, \$.77 on the dollar, compared to \$1.48 on the dollar for residents in sales tax, being indicative, according to the authors, of a lower mean disposable income for the Indians.

#### Game 3--Monthly Payment (Indians only)

Indians were asked to pay a monthly allotment, with no specific method of payment indicated; 49 percent protested with a nonresponse. The mean of those responding was \$1.52 per month.

#### Game 4--Users Fee (tourists only)

Subjects were asked to imagine what they would be willing to pay in user fees to pay for environmental improvements; 81 percent were willing to bid something with an average bid of \$1.84 per day.

#### Game 5--Compensation (tourists and residents)

The subjects were asked to imagine that they owned the environment and therefore had the right to ask for compensation for its abuse--they were to consider that they were renting the environment to the coal-electricity industry. 52 percent of the residents and 61 percent of the tourists indicated that they would demand an infinite amount of compensation. The authors noted that for all respondents who indicated a specific amount of compensation, the amount demanded was always higher than the amount they were willing to pay.

After the games were concluded, all subjects were asked which of four groups or combination of groups should bear the cost of pollution abatement. The four options were: 1) the people directly affected by the pollution, 2) the final users of the electricity, 3) the companies operating the coal mine and power plant, and 4) any combinations of the first three. The vast majority of all subjects in each subpopulation felt the costs should be borne by the companies, the final users, or both these groups in combination.

**RESULTS:** The authors concluded that who should bear the cost of abatement influenced the amount of participation in the five games. In Game 1, where the costs were borne by all electric users, the number of nonresponses were much less than in Game 2 where the sales tax would be paid primarily by local residents.

All data were presented in tables with number of respondents and percentage of sample responding to all bid categories. In addition, means and standard deviations were presented.

No reliability, validity or level of significance were reported.

**REFERENCES:** 3 cited.

90. Erickson, David L. "Attitudes and Communication about Wildlife."  
The Journal of Environmental Education, 1971, 2(4):17-20.

**DESCRIPTORS:** attitudes, beliefs, descriptive research, values.

**VARIABLES:** Wildlife orientation levels, attitudes toward wildlife.

**PURPOSE:** This research identified types of attitudes toward wildlife and correlated these attitudes with selected characteristics of the subjects.

**SUBJECTS:** 49 residents of Columbus, Ohio were picked nonrandomly by factorial design to fill four predetermined subject categories. The categories were Hunter, Watcher, Farmer, and Other. These categories reflected wildlife orientation levels. The author stated that there was a sex effect but did not specify what the effect was.

**RESEARCH DESIGN:** Each subject was interviewed, during which time the subject responded to 80 statements of opinion concerning wildlife and wildlife management. The subjects Q-sorted the 80 statements into 11 piles on the basis of an agree-disagree continuum, the 11 piles forming a quasi-normal distribution. The pile numbers (2, 4, 6, 9, 12, 14, 12, 9, 6, 4, 2) became raw scores and were transformed into standard scores. Neither reliability nor validity were reported.

**RESULTS:** The Q-sorts were intercorrelated and subjected to a "principal components" factor analysis followed by a varimax rotation of the factors. This yielded 1) factors among the intercorrelations of the subjects, and 2) the strength of association each subject had with the factors. Statements for each type were listed and a structured code underlying the statements was determined to establish themes. These codes then underwent ANOVA.

Two wildlife-attitudes emerged. The "protectionist" type, mostly correlated with Watchers and Others, as compared to Hunters, showed concern about vanishing species and favored habitat preservation and some limits on hunting. The "reductionist" type, most closely correlated with Farmers, viewed wildlife from the perspective of crop and livestock damage, but was willing to preserve some species for future generations.

The author felt that research of this type would be useful in directing conservation communications to specific audiences, especially when using mass media, and in selecting participants for resource management decision processes.

Data are not generalizable beyond the population sampled. No level of significance was reported.

**REFERENCES:** 10 cited.

91. Erickson, David L., and Norman Van Turgergen. "The Wolf Men." The Journal of Environmental Education, 1972, 4(1):26-30.

DESCRIPTORS: beliefs, descriptive research, values.

VARIABLES: Environmental context, sex, residence.

PURPOSE: The authors analyzed letters written in response to the telecast of a documentary film to ascertain their environmental content.

SUBJECTS: 320 letters were randomly selected from 1,600 letters received by the Bureau of Sport Fisheries and Wildlife in response to and within one month after the November 18, 1969 telecast of "The Wolf Men" on national television. Females wrote 57.3 percent (N = 176) and males 42.7 percent (N = 131) of the letters whose sex could be determined. Regionally, 29.7 percent (N = 95) of the letters originated from the East, 29.4 percent (N = 94) from the Midwest, 13.8 percent (N = 44) from the South, and 27.2 percent (N = 87) from the West.

RESEARCH DESIGN: Twenty-six categories of content were developed from the letters, each category being given an operational definition consisting of representative statements. The categories were tested for mutual exclusion by coding the first 20 letters by two persons. Intercoder reliability was 0.77, causing refinements in the definitions. When reliability reached 0.88, initiation of letter coding began. Reliability at the end of the study was 0.80. Sex and residence were determined by signatures and postmarks. Validity was not reported.

RESULTS: The content categories were ranked by percentage of occurrence in the 320 letters. For at least one pair of categories (opposed to hunting wolves per se and opposed to a particular method of hunting shown in the film) contingency analysis was performed to determine association/disassociation. Chi-square analysis was performed to determine a sex difference.

Most writers (87 percent) indicated that they believed all timber wolf species to be endangered (a misrepresentation given in the telecast), and a majority of all writers (88 percent) wanted government action to protect them. Other environmental concerns were ranked fourth in the content categories, being mentioned in 51 percent of the letters.

No sex difference was discernible, with the exception that males more frequently mentioned that they hunted. Contingency analysis, mentioned above, revealed strong disassociation between the two content categories.

No data were generated concerning residence. However, the writers suggested tenuously that the disproportionate share of letters coming from the West, in comparison to that region's actual percent of the United States population, might indicate it to be fertile ground for conservation communications.

The data were generalizable to the 1,600 letters received by the Bureau of Sport Fisheries and Wildlife at the .05 level.

REFERENCES: 6 cited.

92. Everett, Peter B., Scott C. Hayward, and Andrew W. Meyers. "The Effects of a Token Reinforcement Procedure on Bus Ridership." Journal of Applied Behavior Analysis, 1974, 7(1):1-9.

DESCRIPTORS: behaviors, conservation education, educational background, energy education, experimental research, knowledge.

INDEPENDENT VARIABLE: Token reinforcement procedures.

DEPENDENT VARIABLE: Bus ridership.

PURPOSE: To attempt to increase bus ridership by offering token reinforcers to bus riders.

SUBJECTS: The experiment took place on the campus of a large university. The total number of individuals at the college were considered the "experimental subjects." The university's population consisted of 23,919 undergraduates (8,646 females and 15,273 males) and 5,225 graduate students (1,383 females and 3,842 males). The experimental bus route spanned 2.5 miles of the university campus.

RESEARCH DESIGN: A pre-experimental design was used involving a Baseline I measurement followed by a treatment consisting of the distribution of tokens. The treatment was followed by a Baseline II measure. Under the token conditions, advertisements were placed in the school newspaper explaining the token system. Tokens, exchangeable at a variety of local businesses, were delivered during the treatment interval (8 days) to all persons boarding the clearly marked experimental buses. Data were collected on the total daily bus ridership for the two baseline periods and for the token conditions. Questionnaires were used to periodically assess the origin, destination, length, and purpose of each trip.

RESULTS: Bus ridership increased by 150 percent over the Baseline during the Token Condition. No levels of significance were reported by the author. Summary results of the questionnaires given in the experimental buses showed that trip lengths were not modified by the Token Condition. The Token Condition attracted primarily undergraduate students who normally walked to classes.

REFERENCES: 6 cited.

93. Falk, John H. "Outdoor Education: A Technique for Assessing Student Behaviors." School Science and Mathematics, 1976, LXXVI(3):226-230.

DESCRIPTORS: behaviors, descriptive research, elementary, middle school, outdoor classroom, outdoor education.

VARIABLES: Student involvement in O.B.I.S. activities; cognitive gain and attitudes.

PURPOSE: To evaluate an unobtrusive technique designed to measure

student involvement in educational activities in an outdoor setting.

**SUBJECTS:** .225 10- to 14-year-old children representing a diverse socioeconomic, racial, age and school cross-section. Four separate groups and teachers were involved.

**RESEARCH DESIGN:** A descriptive study investigating the use of photographic analysis to unobtrusively measure student involvement during a set of O.B.I.S. activities in the outdoors. During the entire activity, still photographs were taken at two-minute intervals. These pictures were analyzed by a panel of experts to determine the degree of student involvement. Scores from all photos taken during the activity are totaled and averaged to yield a mean score representing group involvement. The validity of the scoring procedure was established using six judges and seven photographs (Interjudge reliability yielded an  $r = .80$ ). Data were also collected comparing student involvement scores with scores on cognitive gains and attitudes.

**RESULTS:** Juror scores indicated that the photographic technique appeared to be a valid measure of student involvement. High correlations were found between involvement scores and the cognitive and attitudinal measures. The author states limitations regarding data analysis and control of variables. Research implications regarding the use of the photographic technique are discussed.

**REFERENCES:** 13 cited.

94. Fanning, Odum. "Manpower Needs in Natural Resource Management." The Journal of Environmental Education, 1973, 4(3):20-33.

**DESCRIPTORS:** descriptive research, higher education, resource management education.

**VARIABLES:** Present employment and forecasted future employment in the field of Natural Resource Management.

**PURPOSE:** (1) to assess present employment conditions in the field of Natural Resource Management, (2) to identify positions presently needed in the field if funding was available, and from these identified needs, (3) to forecast probable future employment in the field.

**SUBJECTS:** The research instrument was sent to 1,314 public and private agencies believed to be responsible for programs using personnel trained in Natural Resource Management. Drawn from 50 states, the sample included 182 state, 46 federal and 36 private agencies identified from directories and journals. At the county level, 1,000 agencies representative of urban, suburban, and rural jurisdictions were selected from a master list of 3,800 such agencies. Usable responses were obtained from 34 states, 8 federal, 4 private and 95 county agencies.

**RESEACH DESIGN:** A letter of inquiry accompanying a one-page questionnaire was mailed to the selected agencies. The questionnaire

included items on present employment conditions and additional positions presently needed in the field of Natural Resource Management. Returned questionnaires, and accompanying materials including letters literature on manpower needs, constituted the data for analysis. Instrument validity and reliability coefficients were not reported.

**RESULTS:** The 34 state agencies responding employed 2,094 professionals and 2,904 paraprofessionals. These agencies indicated that an additional 557 professionals and 649 paraprofessionals were needed. The 8 federal agencies responding employed 12,967 professionals and 7,074 paraprofessionals. They indicated that an additional 554 professionals and 332 paraprofessionals were needed. The four private agencies responses varied widely concerning the number of employees and both immediate and projected employment needs. The 95 county agencies responding employed 676 professionals and 1,800 paraprofessionals. They indicated that an additional 284 professionals and 872 paraprofessionals were needed. The need for additional staffing represented a 12 percent increase over present employment levels.

**REFERENCES:** None cited.

95. Fazio, Frank, and David L. Dunlop. "Value Preferences of College Students with Reference to Environmental Chemistry." The Journal of Environmental Education, 1976, 8(1):26-31.

**DESCRIPTORS:** affective, descriptive research, formal, higher education, instrument development, issue awareness/knowledge of issues, teacher training inservice, values.

**VARIABLES:** Value preferences of science majors, nonscience majors, and chemistry teachers.

**PURPOSE:** (1) development of an instrument to assess the value preferences of nonscience majors regarding environmental chemistry, (2) to gather information on the value preferences of groups of nonscience majors who have completed environmental chemistry courses. (3) to assess science majors value preferences toward environmental chemistry, and (4) to measure inservice chemistry teachers value preferences toward environmental chemistry.

**SUBJECTS:** All participants in the study were from the state of Pennsylvania. The samples consisted of: (1) nonscience majors enrolled in a physical science course based upon environmental problems (N = 131), (2) health services majors who had just completed a chemistry course (N = 49); (3) a group of junior-level elementary education majors who had just completed a science content-methods survey course (N = 32); (4) a group of junior-senior biology majors (N = 16), and (5) a sample of high school chemistry teachers from western Pennsylvania (N = 19).

**RESEARCH DESIGN:** The Environmental Chemistry Value Preference Instrument (ECVP) consisted of 28 sets of statements related to environmental chemistry. Each statement was followed by three further statements which were indicative of one of the three value positions:



humanistic, theoretical, and technological aspects of the chemical phenomena. Participants were asked to select their first and second choices for each statement according to their personal preference. The measure was given to each of the sample groups; 25 minutes was used to complete the instrument. The authors report that the validity of the instrument was established with reference to the defined value constructs (i.e., humanistic, theoretical and technological categories). Content validity was further attested to by three college chemistry professors and two science educators. The reliability measures were determined using the Kuder-Richardson formula 20, and were based upon data from two separate groups of nonscience majors.

**RESULTS:** Since three separate value preference scores were obtained from the test instrument, a one-way analysis of variance was conducted on data from the physical science group. The data indicated that the humanistic value preference scores were significantly greater than the technological and theoretical position. In addition the technological value preference was significantly greater than the theoretical. The same pattern and trend of results were found for the health services groups' and for the elementary education majors' responses. T-tests were conducted on a series of planned comparisons to answer specific questions concerning the value preferences of nonscience majors compared to science majors. The highest theoretical value scores were recorded by the science majors. The nonscience major group scores indicated a significantly higher humanistic value preference than did science major scores. There was no difference in technology value scores for chemistry and nonscience majors. The two largest groups were sorted by gender, and t-tests were conducted to detect value preference differences between the two groups. Generally, there were no significant differences in value preferences based upon gender. There were no significant correlations between the three value preferences scores and course letter grades for nonscience major groups. Lastly, the humanistic and technological value scores were found to be significantly negatively correlated with the scores relating to valuation of theory.

**REFERENCES:** 9 cited.

96. Fennessey, Gail M., Samuel A. Livingston, Keith J. Edwards, Steven J. Kidder, and Alyce W. Nafziger. "Simulation, Gaming, and Conventional Instruction in the Teaching of Ecology." The Journal of Environmental Education, 1974, 5(4):21-24.

**DESCRIPTORS:** attitudes, ecology education, elementary, experimental research, knowledge, middle school, program evaluation, simulations.

**INDEPENDENT VARIABLES:** Grade level, simulation treatments.

**DEPENDENT VARIABLE:** Knowledge and application of ecological facts and concepts presented in the simulation treatment and teachers' resource materials; understanding of social and economic relationships resulting in pollution; and attitudes toward solving pollution problems.

**PURPOSE:** To compare the effectiveness of a simulation exercise, a simulation game, and conventional instruction at the elementary and junior high school levels for (1) the teaching of facts and concepts related to ecology, and both population and pollution problems; (2) the teaching of social and economic relationships that result in pollution, and (3) promoting attitudes favoring attempts to solve some of the problems of pollution.

**SUBJECTS:** 1,874 students in 60 third, fourth and eighth grade classes in Catholic parochial schools in the Baltimore area. Classes at other levels participated in the study, but not in sufficient numbers to justify their inclusion in the analysis of the results.

**RESEARCH DESIGN:** In this post-only control group design, classes were randomly assigned to one of three experimental groups, subject to the restriction that within any one school, all classes were to be assigned to the same treatment. The three experimental groups were involved in either a control, a simulation exercise or a simulation game type of instruction. All participating teachers had volunteered to participate in a study comparing the effectiveness of various methods of teaching ecology. Each teacher was presented with resource and instructional material appropriate to his/her experimental group assignment. Two simulation exercises were selected from the Man in His Environment simulation kit distributed free of charge by the Coca Cola Bottling Co. of Baltimore. One exercise, 'Rescue in Space,' was left intact. The 'Make Your Own World' exercise was adapted into an environmental simulation game. All teachers in the simulation exercise group were instructed to use materials provided as the basis for a teaching unit of ten 45-minute class periods to be taught during a specified two-week period. Teachers in each group met with experimenters and received a letter and set of instructions appropriate to their treatment. Teachers in the two simulation treatment groups were instructed to use the exercise/game at least once, and as often as possible. The effects of the three treatments were measured by means of an objective test and questionnaire given on the tenth (i.e., final) day of the unit. Two tests were used: Test 1 for the third, fourth and fifth grades, and Test 2 for the sixth, seventh and eighth grades. While some items were common to both tests, others were unique to each. The instruments were designed to measure the dependent variables listed above. Instrument validity and reliability scores were not reported.

**RESULTS:** Unweighted mean scores were the basis for comparison among groups and grade levels. Differences among groups on all variables were small. Third and fourth differences were small, with the fourth grade scoring slightly higher. Using a multivariate analysis of variance, the fourth grade difference was the only statistically significant multivariate effect ( $p < .013$ ). Three separate univariate analyses showed that this difference was the result of superiority on fact items included in the simulation ( $p < .0015$ ). Eighth grade scores were not compared to third and fourth grade scores due to differences in test

compared to third and fourth grade scores due to differences in test makeup. Conclusions and implications were presented.

REFERENCES: 10 cited.

97. Fleetwood, George R., and Paul B. Hounshell. "Assessing Cognitive and Affective Outcomes of Environmental Education." Journal of Research in Science Teaching, 1976, 13(1):29-35.

DESCRIPTORS: affective, attitudes, cognitive, ecology education, environmental action skills, secondary.

VARIABLES: Determination of significant environmental concepts which should be included in an achievement test, behaviors indicative of a person with a positive attitude toward the environment.

PURPOSE: To develop a valid and reliable instrument capable of assessing the degree to which high school biology students involved in environmental education programs have assimilated specific environmental concepts and attitudes.

SUBJECTS: Instruments were administered to the biology science classes of seven selected high schools in North Carolina in the fall of 1972. The same 1,633 high school biology students were administered both the Environmental Science Test and the Environmental Attitude Inventory.

RESEARCH DESIGN: The major objectives of environmental education were identified, compiled, and grouped through the use of ERIC's Science, Math, and Environmental Education Information Analysis Center.

The item pool consisted of 232 cognitive and 138 affective statements.

--The Environmental Science Test was prepared to measure the degree to which an individual can demonstrate his understanding of certain environmental education concepts.

--The Environmental Attitude Inventory was a self-report inventory designed to measure the extent to which an individual has positive or negative feelings toward the environment and environmental protection.

RESULTS: The environmental science tests' distribution showed a slight skew, indicating that the test was somewhat difficult for the treatment sample. Scores for environmental attitude inventory reflect an almost normal distribution of scores.

REFERENCES: 7 cited.

98. Flitter, Michael J. "Content Analysis: A Method for Research and Evaluation in Environmental Education." The Journal of Environmental Education, 1978, 9(3):40-49.

DESCRIPTORS: cognitive, issue investigation skills/evaluation, model building, program evaluation.

**VARIABLES:** Research sources, content analysis, characteristics and procedures.

**PURPOSE:** To explain and demonstrate the use of the content analysis method of research investigation.

**SUBJECTS:** Not applicable.

**RESEARCH DESIGN:** A review of the literature resulted in the identification of six major characteristics of content analysis. The author summarized these by suggesting that content analysis was a technique for systematic, objective and quantitative description of communications for use in the social sciences. To demonstrate the use of content analysis, a case study situation requiring decision making on planning alternatives was developed and presented. The case study focused upon future policy decisions for the Shawnee National Forest, Southern Illinois. A summary of data collection methods, analysis, interpretation and conclusions were provided. Of particular interest were the content analysis procedures. These included the identification of, training of and independent analysis work completed by each of seven content analysts for 300 documents. Results on 45 variables used in scoring each document were averaged across the analysts, and summarized on a per document basis. These presented the attitude summaries and respondent characteristics of interest to the planners.

**RESULTS:** Frequencies and percentage distributions for the nine categories of documents were computed. Also, cross tabulations, Pearson's product moment correlation and multiple correlation analyses were computed to see which factors and/or clusters of factors were related to attitudes toward the planning alternatives. Reliability of content analysts was decided by determining the degree to which each judge agreed with the majority of judges on each question. The degree of congruence among judges ranged from 75.3 percent to 86.2 percent. The results of the statistical tests mentioned above were reported in a table format, and briefly described. A summary of the results of this case study use of content analysis was presented. The author concluded that the procedure used in this study showed content analysis to be a reliable way to make currently existing written materials more usable. A final discussion of the potential uses and benefits of use of content analysis was presented.

**REFERENCES:** 9 cited.

99. Force, Ronald W. "A Bibliometric Analysis of the Literature of Environmental Education." The Journal of Environmental Education, 1978, 9(3):30-34.

**DESCRIPTORS:** descriptive research.

**VARIABLES:** Environmental education articles; journals; sources of information; authors cited.

**PURPOSE:** To determine where the majority of the environmental education articles have been published, the publications drawn upon by authors in the field, and the most influential authors in environmental education.

**SUBJECTS:** Not applicable.

**RESEARCH DESIGN:** A Bradford's Distribution Analysis was made of the Current Index of Journals in Education (CIJE) for the period of 1969-1974. From the results of the analysis, the journal which contained the largest number of environmental education articles was identified. A criterion analysis was then made for the sources of information cited in the articles in that journal. Finally, the sources were analyzed for the most commonly cited authors.

**RESULTS:** During the five-year period, 80 journals contained 90 percent of the environmental education articles. The Journal of Environmental Education (JEE) contained the highest percentage of articles indexed (9.33 percent), and was consequently selected for citation analysis. The four journals most frequently cited in JEE included JEE, Science, Science Teacher and BioScience. Overall, the list of cited journals is dominated by those oriented toward the sciences or science education. Of the most-cited authors, the top four included Leopold, Udall, Roth and Stapp.

**REFERENCES:** 5 cited.

100. Fortner, Rosanne W., and Thomas G. Teates. "Baseline Studies for Marine Education: Experiences Related to Marine Knowledge and Attitudes." The Journal of Environmental Education, 1980, 11(4):11-19.

**DESCRIPTORS:** descriptive research, ecology education, formal, issue awareness/knowledge of issues, marine education, secondary.

**VARIABLES:** Attitudes and knowledge about the marine environment.

**PURPOSE:** To provide information about the level of marine knowledge, attitudes, and related experiences of tenth grade students living in Virginia.

**SUBJECTS:** 787 tenth graders from 30 Virginia schools were sampled. The schools were selected by a stratified sampling program based on proximity to the coast; 366 of the subjects lived inland. Intact classes from each school were used to represent as nearly as possible the entire range of student ability levels.

**RESEARCH DESIGN:** The Survey of Oceanic Attitudes and Knowledge (SOAK) was administered during one class period. SOAK is a three-part instrument which includes an attitude section using a four-step Likert scale, a multiple-choice knowledge section, and a Marine Experience Profile section. The knowledge section was administered in three forms which were shown equivalent using a chi-square analysis.

**RESULTS:** Student performance on the knowledge section resulted in a statewide average score of 12.5 (49 percent) out of a possible 25 with coastal students scoring significantly higher (12.9 points, 52 percent) when compared with inland student scores (11.9 points, 40 percent). 93 percent of the subjects expressed positive attitudes towards marine issues with no differences observed between inland and coastal regions. Comparison of attitudes and knowledge using a Pearson product-moment correlation revealed a significant positive relationship ( $r = .43$ ,  $p < .01$ ) between the two. Mean scores for the knowledge section were found to be significantly different with regard to race, sex, and residence. In the case of attitudes, white coastal males exhibited the most positive attitude. Students perceived marine-related television programs and movies as having the highest influence on their knowledge about the ocean.

**REFERENCES:** 8 cited.

101. Foxx, Richard M., and Don F. Hake. "Gasoline Conservation: A Procedure for Measuring and Reducing the Driving of College of Students." Journal of Applied Behavior Analysis, 1977, 10(1):61-74.

**DESCRIPTORS:** behaviors, conservation education, educational background, experimental research, higher education, knowledge.

**INDEPENDENT VARIABLE:** Inducements (prizes) for reduced number of miles driven.

**DEPENDENT VARIABLE:** Number of miles driven per day.

**PURPOSE:** To develop a methodology for measuring driving behavior and to use it to reduce the nonessential driving of college students.

**SUBJECTS:** The study took place at a commuter college with only 16 percent of the students living on campus. University students in a developmental psychology course and an abnormal psychology course were asked to volunteer for a study on driving habits. Volunteers meeting a specified criterion were accepted. Nine students in the developmental psychology class (control group) and 12 students in the abnormal psychology class (experimental group) participated throughout the study.

**RESEARCH DESIGN:** A nonrandomized control group, pretest-posttest design was used. Two conditions were imposed on the experimental group. (A) A baseline condition in which no consequences were attached to driving behavior and (B) a reinforcement condition in which subjects were rewarded for decreasing their average miles driven per day. The experimental group received the ABA treatment. The control group received the baseline conditions throughout the study. The reinforcement condition ran for one month. Data were collected on the average daily mileage traveled by each subject. Several special recording procedures were used to reduce and detect the possibility of subjects altering their odometers, the source of the driving data, providing a nearly 100 percent reliable measure. On the day of the final baseline odometer check, each experimental subject was given a

personal fuel conservation guide which listed mileage reduction goals from 10 to 50 percent and the prizes awarded for each degree of reduction. The prizes served as the reward system for the experimental group.

RESULTS: Analysis of the average daily mileage showed that experimental subjects reduced their average daily mileage by 20 percent relative to the initial baseline. The control group did not change. No levels of significance were reported by the author.

REFERENCES: 6 cited.

102. Frankena, Frederick. "Evidence of a Shift in the Social Science Perspective on Energy: A Content Analysis of Geo Abstracts, Part C: Economic Geography, 1966-1978." The Journal of Environmental Education, 1980, 12(1):40-44.

DESCRIPTORS: energy education, historical research, hypothesis generation, issue-based.

VARIABLES: Volume and content characteristics of energy abstracts and citations.

PURPOSE: To determine the absolute and relative growth of the literature on energy in economic geography, as well as the prospective, qualitative change in this literature. The research hypothesis states that the social sciences experienced a relative growth in attention and a shift in perspective on energy, following the events of 1974.

SUBJECTS: Not applicable.

RESEARCH DESIGN: For each volume data were collected for the number of energy citations and compared to the total number of abstracts found in Geo-Abstracts, Part C: Economic Geography (1966-1978). A qualitative discrimination of abstract content was pursued according to a 'commodity approach' typology. Both citations and abstracts were evaluated for the predominating approach, either explicit or implicit. Instrument validity and reliability scores were not reported.

RESULTS: The energy-related events of 1974 appear to have modestly influenced trends in the social science literature. The proportion of energy to total citations ranged from 5 to 8 percent in 1968-1973 volumes, but rose sharply to between 12 and 15 percent after 1974. The systems approach data also indicated a slight shift in perspective, ranging from approximately one percent of energy abstract approaches prior to 1973, to approximately 4 percent in 1973 through 1975, and more significantly, to approximately 10 percent in 1976 and 1977. Despite earlier contributions, the energy-related events of 1974 appear to have contributed to the expansion of both the literature on and approach to energy topics.

REFERENCES: 17 cited.

103. Friedman, Sharon, Rae Goodell, and Lawrence P. Verbit. "The Directory of Science Communication Courses and Programs." The Journal of Environmental Education, 1979, 10(4):33-34.

DESCRIPTORS: descriptive research, formal, higher education, language arts.

VARIABLES: Science communications courses and programs in colleges in the United States.

PURPOSE: To survey educational activities in the field of science communication and to note faculty members in the sciences who were involved in the instruction of these courses.

SUBJECTS: Instructors of and courses in science communication at the university level in the United States. To obtain subjects, notices were placed within nine newsletters requesting instructors to contact the science communications group. Also a registration desk was set up at the 1977 meeting of the American Association for the Advancement of Science. Approximately 150 questionnaires were mailed to schools obtained from a 1977 study by Patterson and Fraley and from the 1977 Journalism Educator Directory; 74 responses were received and 63 were included in the directory.

RESEARCH DESIGN: A two-part questionnaire was used in seeking brief descriptions of courses and programs in science and environmental writing.

RESULTS: The Directory of Science Communication Courses and Programs was published in February 1978. It lists 34 programs and 105 courses from 58 colleges and universities in the United States. Ten graduate and 24 undergraduate programs are listed. Approximately one-third of the programs are housed in schools of science, medicine, or natural resources. Of the 105 courses, 45 teach traditional science writing while six courses were devoted specifically to environmental writing.

REFERENCES: 4 cited.

104. Gardella, J. Ronald. "An Analysis of Two Strategies for Increasing Teacher Awareness and Use of Community Resources." Current Issues V, 1979, 136-146. ED 180 822.

DESCRIPTORS: community resource, experimental research, hypothesis generation, teacher training inservice.

INDEPENDENT VARIABLE: Resource guide development workshop.

DEPENDENT VARIABLE: Teacher awareness and use of the community as a resource.

PURPOSE: Analysis of teacher awareness and use of community resources after being trained in a resource guide development workshop as compared to teachers who never received training but were given the developed guide to the same resources.



**SUBJECTS:** 72 elementary school teachers from Monmouth County, New Jersey, participated. All elementary teachers in Monmouth County were invited to participate, but every fifth applicant was selected until 72 maximum was reached.

**RESEARCH DESIGN:** A pretest-posttest control group design involving two treatment groups was utilized with one group receiving a 20-hour workshop in resource guide development and the second group receiving no workshop. The test instrument was divided into two parts--Part I being devoted to demographic data. Part II measured the participants' awareness of community resources through their responses to an awareness scale and the participants' use of community resources. The Likert scale was used in order for the participants to answer cognitive and attitudinal questions. Validity of the test instrument was established by a jury of professional educators, and reliability was established on the basis of pretest-posttest comparison of the control group. Data were analyzed using multilinear analysis (including person vectors).

**RESULTS:** The F-ratio value, differential variance, directional probability level, mean, standard deviation, and alpha level were computed. Training through workshop significantly increased awareness and use by teachers of the community as a resource. Simply giving the resource guide to teachers did not increase awareness, whereas it did increase the use but not to as great an extent as in conjunction with the workshop. The workshop and/or the availability of a community resource guide did not create an overall attitude change in the teachers concerning the use of community resources. However, teacher understanding of the techniques for use of the community resource increased by both the workshop and availability of the guide. Within group comparison showed that the workshop accounted for a higher amount of group variance (53.33 percent) of the total (58.79 percent) than did availability of the guide (36.74 percent). Deterrents to the use of the community ranged from hindering administrative policies and cost of trips to student safety and teacher liability.

**REFERENCES:** 11 cited.

105. Geisler, Charles C., Oscar B. Martinson, and Eugena A. Wilkening. "Outdoor Recreation and Environmental Concern: A Restudy." Rural Sociology, 1977, 42:241-249.

**DESCRIPTORS:** affective, attitudes, cognitive, conservation education, descriptive research, economic background, educational background, ex post facto, inquiry, knowledge, outdoor education.

**VARIABLES:** Age, sex, income, education, size of place of residence, outdoor recreation involvement, environmental concerns.

**PURPOSE:** To test hypotheses proposed by Dunlap and Hefferman (1975): (1) Involvement in outdoor recreation is positively associated with environmental concern; (2) The association is stronger between appreciative than between

consumptive activities and environmental concern. In addition to determine whether environmental concern is affected more by characteristics in respondents.

**SUBJECTS:** 1,423 permanent residents, at least 18 years of age. All subjects were from 19 counties in northwestern Wisconsin.

**RESEARCH DESIGN:** A correlational study using closed interviews which were conducted with respondents asking them to classify a list of environmental problems anywhere from "very serious" to "no problem." Secondly, respondents were asked whether public expenditures for protection of land resources should be increased, kept at current levels, or cut back. Zero-order and partial correlation coefficients between outdoor recreational activities and environmental concern were used.

**RESULTS:** At the zero-order level some support was found for the first hypothesis (about half of correlations between problem awareness and recreation and between support for public action and recreation were significantly correlated at the .01 level). Data, however, did not provide support for the second hypothesis.

The partial correlation analysis suggested environmental concern is affected more by respondent characteristics than by recreational habit in northwestern Wisconsin (age being most influential predictor of environmental problem awareness).

**REFERENCES:** 19 cited.

106. Geller, E. Scott, John C. Farris, and David S. Post. "Prompting a Consumer Behavior for Pollution Control." Journal of Applied Behavior Analysis, 1973, 6(3):367-376.

**DESCRIPTORS:** attitudes, behaviors, conservation education, experimental research, knowledge, resource management education.

**INDEPENDENT VARIABLE:** Prompting procedures in the form of distribution of handbills.

**DEPENDENT VARIABLE:** Bottle-buying behaviors in terms of returnables and nonreturnables.

**PURPOSE:** To study the relative effectiveness of different prompting procedures to influence a decision to purchase soft drinks in returnable rather than nonreturnable containers.

**SUBJECTS:** Subjects were all individuals who purchased soft drinks at the 7-Eleven store in Blacksburg, Virginia during the study period. Approximately half of the city is made up of university faculty and students, the remainder of farming and/or industry workers.

**RESEARCH DESIGN:** This pre-experimental study consisted of six different two-hour experimental conditions: (1) no prompt (control), (2) one

student giving out handbills, (3) one student with handbills plus a publicly displayed chart, (4) handbills plus five students, and (5) handbills plus three female students. Customers were recorded as purchasing mainly returnable or nonreturnable bottles purchased under each experimental prompting condition, by both the cashier and an independent data recorder. High interreliability of the independent data reports was demonstrated.

**RESULTS:** The number of returnable and nonreturnable bottle customers under each experimental condition was compared. The lowest proportion of returnable bottle customers occurred during the No-Prompt condition. Comparisons between the different prompting methods showed no consistent variation. The variant prompting techniques were equally effective and, in general, increased the percentage of returnable bottle customers by an average of 259.

**REFERENCES:** 7 cited.

107. Geller, E. Scott, Jill F. Witmer, and Andra L. Orebaugh. "Instructions as a Determinant of Paper-Disposal Behaviors." Environment and Behavior, 1976, 8(3):417-439.

**DESCRIPTORS:** behaviors, citizen action, citizenship education, experimental research, unobtrusive.

**INDEPENDENT VARIABLE:** Nature of instructions printed on handbills, sex of participant.

**DEPENDENT VARIABLE:** Littering behavior.

**PURPOSE:** To determine if the nature of instructions printed on handbills affected littering behavior.

**SUBJECTS:** 8,460 customers of two grocery stores. Customers high school age or older participated.

**RESEARCH DESIGN:** In this unobtrusive study customers of two grocery stores were handed handbills with various anti-litter messages on them as they entered the store. The researchers then tallied where the handbills were disposed of in relation to the printed instructions.

**RESULTS:** Chi-square tests for homogeneity were calculated. Anti-litter messages on handbills reduced littering by more than 50 percent. Specific instructions for disposal of the handbills were not more effective. However, instructions that conveyed a rationale for disposal (recycling) were slightly more effective. Implications for future research were given.

**REFERENCES:** 14 cited.

108. Goodman, Robert F., and Bruce B. Clary. "Community Attitudes and Actions in Response to Airport Noise." Environment and Behavior, 1976, 8(3):441-470.

- DESCRIPTORS:** attitudes, behaviors, citizen action. descriptive research, issue-based, preferences, urban.
- VARIABLES:** Political activism, objective and subjective indicators of noise, socioeconomic status.
- PURPOSE:** To analyze how communities respond to airport noise.
- SUBJECTS:** 239 people from a disproportional stratified sample of individuals residing in the communities adjacent to Los Angeles International Airport were interviewed. The sampling list was obtained from the local telephone directory. Only two of the 241 persons contacted refused to participate. In a second survey, 28 homeowners whose property had been purchased by the airport were interviewed.
- RESEARCH DESIGN:** Individuals from six communities all adjacent to the Los Angeles International Airport were interviewed by telephone. The respondents' perceptions of airport noise, exposure to noise, activities affected by noise, political activism, socioeconomic status, and attitude toward the airport's sense of political responsibility were all assessed. A Guttman Scale, four-point scale, dichotomized scale, and a Noise Exposure Forecast Contour were all used in the survey instrument. Reliability and validity coefficients were not reported.
- RESULTS:** Tau-c correlations and dummy variable regression were performed on the data. Politically active people tend to be more annoyed with airport noise than nonpolitically active people. There is also evidence of the relationship between annoyance and the level of noise. Political activists tended to feel the airport was not responsive to the noise problem; they also tended to live in more affluent areas.
- REFERENCES:** 32 cited.

109. Gross, Michael P., and Edward L. Pizzini. "The Effects of Combined Advance Organizers and Field Experience on Environmental Orientations of Elementary School Children." Journal of Research in Science Teaching, 1979, 16(4):325-331.

- DESCRIPTORS:** affective, attitudes, cognitive, field trip, multidisciplinary-infusion.
- VARIABLES:** Variables include orientations of elementary students concerning the value of wilderness and its preservation.
- PURPOSE:** To analyze the effects of an environmental education program on the environmental orientations of upper level elementary students, and development of environmental orientations of elementary students concerning the value of wilderness and wilderness preservation.
- SUBJECTS:** The sample included fifth and sixth grade students from schools within Jasper County, Iowa. The pretest group consisted of 70 students chosen randomly from the population--5 students from each of 14 fifth grade classes; 66 responses were evaluated from this group. The

remaining 225 students not selected for pretesting served as the fifth grade posttest group. A random sampling of 5 sixth graders from 17 sixth grade classes who had received treatment one year previously were tested at the same time as the fifth grade posttest group.

**RESEARCH DESIGN:** The design used in this study is referred to as a "separate sample pretest posttest design" (Campbell & Stanley, 1963). A fifth grade unit, Woodlands and Me, was designed to serve as an advance organizer for studies in a wilderness community, the woodlands of Iowa. Students were involved in activities exploring concepts and knowledge about woodlands and certain environmental problems regarding woodlands in Iowa. The unit was presented to the students by their teachers during March and April prior to a one-day field experience in a woodland preserve in May. The field experience incorporated activities suggested by Van Matre (1972, 1974) specifically designed to develop in children sensory and conceptual perceptions and feelings about their natural world.

**RESULTS:** The posttest grade 5 and posttest grade 6 were significantly different when the mean scores were compared to that for the pretest grade 5. The attitudes measured by this instrument advanced in a more positive direction, and the development was stable one year later.

**REFERENCE:** 17 cited.

110. Haakonsen, Harry O., Lawrence M. Schaefer, and Dwight G. Smith. "A Self-Instructional Approach to Environmental Decision Making: Focus on Land Use." The Journal of Environmental Education, 1977, 8(3):17-25.

**DESCRIPTORS:** cognitive, community resource, descriptive research, environmental action skills, individualized instruction, issue investigation/evaluation skills, program development, program evaluation, resource management education.

**VARIABLES:** Audio-tutorial system factors, need for community education in land use decision making, audio-tutorial land use units and unit format elements.

**PURPOSE:** The purpose of the Land Use Decision-Making Kit (LUK) was to develop informational background, skills, and exposure to issues and concepts considered useful to citizens involved in the land use decision-making process via a self-instruction audio-tutorial system.

**SUBJECTS:** Needs in land use decision making were identified via questionnaire by decision makers in Connecticut towns, and via input from a consultant group representing various environmental fields. Consultants also developed each unit script, objectives and bibliography. A team of editors reviewed and revised the consultants' work. Field testing was done by voluntary secondary schools, colleges and community centers.

**RESEARCH DESIGN:** The staff at E-P Educational Services in New Haven, Connecticut, identified a generic need in the field of land use planning: to develop an environmentally conscious citizenry which was capable of making enlightened decisions concerning state and local land use planning. Specific local needs were identified via a questionnaire and from consultant group input. A preliminary list of 30 topics was narrowed to 16 major topics. Those topics formed the basis of the LUK units, with each topic being assigned to consultants with expertise in that topic field. An earlier decision had been made to develop the units in an audio-tutorial instructional format. Consultants developed script outlines, objectives, and bibliographies for each topic according to that format. Topic outlines also incorporated appropriate media and support materials. Though each unit was designed to be self-contained allowing for selection according to study interests, care was taken to provide a unity of both format and emphasis. Field testing and subsequent revision phases were completed prior to mass distribution.

**RESULTS:** The final format for each topic unit included: a list of behavioral objectives and special instructions found in the set of guide sheets, an audio-tutorial tape, a glossary of terms, an annotated bibliography, and supplemental materials. The land use kit provided 15 hours of tape and for 45 hours of instruction, and may be customized for specific state or community use through the selective addition of local support materials. An analysis of the correlation between actual land use decision-making skills/problems and the material covered in the kit's 16 units was presented in a matrix format. A similar analysis between land use issues and the material covered was also presented in matrix format. Both matrices were provided in the kit, allowing for accessing and cross-referencing LUK information. Due to the high cost of materials, an HEW grant allowed the developers to distribute free copies to Connecticut towns whose representative participated in one of seven regional training and distribution workshops. Additional kits were reportedly in use in a variety of state agencies, 24 colleges and over 100 high schools and community agencies.

**REFERENCES:** 5 cited.

111. Hart, Paul, and Milton McClaren. "Attitudes of High School Students toward Environmentally Oriented Issues." Science Education, 1978, 62(4):497-508.

**DESCRIPTORS:** attitudes, descriptive research, rural, secondary, urban.

**VARIABLES:** Attitudes toward environmental issues.

**PURPOSE:** To investigate the attitudes of high school students as potential decision-making citizens toward current environmental issues and their possible implications for the future.

**SUBJECTS:** 382 twelfth graders from five senior secondary schools in British Columbia, Canada, were selected as samples according to stratified random sampling procedures. Two schools were located in a highly urbanized area and the other three were rural-type schools. Students were further classified by science background and gender.

**RESEARCH DESIGN:** The instrument consisted of the Likert-type factor attitude scales developed as the Inventory of Societal Issues by Steiner and Barnhart. Reliability and validity estimates were reported by Steiner. Total: 382 students; 204 males, 178 females; 160 urban, 222 rural; 94 nonscience, 110 intermediate science, 178 science backgrounds.

**RESULTS:** There seems to be little difference between science and nonscience students in their responses to individual test items. Students with science courses are generally more likely to agree that environmental quality is neglected when economic considerations are involved.

**REFERENCES:** 10 cited.

112. Hayes, Steven C., V. Scott Johnson, and John D. Cone. "The Marked Item Technique: A Practical Procedure for Litter Control." Journal of Applied Behavior Analysis, 1975, 8(14):381-386.

**DESCRIPTORS:** affective, behaviors, citizenship education, environmental action skills, pre-experimental.

**INDEPENDENT VARIABLE:** Incentive procedure designed to induce litter collection.

**DEPENDENT VARIABLE:** Number of pieces of litter collected remaining in the study areas.

**PURPOSE:** To evaluate the effectiveness of an incentive procedure designed to induce collection of all sizes of marked litter.

**SUBJECTS:** 130 inmates of the Robert F. Kennedy Youth Center, a federal prison in Morgantown, West Virginia, were given the opportunity to participate in the incentive program. This comprised the entire population of two cottages. All subjects were males between the ages of 13 and 28; 32 persons, about 25 percent of those eligible, actually participated in the collection of litter.

**RESEARCH DESIGN:** The pre-experimental design employed a multiple-baseline, one for each of the four areas on which litter counts were made. A baseline period was in effect for 17, 22 and 36 days respectively, in Areas 1, 2 and 3. Area 4 remained a baseline only control area. Pieces of trash were collected, marked unobtrusively, and returned to the areas of study. Inmates were informed by flier of the marked litter which they could pick up in their free time and for which they would receive an incentive. In order to test the possible effects of simply asking subjects to pick up litter, subjects were told a second area was their "area of responsibility," although it would not be planted with marked items.

**RESULTS:** Litter counts in each of the four areas showed that exhortation alone did not decrease litter. However, implementation of the marked item technique reduced litter in planted areas. Expressed as

a percent of baseline litter, average reductions were 55, 88 and 71 percent respectively, for Areas 1, 2 and 3. Alpha levels were not reported.

REFERENCES: 7 cited.

113. Heberlein, Thomas A. "Social Psychological Assumptions of User Attitude Surveys: The Case of the Wildernism Scale." Journal of Leisure Research, 1973, 5(Summer):18-33.

DESCRIPTORS: attitudes, behaviors, beliefs, citizen action, model building, theoretical research.

VARIABLES: Attitudes, beliefs, behaviors.

PURPOSE: To re-examine existing research to determine user attitude surveys to managers.

SUBJECTS: None.

RESEARCH DESIGN: In this theoretical research the author presents the hypothesis that "surveys of user attitudes often neither help managers meet user needs nor preserve recreational resources because these studies have little grounding in attitude theory." To explore this hypothesis, three issues in attitude theory are discussed and their relevance for user attitude surveys illustrated. Existing research is re-analyzed in view of the theory proposed.

RESULTS: The author concluded that "the organization of attitude--vertical and horizontal structures and their centrality to the actor--is as important as individual preferences." In addition, it is unlikely that knowledge of user attitudes can help the manager either predict or change user behavior since the bulk of empirical material studies suggest there is no clear linear relationship between single attitudes and behavior. Finally, evidence is presented to show that the possibility of changing user attitudes is very low.

REFERENCES: 30 cited.

114. Hepburn, Mary A. "Environmental Knowledge and Attitude Changes in a High School Program of Interdisciplinary Social Studies and Science Education." Current Issues IV, 1978, 175-185. ED 167 407.

DESCRIPTORS: affective, cognitive, experimental research, interdisciplinary, issue identification skills, issue investigation/evaluation skills, program evaluation, science education, social science education.

INDEPENDENT VARIABLE: The curriculum module.

DEPENDENT VARIABLE: Competency in environmental problem-solving and positive changes in environmental attitudes.

PURPOSE: Evaluation of an interdisciplinary science/social studies curriculum module.



**SUBJECTS:** Four classes of ninth graders (totaling 83 students with a control group of 27 of the 83 students) and 6 classes of slower tenth-grade students totaling 106 with a control group of 21 of the 106 students). There were four treatment groups in each grade level (purely science module, purely social studies module, interdisciplinary module, no environmental instruction).

**RESEARCH DESIGN:** A pretest, posttest evaluation for the cognitive area was utilized and a Likert-type instrument measured student environmental attitudes. Reliability coefficients were determined by calculating Cronbach's coefficient alpha (attitude test was more reliable).

**RESULTS:** Cognitive test data were analyzed by ANCOVA, along with means, standard deviations and adjusted means. Attitude data were analyzed by Analysis of Covariance of the posttest (pretest score was covariate). Post hoc tests were done on cognitive and attitude treatment group means (a significant difference between groups was found in ANCOVA). For ninth graders ANCOVA of the posttest showed a significant difference between groups (.001 level-cognitive; .01 level-attitude change for growth subtest) with the interdisciplinary group scoring the highest adjusted mean. ANCOVA for the tenth grade produced an F-value significant at less than the .05 level on the cognitive test and a significant difference at the .01 level on the growth subtest in attitude change. The tenth grade interdisciplinary group also had the highest adjusted mean.

**REFERENCES:** 19 cited.

115. Hershey, Marjorie Randon, and David B. Hill. "Is Pollution 'A White Thing'?" Racial Differences in Preadults' Attitudes." Public Opinion Quarterly, 1977, 41:439-458.

**DESCRIPTORS:** attitudes, descriptive research, educational background, ethnic group, social background.

**VARIABLES:** Attitudes, race, SES, education level, exposure to pollution, exposure to information, political efficacy.

**PURPOSE:** To compare blacks' and whites' attitudes toward environmental issues, correcting for factors thought to explain racial differences in attitudes--socioeconomic status (SES), years of education, exposure to information, actual and perceived levels of pollution exposure, and sense of efficacy.

**SUBJECTS:** 2,012 subjects were chosen by stratified random sampling of Florida public schools. The sampling was stratified on two factors: city size, and observable pollution level of the sampling area, based on data from the Florida Department of Pollution Control. Six sampling areas were chosen--two central cities, two suburbs and two small town rural areas, with one of each pair in a high pollution area and the other in a low pollution area. Within each sampling area, two

elementary, two junior high and two high schools were chosen at random from lists provided by the school boards. All schools approached by the authors participated. Surveys were administered to one classroom at each target grade level (2, 4, 6, 8, 10, 12) in each school, with the following restrictions: (1) the class had the same racial and SES mix as the student body, (2) the class was not restricted to gifted or slow students, and (3) the class was not an elective course. The sample consisted of 70.1 percent whites and 29.9 blacks, 50.2 percent females and 49.8 percent males, which was virtually identical with the state's public school population. Additionally, 40.0 percent lived in central cities, 27.8 percent lived in suburbs, and 32.2 percent lived in small town rural areas, very similar to the 1970 Census findings for the state.

**RESEARCH DESIGN:** For subjects in grades 2-6, shortened versions of the survey were developed. Shortened versions were read aloud to subjects in grades 2 and 4 and to any classes with reading problems. The questionnaire was pretested on another set of students ( $N = 306$ ) to measure and eliminate set biases. To measure the subjects' conceptualization of pollution, a series of eight pictures were shown that illustrated forms of pollution. Five of the pictures were ranked by the authors on a gradient of easiest to hardest and formed a Guttman scale with a coefficient of reproducibility of .92 and a coefficient of scalability of .64. To measure interest in the causes of pollution, a one-item statement ("Pollution just happens. It isn't anybody's fault.") was included with a five-point Likert scale (agree-to-disagree continuum). To measure the subjects' interpretation of environmental issues, three dilemmas relating to environmental quality were included with fixed-choice responses, the responses being determined from the most common answers given during a pretest. SES was determined by asking the subjects to list their father's/mother's occupation, military personnel and farmers being excluded from the data. Exposure to information levels were measured by asking "How much do you hear about pollution from teachers in school?" and "...much do you hear from books and newspapers?" No validity was reported.

**RESULTS:** Data were presented in both narrative and graphic form, generally reported on the percentage response for each data category. For the three dilemma items, the data were presented as the percentage of whites choosing a particular answer minus the percentage of blacks choosing the particular answer. These data were correlated with responses to the "Pollution just happens" item using Somers'  $d_{yx}$  as the measure of association. Somers'  $d_{yx}$  was also used in determining racial differences, controlling for the variables education level, exposure to information, pollution exposure, and sense of political efficacy, while measuring for association between the picture scale and "Pollution just happens."

To confirm the effects of SES, two-way ANOVA was performed using the picture scale as the dependent variable. The authors reported the F-ratio and alpha. To confirm the effects of information exposure, the authors conducted a quasi-experimental design using a second sample of subjects. In this experiment, the experimental group ( $N = 113$ ) received an intensive program in environmental studies and the control group ( $N =$

248) received no environmental information. To confirm the contributions made by all the variables under study, a hierarchical multiple regression analysis was performed. The authors reported Beta, F-ratio and b. Levels of significance were reported where appropriate.

On the pollution picture scale, 31.7 percent of the whites scored 4 or 5 (maximum score = 5) compared to 13.8 percent of the blacks, indicating that the whites held a more complex and elaborate definition of pollution. Whites were more likely to disagree with the statement "Pollution just happens" ( $d_{yx} = .30$ ,  $\gamma = .51$ ). Based on the responses to the three dilemmas, whites are more likely to emphasize society's interest in protecting the environment, are more likely to see pollution as a societal problem rather than as a concern for only certain groups or individuals, and are more likely to conceptualize pollution in its less obvious as well as more obvious forms. These differences continue to hold controlling for SES, exposure to pollution levels, and sense of efficacy. The data were less clear when controlling for age--at grades 6-10 the racial differences were greatest, suggesting to the authors the possibility of a cohort effect, whereby subjects in these grades were influenced by the founding of the ecology movement, an experience not shared by the older or younger students. The authors noted that an alternative explanation was the effect of aging, and that as the subjects grew older, they increasingly attributed different meanings to environmental issues. The authors concluded that racial differences in attitudes toward the environment represent a distinct black subculture in America, whereby black children learn distinct evaluations of the political process. By extension, the authors implied, all evaluative processes are learned in this manner.

REFERENCES: 31 cited.

116. Herzog, Thomas R., Stephen Kaplan, and Rachel Kaplan. "The Prediction of Preference for Familiar Urban Places." Environment and Behavior, 1976, 8(4):627-645.

DESCRIPTORS: experimental research, preferences, urban.

INDEPENDENT VARIABLE: Presentation method.

DEPENDENT VARIABLE: Preference, familiarity, complexity.

PURPOSE: To examine the effect of three different presentation methods on preferences, familiarity and complexity.

SUBJECTS: 121 introductory psychology students participated in the study. Participation in the study fulfilled a course requirement.

RESEARCH DESIGN: Participants rated 86 scenes from the City of Grand Rapids, Michigan, for familiarity, preference, and complexity. A five-point Likert-type scale was used. There were three experimental conditions based on the method of presentation. In the slide condition, participants were shown the slide while the name and location were given. The label condition consisted of providing only the name and

location of the scene. Participants were asked to imagine the scene after being told its name and location for the imaginary condition.

**RESULTS:** The Guttman-Lingoes Smallest Space Analysis III was used to analyze the data. Five dimensions, based on the preference ratings of the slides, were identified. The five dimensions were as follows: the cultural dimension, the contemporary dimension, the commercial dimension, the entertainment dimension, and the campus dimension. Familiarity and complexity were found to account for a portion of the preference ratings ( $r = .51$  and  $.43$ , respectively). No significant differences were found when preference, familiarity and complexity ratings were compared (ANOVA) across the three experimental conditions.

**REFERENCES:** 23 cited.

117. Holland, R. William. "Communications Approaches to a Cleaner Environment." The Journal of Environmental Education, 1974, 6(1):38-42.

**DESCRIPTORS:** behaviors, citizen action, citizenship education, community resource, issue investigation/evaluation skills.

**VARIABLES:** Personnel and factors involved in analyzing, taking action on and responding to actions taken on a local environmental issue.

**PURPOSE:** (1) to present background information and data on responses by the Mayor of Riverside, California to smog buildup in the community, (2) to analyze potential problems encountered by politically active environmental groups concerning their objectives and the means to secure them.

**SUBJECTS:** The 'actors' within the case study include the Mayor, local citizens, and Chamber of Commerce of Riverside, Dr. R. Loveridge, state officials especially the local pollution control board, and Governor Reagan.

**RESEARCH DESIGN:** This descriptive research was an indepth case study. The authors presented background information and events associated with the Mayor's reponse to smog problems in the City of Riverside, California. This set the stage for an analysis of the Mayor's behaviors. Background information and events indicated the population figures for Riverside, portions of a letter from the Mayor to the Governor, an appearance before the U.S. Senate, actions by the State Pollution Control Board, the opening of a natural gas station (i.e., for auto fuel) and accompanying auto conversion facility, an anti-smog campaign and responses to the Mayor by the Chamber of Commerce and state officials.

**RESULTS:** Analysis of data indicated that the Chamber of Commerce recognized that the Mayor's behaviors could result in unintended effects, including business decline, decline in migration to the city due to its 'dirty' reputation, and threats to the then rising values of housing and property. One actual outcome was the decline in enrollment

at the local university. The sought outcome, a decline in smog levels as a result of citizen behavior, never materialized. The Mayor's failure to promote action toward the resolution of Riverside's smog problem can be explained partially in terms of his insensitivity to other interests in the community. The problems with one of the Mayor's proposed and promoted solutions, those of the natural gas conversion experiment, are of a more fundamental nature. The cost was high to convert a car to run on natural gas (\$500), there was only one natural gas station in operation in California (Riverside), and conversion was not likely to reduce the volume of smog drifting into Riverside from nearby Los Angeles and Orange Counties. An analysis of each of these above problems was reported. The author closes with a question: Is it sufficient to inform environmentalists what they should avoid doing without communicating what they should do? While the former appears easier, the latter apparently involves yet-to-be-developed political insight.

REFERENCES: 6 cited.

118. Holtz, Robert. "Nature Centers, Environmental Attitudes, and Objectives." The Journal of Environmental Education, 1976, 7(3):34-37.

DESCRIPTORS: affective, attitudes, descriptive research, elementary, environmental center, nonformal.

VARIABLES: Opening dates of the nature centers, objectives and change in objectives of nature centers' environmental programs.

PURPOSE: To identify (1) the opening dates of select nature centers throughout the country; (2) whether those nature centers have recently changed the objectives of their environmental education programs; and (3) whether the programs were designed to change peoples' environmental attitudes.

SUBJECTS: Questionnaires were mailed to directors of 160 nature centers representing 34 states. These nature centers were selected from a National Audubon Society publication which indicated that these centers provided environmental education programs for elementary school children. 89 questionnaires, representing 55 percent of those mailed, were returned from 28 states.

RESEARCH DESIGN: In this descriptive study, questionnaires were mailed to nature centers in 1973 to collect information on the variables listed above. Instrument validity and reliability information were not reported.

RESULTS: Of the 89 centers returning questionnaires, 81 included the year which they opened. Of those centers, 32 percent opened in the five-year period prior to 1973 49 percent opened within a seven-year period prior to 1973 and 30 percent opened prior to 1960. 60 percent of the respondents indicated their nature center had changed the objectives of their environmental education programs within the eight-year period

prior to the study. 99 percent of the nature centers either specifically or indirectly hope to change environmental attitudes of their program participants. 36 percent of those respondents made some specific attempts to achieve this change. No nature center director believed his program had no effect on peoples' attitudes. It was the writer's contention that specific environmental attitude objectives need to be developed by the staffs of nature centers.

REFERENCES: 2 cited.

119. Honnold, Julie A., and L. D. Nelson. "Public Opinion Regarding Energy Conservation." The Journal of Environmental Education, 1978, 9(4):20-29.

DESCRIPTORS: attitudes, beliefs, descriptive research, energy education, issue-based.

VARIABLES: Public opinion on energy problems and presidential policies as related to socio-demographic data.

PURPOSE: To survey the general public's opinion regarding President Carter's Energy Policy, and to identify sociodemographic patterns within the survey population.

SUBJECTS: The sample was composed of 426 randomly selected heads of household from a southern city with a metropolitan population of 500,000.

RESEARCH DESIGN: Telephone numbers were randomly selected from the survey area and telephone interviews were conducted during two weeks in April, 1977. Responses were recorded and tallied.

RESULTS: Percentages were calculated and a stepwise sequential multiple regression analysis was completed on all information gathered for socio-demographic variables. Results indicated that three-fourths of those interviewed were familiar with President Carter's Energy Policy; 75 percent of those familiar with the policy agreed with it. Favorableness toward the policy was significantly associated with the following socio-demographic variables: lower income, higher education, youth and non-white race. Further data delineation is incorporated into the article. Extensive discussion of specific results is presented.

REFERENCES: 10 cited.

120. Horn, B. Ray. "World Environmental Communication and Education Needs: How They Vary What It Means." Current Issues IV, 1978, 24-39. ED 167 407.

DESCRIPTORS: descriptive research, economic background, ethnic group, program development, social background.

PURPOSE: Research into the development of a global environmental education program as a result of a UNESCO-UNEP study.

**SUBJECTS:** 136 countries represented by multidisciplinary teams which consisted of people from different social sectors and interests (not only environmental experts and officials, but also representatives of citizens groups and policymakers).

**RESEARCH DESIGN:** A 177-item questionnaire was sent to each country, with a response rate of 83 percent. It asked for qualitative and quantitative information for seven major categories of interest needs concerning environmental education. Other data were gathered from official United Nations statistical documents, special public and in-house reports, and from environmental education consultant missions to 83 countries.

**RESULTS:** The interest needs of different regions were compared and contrasted with a worldwide baseline 71 percent of the countries surveyed had "very high" needs for environmental education resources. Specific needs and themes were evaluated and were found to differ from region to region, although they were all dynamic and interconnected. Suggestions were made as to how environmental education programs can be implemented on a global basis.

**REFERENCES:** 42 cited.

121. Horvat, Robert E. "How Young Children View Their World: The Assessment and the Implications for Environmental Education." Current Issues III, 1977, 114-122. ED 150 018.

**DESCRIPTORS:** affective, attitudes, beliefs, cognitive, economic background, elementary, hypothesis generation, intelligence, issue-based, middle school, preferences, social background, values.

**INDEPENDENT VARIABLE:** Grades 5 and 8, I.Q., socioeconomic status, community and sex.

**DEPENDENT VARIABLE:** Scores on the various environmental orientation scales.

**PURPOSE:** To understand elementary and junior high students' orientations toward the environment and environmental problems.

**SUBJECTS:** 665 fifth and eighth grade students in four Wisconsin communities.

**RESEARCH DESIGN:** Three environmental orientations (EO's), each focusing on different areas, were developed. The EO's express responses to both general and specific aspects of the environment. They reflect both cognitive and affective input involved in environmental decisions. Using a multifactorial analysis of variance (ANOVA) procedure, the scores on the EO scales were "compared," arranged by the independent variables. When the ANOVA's indicated significant main effects or interactions, Scheffe post hoc comparisons were used to pinpoint differences.

**RESULTS:**

1. Orientations toward the present and future appear most stable. Other orientations (problems in general or specific solutions) are less stable but do exceed .70, test-retest correlation.
2. Orientations of eighth graders are more stable than those of fifth graders.
3. None of the independent variables of grade, sex, I.Q., socioeconomic status (SES), or community are always significant on EO's in this study.
4. Education appears to be a strong factor in producing a more positive environmental concern.
5. Higher SES respondents show more environmental concern than lower SES respondents, although SES does not appear to be a pervasive effect.
6. I.Q. was a very pervasive main effect.

**REFERENCES:** 23 cited.

122. Horvat, Robert E., and Alan M. Voelker. "Using a Likert Scale to Measure Environmental Responsibility." The Journal of Environmental Education, 1976, 8(1):36-47.

**DESCRIPTORS:** affective, descriptive research, instrument development, issue awareness/knowledge of issues, issue-based, middle school.

**VARIABLES:** Student perceptions of environmental responsibility; perceptions of environmental problems and problem solvers; and five select demographic variables.

**PURPOSE:** (1) to develop an instrument to assess the environmental responsibility of fifth and eighth graders, as well as their environmental problems and people who solve those problems; and (2) to identify demographic variables associated with those variables. Specifically, the null hypothesis for the study stated that fifth and eighth grade students' 'environmental responsibility' would not differ when compared on the basis of five demographic variables.

**SUBJECTS:** 645 students in the fifth grade and eighth grades from four communities in southern Wisconsin participated in the field test.

**RESEARCH DESIGN:** A review of the literature led the authors to the selection of the format (i.e., Likert) of the instrument and the demographic variables to be used in the current project. Thirty-seven items in standard Likert agree-disagree format were written and judged by a six-member panel of environmental educators of the University of Wisconsin-Madison. Panel members scored each item on 'environmental responsibility' according to its ability to present some environmentally responsible action, behavior, or attitude. Rating procedures for item retention were reported. Subsequently, a pilot test was run on the original 37 items using fifth and eighth grade students from southern



Wisconsin (N = 202). Reliability estimates obtained for the pilot instrument ranged from .70 to .81, and test/retest estimates ranged from .68 to .89 for randomly selected students from the initial group; 25 items were retained for use in the final instrument, 'Some Ideas.' Also included in a separate section, were two multiple-choice items. One focused on the choice of a most and least important environmental problem from a list of six problems, while the other concerned the choice of the most and least important person/group for environmental problem solving from a list of six persons/groups. This instrument was then field tested on the sample identified in 'subjects.'

**RESULTS:** A factor analysis of responses identified four interpretable subscales within 'Some Ideas.' Those subscales contained 16 of the 25 instrument items, and produced loadings on their respective factors. The authors tabled each factor subscale as follows: (1) Use/Abuse of Nature (i.e., a four-item subscale), (2) Overpopulation (i.e., a five-item subscale), (3) General Environmental Concern (i.e., a four-item subscale), (4) Eco-Responsible Behavior (i.e., a three-item subscale). Internal consistency reliability measured for the 25-item test was .73 for both grade levels. Test/retest stability for the total test ranged from .61 to .78 and from .60 to .73 for the various subscales. Results of analyses on the basis of grade, community, IQ, socioeconomic status (SES) and gender were reported. Air pollution (40 percent) and water pollution (28 percent) were ranked as the most important problems, while wilderness preservation (45 percent) was ranked as the least important problem. In responses to the questions 'Who could help the most in solving problems?', children most often (45 percent) cited 'people who live around here!' Responses on who could help the least included the President (22.2 percent), the Mayor (20.8 percent), and 'me and my friends' (21 percent). These data were also analyzed by the demographic variables listed above. Implications were stated.

**REFERENCES:** 21 cited.

123. Hounshell, Paul B., and Larry Liggett. "Assessing the Effectiveness of Environmental Education." The Journal of Environmental Education, 1973, 5(2):28-30.

**DESCRIPTORS:** attitudes, descriptive research, formal, knowledge, middle school, program development, urban.

**VARIABLES:** Demographics, environmental knowledge, environmental attitudes.

**PURPOSE:** To provide baseline data on sixth graders' environmental knowledge and attitudinal variables as part of the development of the Madison County 'Cooperative Environmental Education Project.'

**SUBJECTS:** 1,881 (975 males and 906 females) sixth graders randomly selected from the nine school systems located within Madison County, North Carolina. Six school systems were located in a predominantly rural setting, and three were located in a predominantly urban setting.

**RESEARCH DESIGN:** In an attempt to provide the Madison County EE project staff with baseline data on environmental knowledge and attitudes, the sample was given a 65-item survey known as the Environmental Knowledge and Opinion Survey (EKOS). The sample was divided into both rural/urban and male/female subgroups for the purpose of data analysis. Instrument development and validation procedures were presented. Correlation coefficients significant at the .01 level provided evidence for the instrument's reliability.

**RESULTS:** The t-test of significance was used to test for differences between subgroup scores. Alpha level was set at .05. On the 35-item knowledge scale, scores ranged from 0 to 32 with a modal score of 15. On the 30-item attitudinal scale, scores ranged from 2 to 28 with a modal score of 18. The female subgroup scored significantly higher on the attitudinal scale while no significant differences were detected between genders for scores on the knowledge scale. The urban subgroup scored significantly higher on the knowledge scale, while no significant differences were detected for scores on the attitudinal scale. From these specifics, and from group mean scores, the authors suggest that an effort must be made to raise the overall level of cognitive understanding of students in the project school systems.

**REFERENCES:** None cited.

124. Hounshell, Paul B., and Larry Liggett. "Environmental Education One Year Later." The Journal of Environmental Education, 1976, 8(1):32-35.

**DESCRIPTORS:** affective, attitudes, experimental research, formal, knowledge, middle school, program evaluation.

**INDEPENDENT VARIABLE:** Environmental education center program; length of exposure to treatment.

**DEPENDENT VARIABLE:** Attitudes concerning and knowledge level of the environment, and man's relationship with it.

**PURPOSE:** (1) to evaluate the effect an environmental education program had on students' attitudes and knowledge of the environment and man's relationship within it, and (2) to investigate the effects that length of exposure to treatment had on the attitudes and knowledge of the participants.

**SUBJECTS:** Participants in the study were sixth graders from North Carolina during the 1972-73 school year. A total of 1,962 answer sheets were used in the pre-post experimental and control analysis.

**RESEARCH DESIGN:** In this three-group pretest and posttest control group design, sixth grade teachers and their students were selected for participation in the Center's program on a random basis by each participating county. Three control groups were selected from a

neighboring county. The experimental group was exposed to at least one 10-week EE activity cycle consisting of four phases: Phase One consisted of a survey of the participating teacher's on-site school facilities and nearby community features by staff specialists and consultants; Phase Two consisted of inservice teacher development activities including field trips, small group instruction and individual projects; Phase Three consisted of seven weeks of on-site classroom implementation by teachers; and Phase Four consisted of a week of evaluation.

All students were tested using the Environmental Knowledge and Opinion Survey (EKOS) in a pretest-posttest format. EKOS was designed to yield information on the student's knowledge level of environmental matters and on the student's attitudes concerning the environment. It consisted of 50 items, 27 measuring knowledge and 23 measuring attitudes. Experimental and control groups were paired and pretested according to the pairs. The first group pair was pretested in October of 1972, the second in January of 1973, and the third in March of 1973. All groups were posttested in May, 1973. In other words, some students were under teachers who were in the 'treatment' seven months before the posttesting, some four months before posttesting, and some two months before posttesting.

**RESULTS:** F-tests were used in data analysis. Statistical results of data analysis for the knowledge scores indicated differences between the experimental and control groups ( $F = 3.221$ ,  $p < .073$ ). Statistical results of data analysis for the attitudinal scores also indicated differences between the experimental and control groups ( $F = 5.873$ ,  $p < .016$ ). While the statistical results of data analysis for posttest scores of the three treatment groups were not significantly different, there was a difference for attitudes on the posttest scores for those groups ( $F = 6.24$ ,  $p < .05$ ). Length of exposure to teachers who had been in 'treatment' did make a difference. Finally, analysis of both knowledge and attitude scores indicated a significant difference in scores by gender, with females scoring higher on both knowledge and attitude subtests. A discussion of the results was presented.

**REFERENCES:** 2 cited.

125. Hounshell, Paul B., and Larry Liggett. "Inservice Education: It Can Make a Difference." School Science and Mathematics, 1976, 76(6):493-498.

**DESCRIPTORS:** affective, attitudes, cognitive, knowledge, middle school, pre-experimental, teacher training inservice.

**INDEPENDENT VARIABLE:** Ten-week, four-phase inservice teachers/students.

**DEPENDENT VARIABLE:** Knowledge and attitude.

**PURPOSE:** To bring about cognitive and affective change in students by bringing about cognitive and affective change in their teachers. Can an inservice program with teachers make a difference with their students?

**SUBJECTS:** Sixth grade students/teachers from Asheville, North Carolina. The model involved a variety of approaches and many different techniques implemented by a staff of effective former classroom teachers; 36 teachers/8 different schools, 1972-73 school year.

**RESEARCH DESIGN:** Teachers were pre and posttested using Environmental Science Test-cognitive, Environmental Attitude Inventory-affective. The Environmental Education Behavioral Inventory was used to obtain information on teachers' judgment concerning their use of selected techniques and approaches on teaching about environmental concerns. 2,000 students tested using EKOS, pre and post, for experimental and control.

**RESULTS:** The data were convincing (.01 and .05). Student learning was influenced by treatment of their teachers through inservice. Required enthusiastic participating teachers and fully cooperative school administration. Teacher survey--they enjoyed the experience.

**REFERENCES:** None cited.

126. Howell, David L., and J. Robert Warmbrod. "Developing Student Attitude Toward Environmental Protection." The Journal of Environmental Education, 1974, 5(4):29-30.

**DESCRIPTORS:** affective, attitudes, cognitive, experimental research, formal, issue investigation/evaluation skills, program evaluation, secondary.

**INDEPENDENT VARIABLE:** Levels of instruction in environmental protection; teacher EE coursework background; time and number of films shown during instruction; numbers of experiments used during instruction; students' occupational choice; and class type.

**DEPENDENT VARIABLE:** Students' attitudes towards the protection of the environment.

**PURPOSE:** (1) to evaluate the effectiveness of the student manual Introduction to Environmental Protection in developing students' attitudes toward the protection of the environment among different vocational and science classes; and (2) to investigate the relationships between selected assigned independent variables and class posttest mean scores on the attitude inventory.

**SUBJECTS:** Selected intact vocational agriculture and science classes served as the first accessible population. A stratified random sample consisting of 36 classes (20 vocational and 16 science) was drawn from that population. A second sample population consisted of students enrolled in intact vocational environmental management classes.

**RESEARCH DESIGN:** A modified Solomon Four-Group experimental design was used for treating and testing the first sample groups. The modification included the division of intact classes into pretest-posttest only subgroups. In this part of the experiment, the treatment consisted of the use of the Introduction to Environmental Protection student manual for a recommended period of six weeks. For six weeks the control group received instruction in environmental protection without the use of that manual. A separate sample pretest-posttest design was used for treating and testing the second sample group. Here the treatment involved a more extensive use of that same student manual over a period of ten weeks for four hours per day. Several independent variables (i.e., excluding treatment and class characteristics) associated with the treatment were identified for testing and are listed above. An attitude inventory developed by the researcher was used to measure the dependent variable. The field test of this instrument yielded a Kuder-Richardson internal consistency coefficient of 0.87. Instrument validity estimates were not reported.

**RESULTS:** In the first experimental design the results indicated that there were no significant differences between instructional treatment and control group scores on the dependent variable. However, students in science classes using the manual achieved higher attitude scores than students in vocational agriculture classes using the manual. Results for the identified independent variables tests indicated: (1) a positive relationship between number of professional EE courses completed by the instructor and the students' posttest attitude inventory scores; (2) no relationship between students' posttest attitude inventory score and time used to teach, number of films shown during, nor number of experiments conducted in teaching the treatment unit. Finally, students who chose occupations in environmental management tended to score higher on the posttest attitude inventory than students who chose other occupations or who were undecided about such a choice. Conclusions and recommendations were reported.

**REFERENCES:** 4 cited.

127. Howell, Jerry F., Jr. "Environmental Awareness Determination: A Model." The Journal of Environmental Education, 1974, 6(2):57-63.

**DESCRIPTORS:** attitudes, descriptive research, elementary, issue awareness/knowledge of issues, program development, secondary.

**VARIABLES:** The status of needs, awareness and attitudes associated with the environment and EE as reported by local groups involved or interested in EE.

**PURPOSE:** (1) to develop and institute a workable process for determining the present status of environmental awareness in any geographical area; (2) to produce and evaluate materials for such a process; (3) to pinpoint weaknesses in existing area EE and awareness programs; (4) to identify area environmental awareness and knowledge gaps and suggest methods for closing them; (5) to determine citizen and student attitudes toward several critical

environmental issues; (6) to enable the project to make recommendations to the NE State Master Plan. The study associated with this project involved four main sections associated with project purpose number 3, 4 and 5 above. The purpose of the report was to document major components of the project plan, including observation on strengths and weaknesses.

**SUBJECTS:** The subjects associated with each of the four study sections were: (1) elementary and secondary teachers and school principals; (2) 7,796 high school students from 42 of the area's 125 schools; (3) 320 citizens selected by polling judges in each of the area's counties; (4) 22 target groups in the study area including youth, civic, conservation, school, media, clergy, business and industry, county and federal agencies. The study area was a 49-county area in eastern and south central Kentucky.

**RESEARCH DESIGN:** In this study, four surveys were administered. First, the elementary and secondary teacher survey was designed to obtain information on the present status of school programs and on needs identified by individuals, teachers and principals. The present status of EE in each school was obtained by asking principals via questionnaire how EE was taught in their respective schools. Second, the students were presented with a multiple-choice test designed by project staff. It was intended to measure knowledge and attitudes toward current problems, and included three demographic (e.g., age, gender, grade level) items, 27 items designed to measure environmental awareness, and 6 opinion items. It was an expanded version of CBS's National Environmental test, and was designed to be completed in one class period.

Third, the selected interviewees were contacted, and interviewed either at a home or business address. The 45-minute interviews covered 25 questions which were designed to obtain knowledge and opinion data on many ecological problems/issues. Fourth, only those organizations potentially or actively involved in some sort of EE program were sent questionnaires or letters of inquiry in an attempt to determine the impact of ongoing programs. Letters were sent to some groups because they were small in number and/or their activities could be well explained by a personal response. Two groups, clergy and businesses/industries, were randomly polled. Validity and reliability estimates for instruments and data collection procedures were not reported.

**RESULTS:** A discussion of the procedures, the advantages and pitfalls of the procedures within the context of the project, the utility of data collected, and a set of blanket recommendations for groups considering similar undertakings were reported.

**REFERENCES:** 2 cited.

128. Howie, Thomas Richard. "Indoor or Outdoor Environmental Education." The Journal of Environmental Education, 1974, 6(2):32-36.

**DESCRIPTORS:** cognitive, elementary, environmental center, experimental research, formal, outdoor classroom, outdoor education, nonformal.

**INDEPENDENT VARIABLE:** Indoor and outdoor environmental education instructional treatments, treatment group assignments.

**DEPENDENT VARIABLE:** Students' ability to conceptualize and apply instructional content.

**PURPOSE:** To compare the effects of an outdoor environmental education program to one that was conducted completely indoors on the dependent variables.

**SUBJECTS:** 438 fifth grade students from public elementary schools in Prince George's County, Maryland, were randomly assigned to the four treatment groups.

**RESEARCH DESIGN:** A four-group posttest only control group design was used to compare the effects of indoor vs. outdoor environmental education instruction on the dependent variables. The treatments were: Group 1 ( $X_1$ ) received the classroom treatment only; Group 2 ( $X_2$ ) received the outdoor treatment only; Group 3 ( $X_3$ ) received both classroom and outdoor treatments; and Group 4 ( $X_0$ ) received neither treatment, functioning as the control group. The outdoor treatment was conducted over a two-day period at the Alice Ferguson Foundation Environmental Study Center and included: a nature hike, a woodland discovery trail experience, a tour of the farm study area, demonstrations of colonial and more recent farm tools, an ecological hike, and a creative arts activity session. The classroom treatment was developed after careful study and analysis of the outdoor treatments. It included advanced organizers and consisted of 10 one-hour or less classroom sessions devoted to the introduction and discussion of 10 areas of EE which focused upon ecological principles or less classroom sessions devoted to the introduction and discussion of 10 areas of EE which focused upon a ecological principles or less classroom sessions devoted to the introduction and discussion of 10 areas of EE which focused upon ecological principles were drawn from concepts that were basic to EE, and checked against objectives stated by the county EE staff for validity purposes. A balance between concept and application questions was also established. The finalized instrument was field tested. The Pearson correlation for odd numbered and even numbered items was .85. The Spearman Brown Prophecy Formula estimated the correlation coefficient for the full test reliability to be .92.

**RESULTS:** T-tests were used to test for differences among treatment group responses. The author concludes that there was little difference among the treatment groups concerning the development of application skills. The students in the treatment groups receiving advanced organizers were better able to conceptualize than those who did not receive them. These organizers played a significant role prior to the outdoor treatment ( $X_3$ ). Several facts of the treatment were observed

but not measured. In particular, positive student affect in outdoor settings was a plus as rated by teachers, staff and aides. A discussion of the results was presented.

REFERENCES: 19 cited.

129. Hummel, Carl F., Lynn Levitt, and Ross J. Loomis. "Perceptions of the Energy Crisis: Who is Blamed and How Do Citizens React to Environment-Lifestyle Trade-Offs?" Environment and Behavior, 1978, 10(1):37-88.

DESCRIPTORS: attitudes, behaviors, beliefs, descriptive research, energy education, hypothesis generation, issue identification skills, personality type.

VARIABLES: Socioeconomic background, attitudes toward energy and other environmental issues.

PURPOSE: To develop a profile of the person who manifests behavior related to concern about environmental issues such as air pollution even when confronted with energy and other trade-offs.

SUBJECTS: Adult residents from Fort Collins, Colorado and the immediately surrounding rural area were surveyed. College students were excluded from the subpopulation sampled in the study. 238 residents served as subjects. The total sample was 54 percent male and 46 percent female. The average resident was Republican, somewhat conservative, middle-aged, and of middle-class to upper-class status. Subjects were selected from the city directory. Two samples were taken. The first sample consisted of 114 subjects surveyed during the late summer of 1973. For Colorado, this was a period of "acute" energy shortages. The second sample consisted of 124 subjects surveyed during November 1973. During this time, the energy shortage was described as "chronic."

RESEARCH DESIGN: Descriptive Survey--Correlational. Questionnaires consisting of 88 items were used. Stepwise regression analysis was used and 19 potential predictors were derived from single items measuring demographic characteristics as well as from single items and multi-item scales which dealt with specific behaviors, specific attitudes toward behaviors, or perceptions of problems. Categories for selection of predictors and criteria of one item and multi-item scales were discussed. Also six single items were included as gross indicators and used largely to suggest avenues to pursue in future research. Yes/no and Likert-style tests were administered. Alpha coefficients were used to determine internal consistency of various dependent variables.

RESULTS: Sample means for each of the 5 criteria and 12 predictors were given. Selected variables regarding personal effects, blame and demography were correlated. Support was assessed for the following three types of pro-energy actions: (1) voluntary as well as (2) mandatory actions that had benefits for energy and air pollution problems but exhibited greater concern ( $p < .001$ ) and were more homogeneous ( $p < .02$ ) in their environmental attitudes than a random



sample of adults. The correlation between scores on the comprehensive environmental behavior index and the attitude scale was quite strong ( $r = .62$ ,  $p < .001$ ). The potential utility of the ECS for future research was discussed.

REFERENCES: 15 cited.

130. Humphrey, Craig R., Richard J. Bord, Margaret M. Hammond, and Stuart H. Mann. "Attitudes and Conditions for Cooperation in a Paper Recycling Program." Environment and Behavior, 1977, 9(1):107-124.

DESCRIPTORS: affective, attitudes, behaviors, cognitive, experimental research, issue-based.

INDEPENDENT VARIABLE: Prompting and procedures for recycling.

DEPENDENT VARIABLE: Attitudes and behavior, toward waste paper recycling.

PURPOSE: To examine the relationship between attitudes and behavior in the context of a paper recycling program developing in a bureaucratic organization.

SUBJECTS: Unspecified number of office employees working in 16 selected zones of a rural state university in Pennsylvania.

RESEARCH DESIGN: A combination of survey research and experimentation was used in this study. A questionnaire was first utilized to determine receptivity among personnel to manual separation of wastepaper in offices. To see if people mean what they say, an experiment was designed and implemented. Personnel in each selected zone received a letter requesting their cooperation, and were told that a specified separation procedure of wastepaper would be used in their office. Two conditions were varied: (1) in half the zones, supervisors encouraged personnel to separate wastes; and (2) techniques of separating wastepaper differed from zone to zone. Quality of wastepaper separation was measured by weighing proportion of nonrecyclable material found in containers marked for recyclable materials only. Reliability and validity coefficients were not reported.

RESULTS: This 10-week study found that most employees are receptive to any of the techniques of separating wastepaper (two separate baskets most effective 95.5 percent), and that experience with separating wastepaper does not diminish enthusiasm for paper recycling. An important experimental finding was the decay in the quality of manual separation over time. A better list of recyclable items was suggested for ameliorating the condition. Results of the questionnaire show 70 percent of the respondents favorably predisposed toward environmental quality. Research suggests that in paper recycling, cognition and behavior are highly coincident in the short run. Some divergence in long-run is apparent.

REFERENCES: 25 cited.

131. Hungerford, Harold R., R. Ben Peyton, and Richard J. Wilke. "Goals for Curriculum Development in Environmental Education." The Journal of Environmental Education, 1980, 11(3):42-47.

**DESCRIPTORS:** environmental action skills, issue awareness/knowledge of issues, issue investigation/evaluation skills, model building, program development.

**VARIABLES:** Goals for curriculum development in environmental education.

**PURPOSE:** To present the Goals for Curriculum Development in Environmental Education, the assumptions made in developing the goals, a validity comparison between the goals and the Tbilisi objectives for EE and the results of a subsequent validity assessment.

**SUBJECTS:** Validity of the goals was assessed by a panel of five nationally recognized environmental educators.

**RESEARCH DESIGN:** The developers of the goals took their initial set of goals and compared them to the objectives for environmental education identified during the 1977 Tbilisi Intergovernmental Conference on Environmental Education for content validity. A two-axis comparison grid was used and each goal was independently analyzed as to where it interfaced with the Tbilisi objectives. Next the authors sent an instrument they developed to assess the goals with their list of goals, assumptions, and their initial validity assessment to a panel of five environmental educators for assessment. The instrument contained a number of categories to which the panelists were asked to respond.

**RESULTS:** As a result of the two validity checks the writers concluded that the revised goals constitute a valid, syntactically sound, suitable framework for use in guiding curriculum development in environmental education. The goals are presented in the article and it is recommended that they be used in curriculum development in environmental education in a manner consistent with the guiding principles for EE proposed at the Tbilisi conference.

**REFERENCES:** 13 cited.

132. Iozzi, Louis A. "The Environmental Issues Test (EIT): A New Assessment Instrument for Environmental Education." Current Issues IV, 1978, 200-206. ED 167 407.

**DESCRIPTORS:** affective, cognitive, experimental research, instrument development, issue identification skills, issue investigation/evaluation skills, value clarification skills.

**DEPENDENT VARIABLES:** Test-retest stability, age trends, correlation with attitudes on current environmental issues,

correlation with comprehension of moral concepts, correlation with Rest's existing moral judgment measures, increases of moral judgment test scores following experiences which should accelerate higher stage judgment development.

**PURPOSE:** Determination of validity of the EIT.

**SUBJECTS:** 40 ninth grade students, 38 twelfth grade students, 116 college juniors and seniors (60 majoring in a field considered to be environmental studies and 56 majoring in the humanities).

**RESEARCH DESIGN:** The EIT was administered to the subjects. Test-retest stability was determined by administering the test once again to the ninth graders and computing the Pearson product-moment correlation (.84). A "P" score (expressed as percentage) indicates the relative importance each subject gives to morally principled considerations in making moral judgments. Correlations were drawn for the dependent variables (the Maloney and Ward Ecology Attitude Inventory measured environmental attitude; the Defining Issues Test measured moral judgment). Posttests in comparison with pretests confirm on a preliminary basis that scores increase on the EIT after intervention, which should accelerate higher stage development.

**RESULTS:** The EIT appears to be a valid, useful instrument in determining levels of moral/ethical judgment concerning environmental moral issues. It can also be useful in a variety of other projects and studies.

**REFERENCES:** 9 cited.

133. Iozzi, Louis A. "Evaluation of 'Preparing for Tomorrow's World'--Science/Technology/Society for Grades 7-12: Methodology and Results." Current Issues VI, 1980, 341-361. ED 197 947.

**DESCRIPTORS:** affective, cognitive, experimental research, knowledge, middle school, moral development, program evaluation, science education, secondary, social science education.

**INDEPENDENT VARIABLE:** Treatment effects, sex of participants.

**DEPENDENT VARIABLE:** Cognitive achievement, moral/ethical reasoning, aptitude/ability.

**PURPOSE:** Determination of the effectiveness of Preparing for Tomorrow's World program.

**SUBJECTS:** Teachers and students from public and nonpublic schools of 34 New Jersey communities volunteered. These volunteers are representative of a cross-section of junior and senior high schools, both in New Jersey and even nationally. A wide range of academic abilities was displayed. The subjects came from affluent to economically disadvantaged homes, and all major races and ethnic groups were represented. The number of males was about equal to the number of females. More than 6,000 New Jersey students and 150 New Jersey teachers were representing 34 communities. A matrix sampling technique was used to make efficient use of time.

**RESEARCH DESIGN:** A nonequivalent comparison group design was employed as an evaluation design. Both treatment and comparison groups took the pretest and the posttest, and instruments measured the major dependent variables. A multiple-choice test was used to measure cognitive achievement, and estimated reliability coefficients were computed. Validity was established through correspondence with some predetermined criteria. The SCAT-V was used to measure ability in future academic work. This controlled variances between treatment and comparison groups. A prediction validity of SCAT-V with English grades was computed as a correlation coefficient. Likert-type questionnaires, distributed to both teachers and students, helped to measure module effectiveness in meeting project objectives. Two standardized and published instruments were used for moral/ethical reasoning, the Environmental Issues Test and the Defining Issues Test (both Likert-type tests). Reliability was established for both using a test-retest method. The three analysis approach was used to detect any change in moral/ethical reasoning ("P" score, moral maturity score,  $\% \geq 1/3$  standard deviation). Analysis of covariance controlled differences in ability between treatment and comparison groups. Analyses of variance and covariance and t-tests were the primary statistical tools utilized. ANOVA and ANCOVA were used because of the nature of the necessary comparisons.

**RESULTS:** Significant growth in both cognitive achievement and moral/ethical reasoning appeared in the treatment group in comparison with the control group.

**REFERENCES:** 21 cited.

134. Jernigan, H. Dean, and Linda Wiersch. "Developing Positive Student Attitude toward the Environment." The American Biology Teacher, 1978, 40(1):30-34.

**DESCRIPTORS:** attitudes, environmental action skills, games, inquiry, issue awareness/knowledge of issues, outdoor classroom, simulations, value clarification skills, values.

**PURPOSE:** To develop issue-based awareness, development of a positive environmental ethic within children as a precursor to the development of an ecologically enlightened public.

**SUBJECTS:** The subjects were students attending a school in the suburb of a large city and taking part in "awareness activities."

**RESEARCH DESIGN:** Students, using their senses to become aware of nature and themselves, attempt to develop an empathetic relationship with an animal by imagining how that particular animal senses its surroundings; experience how organisms at different levels in the food chain depend upon their senses; experience environmental extremes to note localized differences within the environment; and complete a contemplation exercise that requires them to go off alone and reflect on human nature and the nature of the world and the universe.

**RESULTS:** Following Outdoor Affective (awareness) unit, the Outdoor Cognitive (field investigation) unit and the Indoor Cognitive (traditional) unit, there was a significant negative decline toward indoor activities. No change occurred on the pretest and posttest scores on the termed outdoor activities, and all three units had a positive significant effect toward the term environment. The outdoor environmental awareness unit produced a significant change in student attitudes toward the environment as measured on the environmental questions (Cohen and Hollingsworth, 1973). The outdoor awareness unit was preferred by students as the most useful and interesting, outdoor investigations ranked second and the indoor unit was third on the Environmental Preference Sheet (Jernigan, 1974). Both evaluation techniques, the Semantic Differential and the Environmental Questions, revealed positive attitude changes.

**REFERENCES:** 5 cited.

135. Johnson, David I. "Employment Trends for a Michigan Environmental Education Major." Current Issues V, 1979, 171-185. ED 180 822.

**DESCRIPTORS:** resource management education, teacher training preservice, theoretical research.

**INDEPENDENT VARIABLE:** Program of study for natural resource and environmental education majors.

**DEPENDENT VARIABLE:** Employability and graduate quality.

**PURPOSE:** Evaluation, in terms of success, of the program which Michigan State University utilizes to prepare natural resource and environmental education majors, including subjective measure of graduate quality and employability of graduates.

**SUBJECTS:** 195 graduating persons in the Natural Science and Environmental Education program at Michigan State University. Some did not reply.

**RESEARCH DESIGN:** A survey questionnaire was sent to all graduating people two weeks before graduation and twice during a three-month period after graduation. If the first questionnaire was answered, the two succeeding questionnaires were not sent unless the reply was "unemployed." Graduates who reported employment were also listed with the name of employer, city and state, and job title. Personal discussion also accounts for some of the information. This was done for a five-year time span (1973-1978).

**RESULTS:** Several important questions concerning employability and quality of graduates were considered. The implication of this research is that environmental education should be either combined with another major (probably a science) or a minor. Noncertified environmental education majors should be aware of overlapping job pools in the natural resource area. Several recommendations for further research are suggested.

REFERENCES: 9 cited.

136. Johnson, David I., and Douglas C. Covert. "A Learning and Communications Profile of Teachers Entering an Environmental Education Experience." Current Issues VI, 1980, 362-383. ED 197 947.

DESCRIPTORS: attitudes, descriptive research, teacher training inservice.

VARIABLES: Attitudes toward environmental affairs, personal actions concerning environmental matters, professional environmental education practices.

PURPOSE: Examination of teacher use of the mass media.

SUBJECTS: 123 teachers (grades 1-12) attending four, one-week residential "Teachers' Environmental School" workshops.

RESEARCH DESIGN: Each participant completed an eight-page questionnaire as an opening activity to the week-long program. Evaluation of the data included descriptive statistics and parametric and nonparametric statistical procedures available in the Statistical Package for the Social Sciences. Primary descriptive information was offered by frequency distributions, central tendencies, and degrees of dispersion. The mean was the desired indicator of central tendency and the standard deviation measured variability. In order to consolidate information concerning the dependent variables, three indices were devised: attitude index, personal action index, and the environmental practices index. Cross-check items limited bias and statistical treatments alleviated some inaccuracies.

RESULTS: Several factors relating to time spent on environmental education in the classroom, media that teachers personally use, reasons for picking a specific medium, how conflicting information is resolved, and training of both teachers and students in how to choose and use the media are all discussed.

REFERENCES: 11 cited.

137. Johnson, Roger T. "On the Spoor of the 'Big Bad Wolf'." The Journal of Environmental Education, 1974, 6(2):37-39.

DESCRIPTORS: affective, attitudes, descriptive research, issue awareness/knowledge of issues, issue-based, knowledge, nonnormal.

VARIABLES: Attitudes toward, beliefs toward, and information read on wolves.

PURPOSE: (1) to determine if adults in Minnesota had moderated their views toward the wolf; and (2) to determine

differences in attitudes toward wolves between men and women, and between adults and children.

**SUBJECTS:** 1,692 individuals who made their way through the University of Minnesota exhibit at the 1972 State Fair. Although dominated by the Twin Cities area residents, the sample represented all parts of the state, a broad range of ages, and about an equivalent number of males and females.

**RESEARCH DESIGN:** The setting for the survey included a wolf display featuring a stuffed wolf, and a computer terminal with a viewing screen and typewriter key attached. Instructions on how to respond to the computer questions were flashed on the screen, and each question was presented to the subject for response. This terminal was connected by phone to the University computer center, where responses were collected on tape. Demographic questions included gender, geographic area (i.e., northern, southern, middle); age (<10, 10-18, 19-38, >38), and rural or urban residence. The six questions focused upon the variables mentioned above, with responses presented in a forced choice format. Instrument validity and reliability scores were not reported.

**RESULTS:** The resulting data were organized into frequencies and percentages for each question and all possible demographic feature combinations. This resulted in the generation of more than 180 tables, hence only highlights of results were reported. For the question asking if wolves were dangerous to people, 30 percent of respondents indicated 'yes' and 70 percent indicated 'no.' For total sample responses to the question 'Should wolves be exterminated? Protected? Left alone?', a small percentage chose 'exterminated' (2.5 percent), while the vast majority chose either 'protected' (56.5 percent) or 'left alone' (41 percent). For total sample responses to the question concerning the value of the world population in Minnesota, 90 percent felt that it was of value. For total sample responses to the question "Why is the wolf always the 'bad guy'?", 50 percent felt that the wolf was misunderstood and 45 percent thought the wolf was merely used to make the story interesting. For total sample responses to the question on the wolf's effect on deer populations, 70 percent indicated that it helped keep the deer and moose population in balance, and 13 percent indicated that either it would 'wipe out' the deer, or have no effect. Lastly, for the question on information recently encountered, 55 percent had encountered none, 34 percent had encountered favorable media reports and 11 percent unfavorable reports. A discussion of the results was presented.

**REFERENCES:** None cited.

138. Jous, Harold N. "The Effect of Environmental Education Instruction on Teachers' Attitudes toward Teaching Environmental Education." Science Education, 1978, 62(1):79-84.

**DESCRIPTORS:** experimental research, hypothesis generation, multidisciplinary-infusion, program evaluation, teacher training inservice.

**VARIABLES:** Attitudes and knowledge toward the environment.  
**PURPOSE:** To teach teachers how to promote the acquisition of both positive environmental attitudes and knowledge even if they themselves had no received formal training in the area.

**SUBJECTS:** 51 elementary and middle school inservice teachers were randomly assigned to two graduate level science methods classes meeting 3 hours a day for 20 days.

**RESEARCH DESIGN:** One class designated the experimental group (N = 25) received instruction in environmental education, and was required to demonstrate knowledge in the areas of life cycles, organisms, populations, environments, communities, eco-systems, food webs, energy sources, interaction, predator-prey relationships, producer-consumer-decomposer relationships, optimum range, energy transfer, pollutants, water cycle, oxygen-carbon dioxide cycle, pesticides, pollution control, overpopulation, resource allocation, conservation, rural planning, and urban planning. Upon completion of instruction, the experimental teachers were administered a 50-item multiple choice test. All teachers received 85 percent or better on the test.

The second group of teachers, the control group (N = 26), received instruction in teaching science to elementary and middle school children. These teachers were provided with instruction on question-asking techniques, discrepant events, elementary and middle school science curriculum. This instruction utilized lab activities, lecture-discussions, teacher and student demonstrations and readings.

Following treatment, both groups of teachers were administered an attitude instrument designed to measure their attitude toward teaching environmental education. The instrument contained a total of 30 questions, and over three categories (10 questions in each category). Reliability of this instrument, determined by the test/retest method, was 0.88.

**RESULTS:** Teachers receiving instruction in environmental education had significantly greater positive attitudes toward teaching environmental education in their classrooms.

The overall difference on the attitude measure provides evidence that teachers who are trained in environmental education develop more positive attitudes toward teaching the discipline than teachers who do not receive this training.

**REFERENCES:** 9 cited.

139. Kaplan, Rachel. "Citizen Participation in the Design and Evaluation of a Park." Environment and Behavior, 1980, 12(4):494-507.



**DESCRIPTORS:** citizen action, descriptive research, issue-based, preferences.

**VARIABLES:** Preferences, use, and conceptual importance of a downtown park.

**PURPOSE:** To evaluate the success of a city park.

**SUBJECTS:** The 163 people included in the on-site sample were individuals who were patronizing the park when interviewers were present. The 224 off-site respondents either lived or worked in the park area. There was a near equal ratio of male to female, and 55 percent of the sample indicated their age to be in the twenties. All respondents were residents of Ann Arbor, Michigan.

**RESEARCH DESIGN:** In this study interviews and questionnaires were utilized. The questionnaire included both open-ended and scaled items. Items for each major topic covered in the questionnaire were combined to form scales based on results of an ICLUST Hierarchical Cluster Analysis. The alpha coefficient for the "general use" scale was .81. The alpha coefficient for the "general satisfaction" scale was .91.

**RESULTS:** Both actual use and conceptual importance of the park were found to be related to the park's success. Knowing that the park was there to use brought just as much satisfaction to respondents as did the actual physical use of the park. Also found that citizens were willing to help in the park's maintenance. This study may be useful to cities interested in utilizing public participation in designing small downtown parks.

**REFERENCES:** 4 cited.

140. Kaplan, Rachel. "Some Psychological Benefits of Gardening." Environmental and Behavior, 1973, 5(2):145-162.

**DESCRIPTORS:** affective, cognitive, descriptive research, preferences.

**VARIABLES:** Community, home and plot gardening in Ann Arbor, Michigan, environmental preferences.

**PURPOSE:** To study the pattern of psychological benefits associated with a garden experience, along with the variables that predict these benefits.

**SUBJECTS:** Subjects were divided into two groups, community gardeners and home gardeners. The 29 community gardeners were young college students (16 women, 13 men). The 50 home gardeners were from 20 to 60 years old (16 men, 34 women). Another group of 17 plot gardeners (6 men, 11 women) was included but insufficient data were obtained due to serious drought conditions (water source not readily available).

**RESEARCH DESIGN:** In this descriptive study, questionnaires and interviews were utilized. Common portions of questionnaire included garden benefits (5-point scale), environmental preference scale (6-point scale), and background variables. Based on responses to 96 completed

interviews, scales were constructed using the Guttman-Lingoes Smallest Space Analysis III Program and the ICLUST hierarchical cluster analysis program. Alpha internal consistency coefficients for garden benefits scales were: primary garden experiences (.79); sustained interest scale (.80); tangible benefits (.72).

RESULTS: Home gardeners found their gardens more satisfying (4.65) than did the community (4.21) or plot (3.86) gardeners. All three groups scored highly on the EPQ "Nature" Scale. Background variables such as sex, age, educational level, and prior gardening experiences were not found to be predictors of garden benefits. Gardening emerged as a powerful source of fascination.

REFERENCES: 11 cited.

141. Kaplan, Rachel. "Some Psychological Benefits of an Outdoor Challenge Program." Environment and Behavior, 1974, 6(1):101-116.

DESCRIPTORS: affective, attitudes, experimental research, outdoor classroom, outdoor education, secondary.

INDEPENDENT VARIABLE: Participation in an outward bound type program.

DEPENDENT VARIABLE: Self-esteem.

PURPOSE: To describe an initial attempt to evaluate the benefits of an outdoor challenge program.

SUBJECTS: 35 high school students, 10 in outdoor challenge program, 25 in control group. All subjects were from Michigan's Upper Peninsula, predominantly rural residents.

RESEARCH DESIGN: There were four phases to the design. The control group completed the first and last, and the other group completed all four. The first and last phases involved questionnaires which dealt with various aspects of self-esteem and confidence. The second and third phases involved questionnaires measuring prior camping experience and ability, and attitudes toward nature, respectively. In evaluating self-esteem, the Rosenberg Scale of Self-Esteem was utilized. Reliability and validity coefficients were not reported.

RESULTS: The outdoor challenge participants felt very positive about their experience, and their test results lead one to conclude that the program makes a definite difference in the lives of these people. Challenge group members also became more realistic in their expectations after the program than did the control group. A higher proportion of the experimental group also expressed satisfaction about who they were than did the control group.

REFERENCES: 6 cited.

142. Kellogg, Don, John Jay Rusch, Robert M. Jones, and Ted Mills. "Outdoor Education: Environmental Immersion for Oklahoma Teachers." Science Teacher, 1975, 42(5):46-48.

**DESCRIPTORS:** descriptive research, outdoor education, science education, teacher training inservice.

**PURPOSE:** To expose teachers and administrators to hands-on science materials; description of three outdoor workshops-workshop model.

**SUBJECTS:** Three groups of 50 teachers--majority elementary/few secondary and administrators. Workshops were held at the Oklahoma Geology Camp.

**RESEARCH DESIGN:** NSF-funded workshops based on data gathered by the Oklahoma State Department of Education. Survey revealed few hands-on science programs and few science supervisors in schools and there is little communication between secondary science specials and elementary teachers. The curriculum-study component used open-ended self-paced lab approach and use of materials. The participants formed action plan groups for their school. Program was based upon the expressed needs of the school. Research design not reported.

**RESULTS:** Reported positive attitude, completed program and demonstrated competencies in all required areas.

**REFERENCES:** None cited.

143. Kidd, William E., Jr., Lei Lane Burrus-Bammel, and Gene C. Bammel. "Evaluation of One Environmental Education Program." The Journal of Environmental Education, 1978, 10(1):12-15.

**DESCRIPTORS:** affective, cognitive style, continuing education, ecology education, nonformal, outdoor classroom, pre-experimental, program evaluation.

**INDEPENDENT VARIABLE:** Participation in Forest Industries Camp Program.

**DEPENDENT VARIABLE:** Attitudes toward and knowledge of forest ecology.

**PURPOSE:** To measure the affective and cognitive effects of environmental education on adolescent boys in a camping setting where specific emphasis was placed on the forest from a forest industry viewpoint.

**SUBJECTS:** 29 young men, ages 16 to 20 were selected to participate in the program based on a series of recommendations and essays submitted. An equivalent group (N = 23) who applied but who were not admitted to the program was used as a control group. Subjects were from West Virginia.

**RESEARCH DESIGN:** A Likert-type affective instrument and an objective conceptual knowledge test were given to the experimental group in a pretest-posttest format. A posttest only was given to the control group, using the same two measures. Participants in the experimental group received one week of lectures and small group instruction. Instruction was designed to develop conceptual knowledge related to the forest.

**RESULTS:** A chi-square comparison between pretest and posttest results of the experimental group, and a comparison of posttest results between groups, were made. In general, the data indicated that there was a significant difference between the pretest and posttest scores of the experimental group on the affective scales ( $p < .01$ ). However, significance was not found at the same level for all items on the scale. The analysis of the conceptual and knowledge portions of the test showed within-group comparisons to be significant ( $p < .01$ ). The control and experimental groups' posttest scores were significantly different ( $p < .01$ ) with the experimental group being higher. Recommendations for further research were made.

**REFERENCES:** 5 cited.

144. Kiely-Brocato, Kathleen. "An Assessment of Visitor Attitudes toward Resource Use and Management." The Journal of Environmental Education, 1980, 11(4):29-36.

**DESCRIPTORS:** attitudes, beliefs, community resource, descriptive research, issue awareness/knowledge of issues, program development, resource management education.

**VARIABLES:** The attitudes and beliefs that visitors at Shenandoah Park hold toward resource use and management.

**PURPOSE:** (1) to assess visitor attitudes toward resource use and management in Shenandoah National Park, and (2) to formulate guidelines for designing an effective interpretive message using information obtained from the visitor assessment.

**SUBJECTS:** A stratified random sample of days was used in selecting visitors. Selected sampling days were then randomly assigned to various stations within the park. The addresses of the visitors were obtained on the day of their visit. These visitors were sent a questionnaire at a later date. 466 visitors returned completed questionnaires. This constituted 81 percent of those visitors originally identified by sampling procedures in the year.

**RESEARCH DESIGN:** A two-part questionnaire was developed. Each part contained 44 seven-point Likert-type questions. The first part contained belief statements concerning policies on the management of the park. In the second part of the survey each policy or action was evaluated by the visitors. Names and addresses of visitors were secured via an information release form. Visitors were contacted in September, 1978 and asked to fill out the attitude survey. A follow-up postcard and two follow-up questionnaire mailings ensued.

**RESULTS:** The researcher used a quadrant analysis within the framework of Fishbein's expectancy-value attitude theory. Scores on the first section of the survey suggested that visitors had a favorable attitude toward resource use and management of Shenandoah National Park. The author suggested that this degree of favorableness might be

substantially increased through proper interpretive approach. The 44 attitude items were divided into three groups based on frequency distributions of attitude item scores for each policy or action. The first group includes items for which the mean attitude scores may be increased as a result of an interpretive message only stating the agency policy or action since that action was favored, and believed to be carried out by the agency. Groups two and three included items that not as many persons favored. The author suggested that to increase these attitude scores it becomes necessary to explain the positive consequences or benefits of the associated practices. The author states that it is particularly important that both the belief and evaluation of the visitor be addressed when many people initially oppose policy but do not believe it is a Park Service practice.

REFERENCES: 11 cited.

145. Kinsey, Thomas G., and John H. Wheatley. "An Instrument to Inventory the Defensibility of Environmental Attitudes." The Journal of Environmental Education, 1980, 12(1):29-35.

DESCRIPTORS: affective, cognitive, instrument development, issue-based, knowledge, moral development, values.

VARIABLES: Information, background knowledge, value judgment according to Kohlberg's levels of moral development.

PURPOSE: To design, construct, and establish both validity and reliability for the Environmental Issues Attitude Defense Inventory (EIADI). The purpose of the instrument is to assess the role which information and knowledge play in making value judgments and in the process of moral development.

SUBJECTS: 98 students at the University of Maryland formed the initial instrument study group. 32 subjects were upper-level undergraduates in the Conservation and Resource Development program while the remaining 57 were non-environmental majors.

RESEARCH DESIGN: The EIADI is patterned after Kohlberg's 'Defining Issues Test of Rest.' The EIADI consists of the following elements for each of the four environmental dilemmas presented: a narrative, a list of potential solutions to the dilemma in a value judgment format; a scale rating the importance of informational supports, and a list of informational statements regarding various aspects of the presented dilemma. For the purpose of testing validity, predictions were made regarding the scores on both the value judgment list (i.e., a moderate position) and the informational support.

RESULTS: A composite score which accounted for differences in group size was arrived at, and used to test for differences regarding value judgments. A nonparametric sign test was used to test for differences regarding information supports. The results of the tests indicate that the prior predictions regarding differences between the two groups were substantiated, with results of the tests indicate that the prior

predictions regarding differences between the two groups were substantiated, with the more experienced Conservation and Resource Development students taking more moderate positions on various judgements while demonstrating a broad base of information supports. The Spearman-Brown split-half reliability score was 0.90.

REFERENCES: 18 cited.

146. Knamiller, Gary W., and John Obeng-Asamoah. "The Child in the Community: Ghanaian Children's Perceptions." The Journal of Environmental Education, 1979, 10(4):21-27.

DESCRIPTORS: descriptive research, issue awareness/knowledge of issues, middle school, resource management education, social background

VARIABLES: Knowledge and attitudes about local water and fuel resources.

PURPOSE: (1) to describe what some Ghanaian children knew and thought about their local water and fuel resources, and (2) to describe how the children perceived use and supply of these resources as they relate to local development.

SUBJECTS: Two towns in Ghana about 14 kilometers apart were used. Aknokerrri is a small rural farming village. Obuasi is a much larger mining town. Two schools from each town were selected for use. The headmasters of these schools selected six or seven children from the school's top two classes. Students' ages ranged from 11 to 14 years.

RESEARCH DESIGN: The authors used an unstandardized interview technique for collecting data. Each interview lasted approximately one hour. A set of questions was prepared beforehand, but usually the discussion drifted in line with the leads given by the children. The authors discussed their notes after the interviews and wrote a basic narrative of what they thought the children said.

RESULTS: The children seemed to have a wealth of knowledge about two local resources, water and fuel. The children's environmental awareness in terms of water and fuel differed. Those from the rural village knew more about water sources and firewood, while the mining town children knew more about production and marketing of charcoal. To the children conservation had little to do with depleted resources, but meant saving money and reducing the workload. They felt powerless to do anything about the bad water system. From the interview data, the authors presented many recommendations for improving teaching methods so they would be more meaningful to the children by incorporating issues of local importance.

REFERENCES: 3 cited.

147. Knopp, Timothy B., and John D. Tyger. "A Study of Conflict in Recreational Land Use: Snowmobiling vs. Ski-touring." Journal of Leisure Research, 1973, 5(3):6-17.

**DESCRIPTORS:** attitudes, descriptive research, economic background, educational background, ex post facto, rural, urban.

**VARIABLES:** Attitudes of snowmobilers and ski-tourers.

**PURPOSE:** To investigate the relationship between participation in two forms of outdoor recreation and attitudes toward the environment and public land management.

**SUBJECTS:** 220 members of the 1971 North Star Ski Touring Club and 169 registered snowmobilers. All subjects, male and female, were from Minnesota. Snowmobilers were predominantly rural with high school education. Ski-tourers were predominantly urban with college education.

**RESEARCH DESIGN:** Descriptive ex post facto research was employed. Likert-type questionnaires were administered through the mail system. Instrument reliability and validity coefficients were not reported.

**RESULTS:** A chi-square test was used as a measure of significance ( $\alpha = .01$ ). An "index" was determined by calculating a mean after assigning a value to each response. There was a significant difference between ski-tourers conforming to the environmentalist image and snowmobilers. Both groups had an index above the "undecided" level of the scale on all but one item. Without a control group it is impossible to say how these groups differed from the general population.

**REFERENCES:** 5 cited.

148. Knopp, Timothy B., Gary Ballman, and Merriam C. Lawrence, Jr. "Toward a More Direct Measure of River User Preferences." Journal of Leisure Research, 1979, 11(44):317-326.

**DESCRIPTORS:** instrument development, issues awareness, knowledge of issues, preferences, resource management education.

**VARIABLES:** River user preferences.

**PURPOSE:** Develop a baseline measure of river user preferences that would facilitate management decisions.

**SUBJECTS:** Instrument was distributed to 382 (N = 382) river users entering or leaving the river at three major access points.

**RESEARCH DESIGN:** Descriptive research using instrumentation designed to (1) compare river user preferences over time and space, (2) facilitate management policy development. The take-home, Likert-type response instrument consisted of 39 "environmental preference" items and 11 "management alternative" items (reproduced in the article). Also questions about socioeconomic characteristics, river experience and the specific trip on which the respondent was contacted, were asked. Hierarchical cluster analysis was applied to the data. In addition, means and standard deviation for each item were reported.

**RESULTS:** 82 percent of the questionnaires were returned by mail. A dendrogram formed by the hierarchical cluster analysis of 39 environmental preference items and 11 management alternative items was provided. Four "rather distinct associations" were identified and labeled by the authors: (1) noise and development-tolerant; (2) activity setting; (3) mature and solitude; (4) mature with comfort and security. A discussion of these associations on various items is provided.

**REFERENCES:** 12 cited.

149. Kohlenberg, Robert, and Thomas Phillips. "Reinforcement and Rate of Litter Depositing." Journal of Applied Behavior Analysis, 1973, 6(3):391-396.

**DESCRIPTORS:** attitudes, behaviors, conservation education, experimental research, urban, values.

**INDEPENDENT VARIABLE:** Reinforcement and incentives for litter removal.

**DEPENDENT VARIABLE:** Number of litter deposits made.

**PURPOSE:** To evaluate a reinforcement procedure on the behavior of depositing litter in an appropriate trash container.

**SUBJECTS:** Subjects self-selected themselves into the study by depositing trash into a designated trash can in the Seattle Zoo, but were later categorized by age and gender. Subjects were believed to be from or near the Seattle metropolitan area and to consist of a wide variety of age and socioeconomic status.

**RESEARCH DESIGN:** A pre-experimental design was used. The eight-week experiment was divided into four two-week experimental sessions: Baseline I, Reinforcement I, Baseline II, and Reinforcement II. Reinforcement consisted of providing a free soft drink at a nearby concession stand alternately to every 10th and 20th persons depositing trash. All litter deposits to the experimental trash can were recorded by an experimenter and a reliability checker. A Pearson correlation coefficient was computed for responses by the experimenter and the reliability checker (0.9916).

**RESULTS:** The cumulative numbers of litter deposits for each of the four experimental conditions were given. The reinforcement periods resulted in the greatest number of litter deposits. Observations of the ages and gender of the litter depositors indicated no difference between sexes. Age groupings showed the presence of reinforcement decreased the number of litter deposits of those older than 20. Those between 10 and 20 increased while children under 10 appeared unaffected. No levels of significance were reported by the authors.

**REFERENCES:** 2 cited.



150. Kohlenberg, Robert, Thomas Phillips, and William Proctor. "Behavioral Analysis of Peaking in Residential Electrical-Energy Consumers." Journal of Applied Behavior Analysis, 1976, 9(1):13-18.

DESCRIPTORS: attitudes, behaviors, conservation education, energy education, experimental research, knowledge.

INDEPENDENT VARIABLE: Information, feedback, and incentives for conserving electrical energy.

DEPENDENT VARIABLE: Electrical energy usage.

PURPOSE: To study the electrical energy-consuming behavior of three families in an effort to determine the effects of three variables: information, feedback, and feedback plus incentives.

SUBJECTS: Three middle-class families, each with two children, volunteered for the study after seeing a notice in a local conservation club newsletter. The primary wage earners in the experimental families were a lawyer, an engineer, and a businessman. The wives of all three families were full-time homemakers.

RESEARCH DESIGN: A pre-experimental design was used. The research was divided into six consecutive two-week phases. Electrical energy usage was automatically recorded throughout the duration of the study. The first two-week period established a baseline usage pattern. In the second two-week phase, the subjects were given information concerning peaking problems. The third phase involved installation of a feedback device consisting of a warning light that lit as peak levels were approached. Phase four was a second baseline measure. Phase five consisted of monetary incentives plus feedback. Phase six was a third baseline measure.

RESULTS: The cumulative number of energy units above the criterion of peaking for each family was reported. The information condition had little effect for all three families on peaking behaviors. Feedback was effective in reducing the peaking by a relatively small magnitude. The largest effect was shown during the incentive-feedback condition. This study indicated that it was difficult to change consuming behavior. The data did show that feedback was important in producing the behavior changes observed.

REFERENCES: 2 cited.

151. Kostka, M. (Donna). "Nature Center Program Impact." The Journal of Environmental Education, 1976, 8(1):52-64.

DESCRIPTORS: attitudes, experimental research, instrument development, middle school, nonformal, outdoor classroom, rural, urban.

VARIABLES: Attitudes, nature programs, socio-demographic data.

PURPOSE: (1) to locate or design a suitable environmental attitude scale instrument, (2) to test the effects of selected ongoing nature programs on the attitudes of a sample of

sixth grade visitors, and (3) to propose any adjustments in future nature center philosophy based on these results. The author further states six research problems related to these three purposes.

**SUBJECTS:** Sixth grade students ( $N = 600$ ) in elementary schools within the two school districts which were the top users of the selected nature center during the previous (1972-1973) school year. District 1 developed a random selection procedure by which six of its inner schools were selected for use. District 2 included all six of its elementary schools in the projects. Two schools from each district were randomly selected for participation in the pilot study, while all six from each district participated in the main study. Teachers of all classes also participated.

**RESEARCH DESIGN:** A review of six studies on environmental attitudes did not yield an instrument useful at the sixth grade level. The author chose to generate items for an Environmental Attitude Scale (EAS) by contacting 101 sources including sixth graders, teachers, naturalists, and school science coordinators. Items were checked for readability and appropriateness by a panel of 7 adults and 12 sixth graders. A pilot test for this instrument was conducted with 103 sixth graders, and resulted in the establishment of a basic ordinal scale.

The EAS was a '0-1' scored, true-false survey including items appealing to a variety of negative and positive feelings. According to the author, ranking by a jury of EE experts established the EAS validity. A post facto survey of the seven main study naturalists substantiated the expert's rankings on 58 of 59 scale items. A Hoyt reliability score of .83 was found for the EAS total score, and a Cronbach's Alpha of .42 or above was found for six of the seven EAS scale categories ( $N = 815$ ). These categories had been established by cluster analysis, tetrachloric R analysis, factor analysis and item analysis.

The author also reported a lack of available instrument for measuring a pupil's nature center activities or for recording program evaluations, and so developed the nature activities questionnaire (NAQ) and program evaluation form (PEF). The same jury of experts reached consensus on items to be included. The NAQ contained 25 items, and yielded a Hoyt reliability of .75 ( $N = 815$ ), while the PEF contained 30 items, and yielded a Hoyt reliability of .75 ( $N = 160$ ). In the pilot study, one class from each school was randomly assigned to the treatment, with the other becoming a control group. The treatment consisted of a maximum of five hours of in-school activities suggested by the nature center and two hours of standardized naturalist-led activities at the nature center. Pilot classes were pretested at school two weeks before the treatment using both the NAW and EAS. Half of the treatment group was posttested upon arrival, and half upon completion of activities. The next day, the control group was posttested at school.

**RESULTS:** An analysis of variance of pretest EAS means yielded significant differences between rural and urban students for both the pilot ( $p < .05$ ) and main ( $p < .01$ ) studies. An analysis of variance of adjusted posttest EAS total mean scored indicated there were no

significant differences between T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> groups in both the pilot and main studies. However, in the main study, the nature center program did stimulate growth in select categories of environmental attitudes. A Pearson product moment analysis yielded a significant correlation between pretest EAS scores and NAQ scores ( $p < .01$ ) indicating a relationship between previous nature center exposure and reaction to nature center programs. A Pearson analysis also indicated that relationships between students' evaluation of the nature center and their own attitudes were present though not especially strong ( $p < .01$ ). Finally, in the main study, the pre and posttest EAS mean scores for T groups did not provide enough data to evaluate the effects of the naturalists' program. Conclusions and recommendations were reported.

REFERENCES: 23 cited.

152. Kreger, Janet. "Ecology and Black Student Opinion." The Journal of Environmental Education, 1973, 4(3):30-34.

DESCRIPTORS: attitudes, descriptive research, ecology education, ethnic group, higher education, issue awareness/knowledge of issues.

VARIABLES: Opinions and attitudes toward as well as coursework in ecological matters; race.

PURPOSE: To probe black students' opinions and attitudes regarding ecological matters as opposed to other issues of racial interest.

SUBJECTS: 28 black students attending Michigan State University in February, 1972. This sample included an even number of males and females.

RESEARCH DESIGN: A six-item questionnaire was verbally administered by the author to each subject. The questionnaire contained: (1) two questions pertaining to interest in and concern for ecological problems/goals, and (2) one question each pertaining to the relative importance of physical and social environments, the effects of ecological problem solving on other social problems, the representativeness of their responses for black people in general, and previous coursework in ecology. Instrument validity and reliability scores were not reported.

RESULTS: 25 of the 28 respondents felt that black people were not very interested in and concerned about ecological problems/goals for varying reasons. 16 subjects rated the social as more important than the physical environment, 11 rated them as relatively equivalent and only 1 rated the physical as more important than the social environment. Concerning the impact of ecological problem solving on other social problems, 11 respondents saw a direct relationship, 9 saw an indirect relationship and 8 saw no relationship. Concerning the racial representativeness of their statements, 5 took 'extreme' and 20 took 'moderate' positions while 3 respondents took an 'atypical' position expressing direct personal interest in ecology. Lastly, concerning

previous coursework, 23 respondents had no formal background in ecology, 4 had had some formal training, and 1 had 'sat in' on a class.

REFERENCES: 4 cited.

153. Kronus, Carol L. "Involvement of Community Organizations in Environmental Quality." The Journal of Environmental Education, 1974, 5(4):34-36.

DESCRIPTORS: behaviors, citizen action, citizenship, community resource, descriptive research, social background.

VARIABLES: Concern, responsibility, and action for environmental quality. group size and purpose, age and gender composition, and leadership.

PURPOSE: To explore the concern, responsibility, and actions regarding environmental quality of volunteer community organizations.

SUBJECTS: From a population of 300 voluntary organizations in Decatur, Illinois, a random sample of 209 organizations was selected for use in this study. The organizations' current top officers were surveyed, with a 100 percent response rate. The median size of the organizations' active membership was 35 members (nearly 50 percent womens groups; 35 percent mens groups; 17 percent both gender members). Decatur is a central city of 100,000 whose economic livelihood is closely tied to the surrounding farmlands.

RESEARCH DESIGN: For this survey the original list of voluntary organizations was obtained from a current community guide and a specially compiled list of all school PTA's and church-related activity groups. One officer representing the randomly selected organizations was interviewed by telephone in May 1972. The questionnaire consisted of 23 closed-ended questions on the demographic and environmentally-oriented variables listed above. Instrument validity and reliability scores were not reported.

RESULTS: Responses were categorized and reported in a percentage format. Nearly half (101, or 48 percent) of the leaders reported organizational interest in EQ. Of these organizations, 83 percent backed up this statement with action, i.e., the modal number of activities for these groups was one, by having participated in one or more activities aimed at promoting the goals of EQ. Activity types, ranked by frequency of occurrence, included: sponsoring/inviting speakers, conducting waste collection, writing letters, contacting business or political leaders, collecting/contributing money. The leaders of the 108 groups not interested nor involved in the EQ movement overwhelmingly (76 percent) considered the EQ movement outside of the goals and purposes of their organizations. Other less frequently stated reasons were reported. The authors concluded that: (1) the most important predictor of involvement is a strong sense of responsibility for EQ; (2) as group size increased, the more EQ activities were planned and carried out; (3) leaders who are personally motivated toward EQ tend

to head groups active in EQ issues; and (4) sports/hobby and social clubs were the least active types of groups. Conclusions and recommendations were reported.

REFERENCES: None cited.

154. Kronus, Carol L., and J. C. Van Es. "The Practice of Environmental Quality Behavior." The Journal of Environmental Education, 1976, 8(1):19-25.

DESCRIPTORS: affective, attitudes, behaviors, descriptive research, issue awareness/knowledge of issues, rural, urban.

VARIABLES: Residential location and life cycle conditions; environmental quality (EQ); attitudes and behavior.

PURPOSE: To analyze the relationships between residential locations/life cycle conditions factors and environmental quality attitudes/personal involvement in pollution treatment.

SUBJECTS: Two sets of subjects from Decatur, Illinois were randomly selected; 91 urban males from the city of 100,000 comprised the first group. The second group consisted of 96 rural males from the surrounding county. Refusal rates of 11 percent in the rural and 16 percent in the urban samples were reported.

RESEARCH DESIGN: A questionnaire was constructed and administered by telephone to the sample groups. The questionnaire was divided to reflect four indices of environmental quality behavior: (1) concern for pollution problems, (2) local spending of money, (3) voluntarism, and (4) household pollution behaviors. The concern index consisted of five items rated on a four-point scale of seriousness of various types of pollution. In the local spending index, respondents were asked and rated on their feeling about tax monies being spent on pollution abatement rather than six other areas of social concern. Voluntarism was measured by four items rated on a three-point scale asking whether specific pollution-oriented behaviors should be prohibited by law or left to individual responsibility. Finally, on the household pollution behaviors index, respondents were rated on the frequency of five select pollution abatement practices undertaken in their own household. Numeric values were assigned each of the responses on the questionnaire. High values were assigned to reflect favorable environmental quality attitudes.

RESULTS: Despite randomized data collection procedures, the data were analyzed for males only, due to the absence of female farm owners. Company EQ attitudes and behavior of urban versus rural men showed statistically significant for concern ( $Z = 4.60$ ,  $p < .01$ ), local spending ( $Z = 3.43$ ,  $p < .01$ ) and household pollution behavior ( $Z = 2.87$ ,  $p < .01$ ) but not for voluntarism. Urban men were more concerned about local pollution, more willing to spend local monies, and scored higher in their pollution-related household behaviors. In addition, a multiple regression analysis of the responses for the urban groups

showed that the variables of marital status, environmental concern, and voluntarism were the highest indexes of household practices ( $p < .05$ ). The farm groups responses indicated that age and concern were significant related to household practices ( $p < .05$ ). A discussion of the findings was presented.

REFERENCES: 6 cited.

155. Kuhn, David J. "The Development and Application of an Energy Opinionnaire." The Journal of Environmental Education, 1980, 11(4):25-28.

DESCRIPTORS: attitudes, energy education, instrument development, issue awareness/knowledge of issues, secondary.

VARIABLES: Attitudes toward energy issues.

PURPOSE: To develop and validate an Energy Opinionnaire.

SUBJECTS: 413 college preparatory students (grades 10, 11 and 12) in a city in southeastern United States, including 201 males and 212 females. The subjects evidenced a high interest in science and keeping informed on national issues.

RESEARCH DESIGN: 82 items were included in the first Energy Opinionnaire. A five-point Likert scale accompanied each item. A factor analysis procedure was used to reduce the number of opinionnaire items to 25 divided into two subscales--Energy Conservation and Development and the Public's Responsibilities and Government Control. Content validity was established by a panel of scientists, engineers, and science educators. The reliability of the two scales was 0.58 and 0.46, respectively.

RESULTS: 70 to 80 percent of the subjects' responses indicated a strong feeling for energy conservation (Subscale I). Responses also indicated at least an indirect concern for the environment. The response pattern in Scale II was less definitive. When energy conservation was related in personal terms, the subjects were more ambivalent in responses. Further, their attitudes toward governmental control was decidedly negative. Significant differences were not noted among the responses of subjects in the various grade levels. In general, the effect of the sex of the subjects on the response pattern was unclear.

REFERENCES: 10 cited.

156. LaHart, David E., and Jon S. Bailey. "Reducing Children's Littering On a Nature Trail." The Journal of Environmental Education, 1975, 7(1):37-45.

DESCRIPTORS: behaviors, elementary, field trip, issue-based, outdoor classroom, pre-experimental.

INDEPENDENT VARIABLE: Educational methods and incentives.

**DEPENDENT VARIABLE:** Children's littering and litter clean-up behaviors.

**PURPOSE:** To investigate the effects of incentives and various educational methods on the littering and clean-up behaviors of elementary school children on a nature trail.

**SUBJECTS:** 903 elementary school children from 5 to 12 years of age from local public and private elementary schools in the Tallahassee, Florida area; 43 classes were involved over a three-month period. Subjects involved were those who had attended the Tallahassee Junior Museum.

**RESEARCH DESIGN:** A posttest only control group design was used. The setting was the Junior Museum's nature trail. Two study areas were selected along the short loop of the nature trail. One area was "salted" with 50 pieces of litter and the other was cleaned of any litter prior to experimentation. Baseline data were obtained by collecting and counting litter left by children along the trail in both "salted" and cleaned areas. Data were collected after a museum staff member or a trained volunteer conducted the "Reading Mother Nature" program. That program took the children through the experimental area and lasted 30 to 40 minutes. Five treatments were used prior to students being given the program. These were: an anti-litter statement; educational materials; a lecture; instructions and an incentive system. A more extensive explanation of these methods was given in the article. The control group was not exposed to any of the pre-program treatments. Litter was collected after each treatment, placed in a bag, and carefully labeled. The researcher stated that reliability data were not taken because such an extensive search for litter was made. Counting of litter took place inside the museum office.

**RESULTS:** The researchers stated that due to the impossibility of directly measuring the amount of litter per individual child, classical statistical analysis of data was inappropriate. Bar graphs were used to compare the data collected from the five treatment groups. The findings show that whether students were taken on the trail before (less litter) or after (more litter), lunch appeared to have a great effect on the amount of litter left on the trail. The authors attribute this to goods sold at the Junior Museum. In the "salted" area, none of the treatments except for the incentives condition resulted in litter being picked up. In fact, more litter was thrown away in the salted area. In the cleaned area, data show that the statement, the educational materials and the lecture methods were about equally effective in reducing the amount of litter left by the students. The instruction and the incentives treatments did not appear to reduce the amount of litter left in the cleaned area. The researchers discussed these results. According to the researchers, data collected suggest that the easiest way to increase the amount of litter picked up is to give litter value. Motivating people not to drop litter is said to be a slightly different problem. The researchers suggest that more research should be done to analyze the relationship between littering and pick-up behavior.

**REFERENCES:** 4 cited.

157. LaHart, David E., and C. Richard Tillis. "Using Wildlife to Teach Environmental Values." The Journal of Environmental Education, 1974, 6(1):43-48.

DESCRIPTORS: affective, attitudes, descriptive research, educational background, issue awareness/knowledge of issues, issue-based, middle school, teacher training preservice.

VARIABLES: Attitudes towards Florida's dozen Endangered Species, group membership.

PURPOSE: To determine the attitudes towards Florida's Endangered Species held by the three sample groups.

SUBJECTS: Group 1 consisted of 30 science supervisors from all over the U.S. then enrolled in Florida State University's science supervisor summer institute. They all had earned at least a B.S. in science. Group 2 consisted of 28 preservice teachers currently enrolled in Florida State University's College of Education program for elementary education. Most were college seniors. Group 3 consisted of 91 fifth, sixth and seventh graders currently enrolled in Leon County's summer enrichment program.

RESEARCH DESIGN: In this survey members of all groups were asked to complete a 12-item animal preference opinionnaire. The opinionnaire instructed each subject to indicate his/her honest feelings about a given animal by placing a check in a 'like' or a 'don't like' column. Since several of the animals involved would be unfamiliar to the subjects, a third column, 'don't know' was provided. Responses were coded '1' for like and '0' for 'don't like.' Don't know responses were eliminated so that each subject tested produced a response pattern of '1's' and '0's.' Instrument validity and reliability scores were not reported.

RESULTS: Data were ranked by the number of 'like' responses, and the proportion of 'like' responses were calculated. A Spearman rank correlation coefficient was then calculated for pairs of groups. Results were: (1) science supervisors and pre-interns ( $r = .93$ ), (2) science supervisors and students ( $r = .56$ ), and (3) pre-interns and students ( $r = .71$ ). The results of the analysis indicated that sequential ordering of the 'endangered dozen' should be different for each group. According to the authors, there does not appear to be any significant difference between pre-interns and science supervisors, yet the relatively small size of the two samples prevents meaningful statistical analysis. A discussion of results and implications were reported.

REFERENCES: 10 cited.

158. Lamy, Steven, M. Glenn Newkirk, and Mark P. Miller. "A Conference Model for Global Environmental Education." The Journal of Environmental Education, 1975, 7(2):48-53.



**DESCRIPTORS:** cognitive, experimental research, issue awareness/knowledge of issues, knowledge, program evaluation, secondary, social science education.

**INDEPENDENT VARIABLE:** The 41st Annual International Relations Conference of Colorado High Schools.

**DEPENDENT VARIABLE:** Students' cognitive awareness.

**PURPOSE:** To determine the overall success of the independent variable in providing a cognitive learning experience for the students.

**SUBJECTS:** Subjects were randomly selected from high school students registered to attend the 41st Annual International Relations Conference of Colorado. Groups of 65 students were randomly selected from the participants for each of four test periods. Test were administered by the sponsoring teachers one month prior to the conference, directly before the conference, directly following the conference, and two months after the conference. The test information for 31 respondents from each group was utilized. This number corresponded with the lowest response rate of the four test groups.

**RESEARCH DESIGN:** A time-series, "quasi-experimental design" was used. A diagram of the actual design is as follows: R O<sub>1</sub> O<sub>2</sub> X O<sub>3</sub> O<sub>4</sub>. The instrument used in data collection was a 10-point multiple-choice test designed by the researchers. The test was piloted previous to use in the experiment and determined satisfactory. Validity and reliability estimates were not reported.

**RESULTS:** A one-way, fixed effects analysis of variance and a subsequent set of orthogonal comparisons were used to analyze the time-series data. Through an analysis of variance, it was determined that there was a significant variation in the data collected from the four group ( $p < .05$ ). Orthogonal comparisons indicated that there were no significant increases in scores from O<sub>1</sub> to O<sub>2</sub> nor from O<sub>3</sub> to O<sub>4</sub>. Comparison between combined pretest scores and combined posttest scores showed a significant increase in scores from pretest to posttest ( $p < .01$ ). The researcher suggests that the results indicate that the conference activities themselves were the key in the learning process. The researcher also discusses other considerations in the organization and financing of such a large undertaking as a conference.

**REFERENCES:** 7 cited.

159. Leff, Herbert L., and Lawrence R. Gordon. "Environmental Cognitive Sets: A Longitudinal Study." Environment and Behavior, 1979, 11(3):291-327.

**DESCRIPTORS:** affective, cognitive, cognitive style, experimental research, instrument development, issue identification, issue investigation/evaluation skills, nonformal.

**INDEPENDENT VARIABLE:** Environmental cognitive sets, certain environmental procedures.

**DEPENDENT VARIABLE:** Effect of long-term practice in regard to people's awareness of environmental problems and effectiveness in enhancing creativity.

**PURPOSE:** To report the results of a longitudinal experiment exploring environmental cognitive sets (ways of perceiving or thinking about one's surroundings) that were designed especially to promote awareness of environmental problems and possibilities but also to induce aesthetic experience, environmental understanding and a playful and creative orientation toward environmental experience.

**SUBJECTS:** 257 students from an introductory psychology course were involved in a two-hour pretest session. At the conclusion of the pretest, 161 students (116 females and 45 males) were recruited to participate in research involving up to two hours per week for six weeks. They were randomly assigned to various experimental conditions; 129 continued through the final laboratory session.

**RESEARCH DESIGN:** Experimental study with a pretest, posttest control group. A baseline session with experimental manipulation of cognitive sets and 61-point rating scale questionnaires followed a questionnaire-based pretest. This was followed by a "field phase" in which each subject was asked to visit several specified locations on or near the University of Vermont campus. They were given "focus" instructions and asked to fill out a questionnaire after each visit. At the end of the first week, they were given a "recall questionnaire" to check memory. A final laboratory session similar to the baseline session was run as well as a follow-up session approximately four months after the final laboratory session. Cognitive sets were outlined in the study. Interrater reliabilities were between .80 and .90.

**RESULTS:** Subjects using cognitive sets noticed significantly more human-induced environmental problems than did subjects viewing scenes normally. Those using these sets also remembered significantly more environmental problems. No significant differences for memory of environmental problems were evident at the follow-up four months later. Creativity techniques were shown to raise the quality of imagined environmental changes. Implications of this research are noted and recommendations for further research are provided.

**REFERENCES:** 20 cited.

160. Leftridge, Alan, and Robert K. James. "A Study of the Perceptions of Environmental Issues of Urban and Rural High School Students." The Journal of Environmental Education, 1980, 12(1):3-7.

**DESCRIPTORS:** affective, cognitive, descriptive research, issue awareness/knowledge of issues, knowledge, rural, secondary, urban.

**VARIABLES:** Type of home community, perception of environmental issues.

**PURPOSE:** To test the following research question: "Do secondary students from urban and rural areas perceive environmental issues differently?"

**SUBJECTS:** Secondary students (grades 10 and 11) were selected from nine Kansas high schools. Four of the schools were located in central cities, while five were located in rural agricultural communities. Required and intact classes of English, American history and literature constituted the sample population.

**RESEARCH DESIGN:** A slide show and instrument were designed to assess student perception of environmental issues relative to both rural and urban problems. A series of 36 slides depicting rural and urban problems in the areas of air, water, waste disposal and land use were selected by a jury review and rating procedure. Four decoy slides were subsequently added. The slides were then shown to the sample groups at one-second intervals without pause. Each slide was scored on four separate seven-point semantic differential scales. Subsequently, the slides were reshown, and students were asked to identify the issue depicted in each slide. Students accomplished this by corresponding the slide number with one of the issue descriptions found on their copy of the listing of issue descriptions. Instrument validity and reliability scores were not reported.

**RESULTS:** An analysis of variance procedure was employed to test for significant differences between the mean ratings of urban and rural respondents. The level of significance was set at 0.05. Group means were computed based upon the composite scores of individuals within each group. This composite score was arrived at by summary scores on the four semantic differential scales associated with each slide, and totaling these sums for the 36 selected slides. Rural score means were consistently higher, indicating a more negative, and therefore, 'perceptive consideration' of both urban and rural environmental problems depicted in the slides. More specifically, significant differences between the two groups were found on perception of urban water pollution and rural waste disposal problems.

**REFERENCES:** 3 cited.

161. Lingwood, David. "The Case of an Environmental Teach-In." Environment and Behavior, 1971, 3(3):230-262.

**DESCRIPTORS:** attitudes, community resource, continuing education, descriptive research, issue awareness/knowledge of issues, issue-based, knowledge, program evaluation.

**INDEPENDENT VARIABLE:** Environmental Teach-In.

**DEPENDENT VARIABLE:** Characteristics of attendants (i.e., their expectations and outcomes, resultant behavioral change and patterns of environmental information seeking) and changes in environmental knowledge,

interest, concern, and information processing in student population.

**PURPOSE:**

To analyze an environmental teach-in and to examine its impact on teach-in attendants and students from the university community in which the teach-in took place, especially with regard to knowledge acquisition.

**SUBJECTS:** The first part of the analysis was based on a teach-in. The Study Questionnaire was handed out at random to session attendees and visitors at two information centers as they entered the session or center; 54 percent of the respondents were male and 46 percent female; 70 percent were under 30 years of age and 30 percent were over 30; 58 percent were single; 34 percent were nonstudents; 63 percent lived in the Ann Arbor area for five years or longer; 46 percent of nonstudents have professional-level occupations, 31 percent managerial occupations. Most were upper middle class and above. The second part of the analysis was based on 289 students from the University of Michigan Ann Arbor campus chosen randomly from the Student Directory.

**RESEARCH DESIGN:** Descriptive Survey. The first survey (done entirely by interview) provided 142 usable returns from a sample of 200, for a response rate of 71 percent. The second survey was done by a combination of interviews and questionnaires, and a sample of 200 gave 147 usable questionnaires, a response rate of 73.5 percent. Reliability and validity coefficients were not reported.

**RESULTS:** The study shows that there are logical relationships between the ways people get information, what they know, feel and do, and personal characteristics. It showed that most came to the teach-in not to be informed but to look for specific actions that could be taken and to demonstrate group consensus and solidarity. A significant shift in attitudes toward environmental problems was found in the student population as the result of the teach-in. Results are inconclusive regarding actual knowledge gained. A chi-square analysis, using expected returns calculated from the basis of types of persons to whom questionnaires were given, showed no significant response bias. Correlations among selected variables show .05 a significance level of  $r$  approximately = .162, .01 level approximately = .212. Implications and recommendations for further research were noted.

**REFERENCES:** 18 cited.

162. Lipman, Diane S., and Ronald W. Hodgson. "The Influence of Interpersonal Interpretation on the Effectiveness of Self-Guided Cave Tours." The Journal of Environmental Education, 1978, 10(1):32-34.

**DESCRIPTORS:** affective, behaviors, nonformal, pre-experimental.

**INDEPENDENT VARIABLE:** Exposure to interpretive talks.

**DEPENDENT VARIABLE:** Number of questions asked by tourists.

**PURPOSE:** To investigate the influence of interpersonal interpretation on the effectiveness of self-guided tours.

**SUBJECTS:** The subjects were tourists who joined self-guided cave tours at Carlsbad Caverns National Park, New Mexico.

**RESEARCH DESIGN:** Ten-minute interpretive talks were presented four times each day at two locations in the cave for 14 days. Personnel recorded the number of cave-related questions asked during the 14 days preceding the use of interpretive talks, during the period when talks were given, and during the 14 days after talks were suspended. The number of questions asked during the talk period was compared with the number asked when talks were not given to evaluate relative effectiveness of the talks. Measurement validity and reliability scores were not reported.

**RESULTS:** Statistical significance of results was evaluated by a two-way analysis of variance, considering attendance at, and presence/absence of talks as related to the number of questions asked. Significantly more cave-related questions were asked during the period when talks were given than when talks were not given ( $F = 9.69$ ,  $df = 1$ ;  $p \leq .004$ ). Attendance at the talks was not significantly related to the asking of questions. It was reported that together the main effects were significant ( $F = 3.75$ ,  $df = 4$ ,  $p \leq .012$ ).

**REFERENCES:** 2 cited.

163. Loo, Chalsa M. "Behavior Problem Indexes: The Differential Effects of Spatial Density on Low and High Scores." Environment and Behavior, 1978, 10(4):489-510.

**DESCRIPTORS:** affective, behaviors, elementary, experimental research, personality type.

**INDEPENDENT VARIABLE:** Spatial density.

**DEPENDENT VARIABLE:** Effects on children on dimensions of hyperactivity-distractability, anxiety, hostility-aggressiveness, behavior disturbance, and motor inhibition.

**PURPOSE:** To take a differential psychological approach toward exploring whether spatial density has differential effects on children who score "high" or "low" on dimensions of hyperactivity-distractability, anxiety, hostility-aggressiveness, behavior disturbance, and motor inhibition. More generally, it seeks to ascertain what types of children might be more or less adversely affected by crowding and in what ways such an effect would be demonstrated.

**SUBJECTS:** 72 children from preschools who were five years of age; 36 were male and 36 were female. There were 12 groups and each group contained 3 boys and 3 girls. Each group came for two sessions, each lasting 54 minutes and consisting of free play in an adult-free

situation. The second session was held three to seven days following the first session. The participants were primarily Caucasian, with a few children of ethnic minority background, and were primarily from middle to upper-middle class families.

**RESEARCH DESIGN:** Teachers filled out a Preschool Behavior Questionnaire (PBQ) for each participating child in their classroom. The Draw-A-Line-Slowly Test was administered to each child. Test-retest reliability within the same day of testing for the Draw-A-Line-Slowly Test was .90. A median split was performed on the scores for each of the behavior problem measures. The children were told that they would be in the playroom for about an hour and that they could play with anything in the room in any way they wanted. In the adjoining room, six research assistants rated the children's behavior. They would alternately observe then rate for 30-second intervals each. Each child was observed by each of the assistants for nine minutes each. Dependent variables are defined and discussed. Immediately after the play session, each child was interviewed separately. Using a questionnaire, each child was asked how much he/she like/disliked the room on a scale of 1 (disliked a lot) to 5 (liked a lot). An analysis for first session effects was done for anxiety and motor inhibition. Using the interclass correlation formula, interrater reliabilities for the observed-rated dependent variables ranged from .71 to 1.00.

**RESULTS:** In general, normal children motorically adjusted to a higher-density condition to a greater degree than children with behavior problems. Anxious and impulsive children were especially distressed by a high-density condition, compared to normals. Recommendations for further research were noted.

**REFERENCES:** 25 cited.

164. Lowenthal, David, and Marguita Riel. "The Nature of Perceived and Imagined Environments." Environment and Behavior, 1972, 4(2):189-207.

**DESCRIPTORS:** affective, attitudes, behaviors, experimental research, field trip, hypothesis generation, preferences, urban.

**INDEPENDENT VARIABLE:** Set of half-mile walks selected to represent an array of local environments in four cities--Cambridge, Boston, New York and Columbus, Ohio.

**DEPENDENT VARIABLE:** Environmental perceptions and behavior.

**PURPOSE:** To characterize the terms in which people identify the everyday outdoor environment.

**SUBJECTS:** 300 "observers" varying systematically in age, sex, occupation, and educational and residential background were recruited from the Boy Scouts, Church Clubs, architectural firms, hospital nursing and training staffs, and university rosters, in each of the four cities. Each group of subjects was reasonably homogeneous in background and large enough to provide statistical validity. A control group of 140

individuals from the same four localities was also utilized.

**RESEARCH DESIGN:** A questionnaire was distributed in which observers rated each environment traversed along a 5-point scale for 25 bi-polar attributes. Six attributes generated responses about preference, feeling, and effect, while 19 reflected a spectrum of traits fundamental to environmental apprehension and differentiation. The control group was given a separate questionnaire in which they rated the 25 attribute pairs. Attribute correlations and semantic differentials were reproduced in the text. Reliability and validity coefficients were not reported.

**RESULTS:** Of the 300 paired relationships in the 25 x 25 matrix of attribute correlations, only 59 strongly correlated among all groups in each of the four cities. Neither past environmental experience nor any background difference in age, sex, education, or occupation significantly affected the strength of associations. Control group testing (calculation of linkage among each double pair of attributes was based on the Fisher Exact Probability Test) yielded a correlation matrix for semantic associations analogous to that developed from environmental responses. Powerful, undeviating semantic correspondences outweigh those from actual observation, leading authors to conclude that what we think we like about certain kinds of environments and what we actually do like are often not the same. Planners were cautioned. Additional conclusions were listed.

**REFERENCES:** 2 cited.

165. Lunneborg, Patricia W., and Clifford E. Lunneborg. "Effects of Environmental Information on Teacher Value." The Journal of Environmental Education, 1972, 4(2):48-50.

**DESCRIPTORS:** attitudes, experimental research, instrument development, knowledge, teacher training inservice, values.

**INDEPENDENT VARIABLE:** Workshop training.

**DEPENDENT VARIABLE:** Values.

**PURPOSE:** Investigation of the impact of a year-long, weekly environmental workshop on teacher values.

**SUBJECTS:** The experimental group consisted of 25 teachers from Sedro-Woolley, Washington; 17 males and 8 females, age range 21-65, with median age 30. The range of grades taught was 1-12. All were reimbursed volunteer participants in the workshop. The control group, which did not participate in the workshop, consisted of 22 teachers from Marysville, Washington: 12 males and 10 females, age range 23-65, with median age 27. The range of grades taught was 1-12. The authors mentioned problems with attrition, especially with the control group, but did not report specifics.

**RESEARCH DESIGN:** Both groups were pre- and posttested with the following instruments: (1) the Allport-Vernon-Lindzey Study of Values (SOV), (2) the Levit-Morrison Test of Basic Assumptions (TBA), and (3)

an experimental Environmental Awareness Study (EAS). The SOV measured the relative standing of the following motives: theoretical, economic, aesthetic, social, political and religious. The TBA compared realism, idealism and pragmatism within the course of: planning, human abilities, business planning, and life planning. The EAS consisted of 65 multiple-choice items dealing with factual, attitudinal and value-oriented material related to the environment, and was accompanied by a biographic data sheet to measure behavioral data. The EAS was keyed by answers given by the workshop's instructor who took the test both pre and post. The instructor was unaware as to the purpose for his taking the EAS. Only those 50 items that the instructor answered identically in the pre and posttest constituted the final EAS. Therefore, a correct response for the subjects was agreement with the instructor. Neither reliability nor validity were reported.

**RESULTS:** Selected t-tests were made between the two groups, but specific data were not reported. Graphs were presented for the SOV scores and represent the only nonnarrative data reported. On both the SOV and TBA, both groups had "nearly identical" pretest profiles and the control group remained static with the posttest. On the SOV, the experimental group increased posttest on social values, and on the TBA, they scored posttest more idealistic. The groups had dissimilar pretest profiles on the EAS; however, the differences were not specified. On the posttest, the control group showed slightly more improvement than did the experimental group.

With regard to the behavioral data, the experimental group showed a nonsignificant tendency to decrease consumption, while the control group increased its possessions. No level of significance was reported. The authors concluded that the changes on the SOV and TBA resulted from the workshop treatment. However, these changes were not reflected by the behavioral data. The authors suggested that further research is needed to determine the reasons for this.

**REFERENCES:** 9 cited.

166. Luyben, Paul D. "Effects of Informational Prompts on Energy Conservation in College Classrooms." Journal of Applied Behavior Analysis, 1980, 13(4):611-617.

**DESCRIPTORS:** behaviors, conservation education, energy education, experimental research, knowledge.

**INDEPENDENT VARIABLE:** Informational prompts.

**DEPENDENT VARIABLE:** Whether or not lights were turned off.

**PURPOSE:** To evaluate the effectiveness of a prompting procedure on energy conservation.

**SUBJECTS:** Subjects were professors who taught during 55 targeted class periods at a state university. Class periods were chosen which had unscheduled classrooms following the targeted periods. The target periods were assigned randomly to Groups A (N = 28) and B (N = 27).



**RESEARCH DESIGN:** A pre-experimental design was used. Group A underwent five weeks of baseline measurement, followed by six weeks of a letter prompt, followed by three weeks of a letter plus poster prompt. Group B underwent baseline measurement for eight weeks followed by a six-week letter prompt. In the letter prompt phase, a dittoed letter was sent to each target professor in which he/she was encouraged to turn off lights after each class. Only one such prompt was used for each instructor. In the letter plus poster phase, a poster urging users to turn off lights was placed next to each light switch and/or exit door of the study's designated classrooms in addition to each professor receiving the dittoed letter. Observers checked each room after the specified classes and recorded whether lights were left on or turned off. Reliability checks were conducted by a second observer, with 94 percent agreement. A post-experimental consumer survey was also conducted.

**RESULTS:** After receiving the letter prompt, the percentage of observation periods with lights turned off increased from 67 percent during baseline to 80 percent in Group A. The difference between conditions was statistically significant using the Wilcoxon matched-pairs signed-ranks test  $T(24) = 46.5, p < .005$ . In Group B, the difference failed to reach statistical significance, although the baseline rate for this group was quite high. In the letter plus poster condition, the percentage of lights turned off increased to 84 percent. Only 24 of the 55 consumer surveys were returned. Expressed attitudes toward energy conservation and this project were generally positive.

**REFERENCES:** 10 cited.

167. Luyben, Paul D., and Jon S. Bailey. "Newspaper Recycling: The Effects of Rewards and Proximity of Containers." Environment and Behavior, 1979, 11(4):535-557.

**DESCRIPTORS:** behaviors, citizen action, citizenship, community resource, energy education, experimental research, program evaluation.

**INDEPENDENT VARIABLES:** Proximity of the recycling containers and a reward strategy for newspaper recycling.

**DEPENDENT VARIABLE:** The number of pounds of newsprint collected from each park.

**PURPOSE:** To investigate the effects of rewards and the proximity of recycling containers on the amount of newspaper recycled.

**SUBJECTS:** Were chosen from four moderately large mobile home parks in

Tallahassee, Florida. The criteria for park selection were that they (1) were located in the same general area of town; (2) charged approximately the same lot rental fee; (3) contained a large number of mobile homes; (4) contained a number of children of elementary age; (5) had an entrance road, and (6) were approximately equal distance from a paper recycling container.

**RESEARCH DESIGN:** A multiple baseline experimental design with reversals was used to test effects of both proximity and prize conditions. The reliability of recorded weights was checked throughout the study on 26 occasions by independent observers. Pre and post-experimental interviews were conducted in the parks to obtain comparative demographic data and to assess expressed attitudes toward the prize program.

**RESULTS:** Both prize and proximity procedures produced increases in newspaper recycling, but the overall prize condition was more effective. The degree of effectiveness of the prize condition relates to the number of ages of the children in the park. The chi-square statistic was used for pre and post interview results. A significant differences in the number of reported recyclers was found ( $X^2 = 4,792$ ,  $df = 1$ ,  $p < .05$ ), in that 63 percent of the residents reported that they recycled after the study versus only 19 percent prior to the study. Implications for further research were noted as well as recommendations for future research.

**REFERENCES:** 16 cited.

168. McCaw, Steven C. "Teacher Attitudes toward Environmental Education." The Journal of Environmental Education, 1979-80, 11(2):18-23.

**DESCRIPTORS:** attitudes, behaviors, descriptive research, elementary, outdoor classroom, outdoor education, secondary, teacher training inservice.

**VARIABLES:** Demographics; relative importance of EE; use of outdoors and subjects taught there; principal's attitudes toward use of outdoors; use of study trips and indoor/outdoor emphasis; potential and actual study trip problems; and inservice teacher training.

**PURPOSE:** (1) to determine to what extent teachers are currently using the environment to teach, both for study trips and school-site study; (2) to find out what is taught outside; (3) to determine where study trips are taken; (4) to determine teachers' priorities regarding environmental education and other 'nonbasic' parts of the curriculum; (5) to find out what factors inhibit the conducting of environmental education activities; and (6) to determine the willingness of teachers to obtain inservice training in using the environment to teach.

**SUBJECTS:** Subjects were drawn from a sample population ( $N = 4,513$ ) of Columbus, Ohio teachers in all grade levels and subject areas. To

obtain reliable results from a small sample, a matrix containing 24 cells was constructed. It contained schools of low and high Aid to Dependent Children populations; small, medium and large sizes; and of grades K through 3, 4 through 6, 7 through 9, and 10 through 12. From such a stratified population, 1.4 percent, or 63 teacher responses were needed to obtain statistically reliable results. To ensure responses, 5 percent (N = 224) of the teachers were randomly selected and mailed questionnaires. Of 224 questionnaires mailed, 102 (45.5 percent) were returned. Return rates were: elementary, 48.5 percent; junior high; 44.2 percent, and senior high, 36.4 percent.

**RESEARCH DESIGN:** In this survey, a literature review was conducted to identify factors influencing teachers' use of the outdoors. The research instrument developed was based upon factors identified from the literature and upon the basis of discussion with district personnel. School personnel suggested the addition or removal of items at various points in the formulation of the instrument. The questionnaire requested information on age, gender, teaching experience, grades taught, and class size. On it teachers were asked to rank EE in relation to other 'nonbasic' curriculum offerings. Also information for each of the other five study objectives was sought. Instrument reliability scores were not reported.

**RESULTS:** Responses were tabulated and chi-square tests for statistical significance were computed on key items. Mean values and relative frequencies of responses were computed for other items. Types of schools, principals' attitudes and the makeup of student populations did not prove to be significant influencing factors in outdoor use. Principals' attitudes were relatively encouraging at the primary level and relatively ambivalent at the secondary level. Return rates and data suggested a decreasing emphasis on EE at the junior and senior high levels. EE ranked highly, yet declined at junior and senior high levels when compared to vocational and consumer education. Of those teachers who did go outdoors to teach, there were wide differences among grade levels and for subject areas. Study trips were more commonly used by primary than secondary teachers, yet 72 percent of all teachers who used study trips went to indoor sites. Problems with transportation and finances were identified as primary factors influencing the use of these trips. Finally, teacher training was more desirable on school time, and desired by elementary teachers and secondary science/social science teachers. Implications were discussed.

**REFERENCES:** 2 cited.

169. McClelland, Lou, and Nathan Auslander. "Perceptions of Crowding and Pleasantness in Public Settings." Environment and Behavior, 1978, 10(4):535-553.

**DESCRIPTORS:** affective, behaviors, descriptive research, population education, preferences.

**INDEPENDENT VARIABLE:** Crowding.

**DEPENDENT VARIABLE:** Perceptions and degree of pleasantness.

**PURPOSE:** To address the physical and social factors determining crowding and the affective evaluation of crowding.

**SUBJECTS:** 61 University of Colorado introductory psychology students served as subjects to fulfill course requirements.

**RESEARCH DESIGN:** Descriptive Survey. Subjects were shown slides on crowding or pleasantness scales; the slides were also rated by "experts" on several dimensions thought to be important in determining crowding. Subjects, in groups of 15-25, were presented the slides at a rate of about four per minute and asked to rate on a 1-to-9 scale the degree of crowdedness and pleasantness. Of the first 65 slides, a randomly selected group of 15 were presented a second time at the end, so that each subject made a total of 154 ratings. Subjects with replication correlations lower than .62 (the  $p < .01$  significance level for  $n = 15$ ) were removed from the sample. Ratings across subjects were combined by a 10 percent trimmed mean, an average based on the central 80 percent of the ratings distribution for each slide.

**RESULTS:** Mean crowding rating for the 139 slides was 4.70, just to the "uncrowded" side of the rating scale's center point; mean ratings for individual slides ranged from 1.06 to 8.28, with a standard deviation of 1.82. Social density was found to more strongly relate to crowding ratings than spatial density. The negative correlation between crowding and pleasantness was large only for shopping and work settings, but crowding did not predict low pleasantness ratings when coupled with other variables in a multiple regression analysis. Other predictors of pleasantness included work-play, amount of space, waiting, and percent of people alone or unaccompanied. Implications of this study are discussed, as well as several avenues for future research.

**REFERENCES:** 22 cited.

170. McNees, M. Patrick, John F. Schnelle, John Gendrich, Murphy Thomas, and Gwen Beagle. "McDonald's Litter Hunt." Environment and Behavior, 1979, 11(1):131-138.

**DESCRIPTORS:** community resource, descriptive research, issue awareness/knowledge of issues, issue-based, program implementation.

**INDEPENDENT VARIABLE:** Litter in a community.

**DEPENDENT VARIABLE:** Effectiveness of a litter control program.

**PURPOSE:** To attempt to design, implement and evaluate the effects of a community litter control program.

**SUBJECTS:** The study was conducted in Murfreesboro, Tennessee. Twenty quarter blocks were randomly selected from each of four school districts; 80 blocks were designated for measurement purposes. Students from eight different schools participated in the litter hunt. Five students from each school served as "litter patrol members."

**RESEARCH DESIGN:** Descriptive case study based on (unobtrusive) measure of sample areas. Litter tags were randomly attached to litter throughout the city by individuals not familiar with the sample area. Tags were redeemable for free cookies at McDonalds. McDonalds also raffled prizes in return for bags of litter. Observers walked along the shoulder or sidewalk and counted "all the litter in sight" in all 80 areas before and after the litter campaign. Reliability measures were made during 22 percent of the observations. Interobserver agreement was calculated. Reliability averaged 84 percent.

**RESULTS:** Litter level fell from a mean of 2,500 pieces to a mean of 1,712, a reduction of 32 percent. The study concluded that a litter program, working with business and using attractive incentives, can engage youth in anti-litter efforts.

**REFERENCES:** 13 cited.

171. McNeil, R. J. "Studying the Environment by Mail." The Journal of Environmental Education, 1971, 3(2):36-40.

**DESCRIPTORS:** conservation education, continuing education, descriptive research, educational background, preferences.

**VARIABLES:** Age, sex, educational level, occupation, activity interests, percent completing course.

**PURPOSE:** Describes the characteristics of participants in two correspondence courses on conservation offered by Cornell University from 1962-1966.

**SUBJECTS:** The exact number of subjects was not reported. The number of subjects for each of the variables under study varied from 784-847. All subjects were participants in at least one of two correspondence courses offered by Cornell University. Virtually all subjects were residents of New York State. Males constituted 81 percent and females 19 percent of the population. Educational levels ranged from "some high school" to "graduate work in college"; ages ranged from 14-83. Occupation categories were varied.

**RESEARCH DESIGN:** Data were collected via a questionnaire mailed to all participants upon course registration. The specific format of the questionnaire and the percent response rate were not reported. Reliability and validity were not reported.

**RESULTS:** Two separate courses were offered. Data for course one were presented on a percentage basis for the following categories: sex, age, educational level, occupation, and activity interests. For courses one and two combined, data were presented on course completion rates. In addition, general information was reported concerning advertising strategies and success, the course budgets, and the course administration.

**REFERENCES:** None cited.

172. McTeer, J. Hugh. "Teen-age-Adult Differences in Concern for Environmental Problems." The Journal of Environmental Education, 1977, 9(2):20-23.

DESCRIPTORS: attitudes, descriptive research, secondary, values.

VARIABLES: Concern for environmental problems as perceived by teenage students, administrators, social studies teachers and parents.

PURPOSE: To investigate the differences between teenagers and adults regarding the degree to which these groups express concern for environmental problems.

SUBJECTS: The study viewed two sample groups. Group A (N = 280) consisted of 90 high school students 109 parents, 64 social studies teachers, and 17 school administrators. Group B (N= 288) consisted of 100 students, 120 parents, 38 social studies teachers, and no school administrators. All respondents came from suburban Atlanta.

RESEARCH DESIGN: In Group A, the subjects were asked to rank in order of importance 12 objectives for the teaching of secondary social studies. Only one of these objectives dealt with environmental problems. In Group B, the subjects were asked to rate each of the 12 objectives on a five-point scale (from very little importance to very important). Those 12 objectives were similar to those given to Group A. Again only one of these objectives dealt with environmental problems. Instrument reliability scores were not reported.

RESULTS: An analysis of variance for Group A data showed that students selected the environmental objective as being more important than did the other groups (Alpha level = .01). The chi-square result for Group B corroborated the Group A findings. A rank ordering of each objective rated in Group B showed that students ranked the objective dealing with the environment as most important while parents ranked it fourth, teachers tenth and administrators eleventh.

REFERENCES: None cited.

173. Mahaffey, Ben D. "Curricular Guidelines for Environmental Interpreter Training Programs." The Journal of Environmental Education, 1973, 5(1):23-30.

DESCRIPTORS: descriptive research, higher education, nonformal, program development, resource management education, teacher training preservice.

VARIABLES: Personal and professional background, philosophy toward issues, desired professional proficiencies, and curricular offerings, emphasis and subject focus in the field of Environmental Interpretation.

PURPOSE: To propose general curricular guidelines for use in the preparation of Environmental Interpreters via the collection and evaluation of data on the variables listed above.

**SUBJECTS:** 49 colleges and universities with curricula available for the education of Interpretive Naturalists or Environmental Interpreters selected from Replinger's compilation and the 1970 Directory of Recreation and Park Curricula were surveyed regarding curricular offerings, emphasis and subject focus in their program(s). A 34 percent random sample of the memberships of the Association of Interpretive Naturalists and the Western Interpretive Association, and the readership of The Journal of Environmental Education were surveyed on the personal, professional, philosophy and proficiency variables. 82 percent of colleges and universities, and 71.5 percent of the professionals surveyed, responded. Of professional respondents, 80 percent (a) were located east of the Mississippi, (b) worked for various levels of the government, and (c) had 15 years experience or more.

**RESEARCH DESIGN:** Two instruments were developed to obtain the desired information. The institutional curricular survey was designed to determine program offerings, emphasis and the frequency of subjects taught in the preparation of environmental interpreters. The professional survey was composed of four parts: philosophy toward selected current issues, proficiencies desirable in interpreters, knowledge desirable from baccalaureate work, and a personal profile section. Instrument validity and reliability scores were not reported.

**RESULTS:** The computation and analysis of data consisted of frequency distributions, percentage distributions, chi-square analyses, and priority ranking scales. Two university programs had curricular offerings specifically designed for preparing environmental interpreters: Michigan State and the University of Michigan. The remainder of programs surveyed presented specializations, options, or limited course offerings in this area. The professionals' responses regarding philosophy toward issues indicated: (1) an ecologic emphasis over a taxonomic approach (content), (2) a definite role in awakening the public to environmental management concerns, practices and social/political problems related to resources (activism), and (3) that this role was not unethical (ethics). Of the proficiencies measured, public speaking, writing and AV equipment operation were deemed essential. For desirable coursework, 47 courses scored at least 1.0 on a scale of 2.0, and were dominated by the natural, biological, physical and social sciences, natural resources and communications-related subjects. Needs and recommendations were stated by the author.

**REFERENCES:** 1. ted.

174. Mangum, Thomas E., III, and Thomas R. Mertens. "Introductory Ecology Courses in Colleges: A Survey." The American Biology Teacher, 1971, 33(8):484-488.

**DESCRIPTORS:** ecology education, higher education, program development.

**VARIABLES:** Determination of content of general ecology courses.

**PURPOSE:** To gather data concerning the faculty and students involved and the content and organization employed in general ecology courses in institutions of higher education throughout the U.S.

**SUBJECTS:** 446 members of the Ecological Society of America receiving a questionnaire in 1969.

**RESEARCH DESIGN:** A questionnaire consisting of questions designed to identify what was being taught in ecology courses across the nation. 291, or about 65 percent of the questionnaires were completed and returned. Of these, 240 were employed in the tabulation of data. The 51 unused returned questionnaires were eliminated because of the more specific nature of the course it reflects.

**RESULTS:** Ecology courses taught in U.S. colleges and universities appear to be widely variable in content. Most instructors indicated that they did not devote as much class time to currently popular topics such as overpopulation and pollution and instead emphasized the more classical topics of succession, population ecology and community ecology. Many indicated their emphasis was dictated by the fact that classical ecology textbooks do not sufficiently stress human ecological problems. Authors also concluded that more preservice biology teachers and biologists should be required to take a general ecology course in their program of study.

**REFERENCES:** 15 cited.

175. Marler, Lela. "A Study of Anti-litter Messages." The Journal of Environmental Education, 1971, 3(1):52-53.

**DESCRIPTORS:** attitudes, behaviors, descriptive research, knowledge.

**INDEPENDENT VARIABLE:** Leaflet themes (punishment, reward, factual)

**DEPENDENT VARIABLE:** Knowledge about littering, littering behavior, attitudes about littering.

**PURPOSE:** Examined the effectiveness of three themes in informational leaflets on the knowledge, motivation, opinion and behavior directed toward littering and vandalism.

**SUBJECTS:** An unspecified number of user group campers and picnickers in three campgrounds of Uinta National Forest, Utah, received informational leaflets stapled to validation cards issued upon entrance. 118 user groups were asked to fill out questionnaires; 30 had not received a leaflet and formed the control group. Approximately 30 had received the punishment theme leaflet, approximately 30 had received the reward theme leaflet, and approximately 30 had received the factual theme leaflet. The 118 subjects represented all campground users for a two-week period. No attempt was made to equate the control and experimental groups.

**RESEARCH DESIGN:** Littering behavior was measured by examining each campsite prior to and after occupation and rating the amount of litter



found. The subjects' opinions about litter, motivations to keep an area clean, awareness of the litter problem, and knowledge about the litter problem were measured by the questionnaire. The questionnaire also had a section for demographic information. Reliability and validity were not reported.

**RESULTS:** The data were presented in a narrative form. The control group knew more specific facts about littering than the experimental groups, and also placed less responsibility for litter control on the Forest Service. All groups were nearly equal in their opinions as to the inevitability of littering in public, and also in their views as to enforcement procedures that should be used to control littering. The punishment group left their sites cleaner than they found them to a degree higher than the control, reward and factual groups. The results are not generalizable due to differences in demographics, and no level of significance was reported.

The author noted that of the leaflets stapled to the validation cards, only 65-70 percent of them were noticed by the campers, and of these, only 60 percent were read, resulting in a net communication rate of about 40 percent.

**REFERENCES:** None cited.

176. Marsh, C. Paul, and James A. Christenson. "Support for Economic Growth and Environmental Protection, 1973-1975." Rural Sociology, 1977, 43:101-107.

**DESCRIPTORS:** affective, attitudes, citizen action, economic background, educational background, ex post facto, inquiry, issue-based, population education, resource management education.

**INDEPENDENT VARIABLE:** Income, education, place of residence, political orientation.

**DEPENDENT VARIABLE:** Attitudes.

**PURPOSE:** To present data dealing with the trend and structure of support for both environmental control and economic development from 1973 (a year of low fuel prices and high employment), to 1975 (high fuel prices and severe recession). Structure of support was measured using independent variables as listed previously.

**SUBJECTS:** 1973 survey used a total of 3,115 respondents and 1975 used 3,054. All respondents were to be heads of households and all lived in North Carolina.

**RESEARCH DESIGN:** Two (1973 and 1975) statewide surveys were mailed in this ex post facto design. Items measured support for both environmental protection (air and water pollution) and economic growth (industry and agriculture). Mean scores were used to measure level of support. T-tests were used to test significance of changes in means

from 1973 to 1975. F-tests were used to test differences within each of the years ( $\alpha = .05$ ).

**RESULTS:** From 1973 to 1975, there was shown to be a significant decrease in the level of support for public expenditures for both air and water pollution. However, there was a significant increase in support for public expenditures to promote agriculture and industrial development.

Education was positively related to support for environmental protection. Income was not consistently related to support for environmental protection. Support for controls of air and water pollution was greatest among urbanized respondents. Support for economic growth was greatest among those who lived in or near towns of less than 10,000. Liberals were more favorable to pollution controls than conservatives, but there was no significant difference between the two for economic development.

**REFERENCES:** 12 cited.

177. Moyer, Richard H. "Environmental Attitude Assessment: Another Approach." Science Education, 1977, 61(3):347-355.

**DESCRIPTORS:** affective, attitudes, citizen action, issue awareness/knowledge of issues, population education, program development, program evaluation, science education, social science education, teacher training inservice.

**INDEPENDENT VARIABLE:** Sex, urbanism, and community size.

**DEPENDENT VARIABLE:** For the four full models - Y = MUSEA Score.

**PURPOSE:** To develop and field test an instrument for assessing environmental attitudes utilizing unobtrusiveness measurements.

**SUBJECTS:** Sample included: 379 seventh graders in Colorado representing 14 classes with students from both rural and urban areas, neither being predominant in this particular area.

**RESEARCH DESIGN:** The MUSEA (Moyer Unobtrusive Survey of Environmental Attitudes) was designed to evaluate students' attitudes toward pollution, population, and ecological relationships. Three subscales to MUSEA include Word Association Scale, Free Choice Scale, and a Sentence Completion Scale. The questions of the MUSEA were structured so as to be nondirective toward environmental topics. Reliability of the MUSEA was established by calculating a coefficient of internal consistency. Overall reliability was found to be 0.67.

**RESULTS:** Possible range of scores on the MUSEA is -18 to +27. Mean score for the total sample on MUSEA was 10.21, w/S.D. of 4.66

Mean Score on WAS = 2.52

FCS = 4.84

SCS = 2.85

Multiple regression analysis indicated no significant difference between scores for urban and rural dwellers or between students from small, medium or large communities, or between male and female students on the MUSEA. The MUSEA could be a useful tool for teachers, coordinators and administrators in evaluating environmental education in the affective domain.

REFERENCES: 11 cited.

178. Michaud, Howard H., and L.R. Hilterbrand. "Conservation Education in Indiana." The Journal of Environmental Education, 1972, 3(3):39-43.

DESCRIPTORS: conservation education, descriptive research, secondary.

PURPOSE: The researchers surveyed high school principals to determine the extent to which conservation education was being taught at the secondary level in Indiana.

SUBJECTS: Questionnaires were distributed to 125 principals; 102 were sent through the mail and 23 were given by personal contact. 51 returned usable questionnaires for a response rate of 40 percent. Schools were picked at random and covered 47 percent of the state's counties. The authors stated that the majority of schools were in rural settings, but did not specify what the size of the majority was, nor what the definition of rural setting was.

RESEARCH DESIGN: Respondents were given questionnaires with stamped, self-addressed return envelopes. The questionnaires asked for the following information: number of students, percent teachers with life and provisional certification, in which of 12 areas conservation topics were taught, what were some conservation problems within the community, what extracurricular organization carried out conservation activities, what conservation clubs received support from the community, whether the school owned or controlled a land laboratory, what school departments used the land laboratory, what resource personnel were available to the school, what types of field trips were available, what plans were being made to incorporate conservation education into the curriculum, at what age level conservation education should be taught, what should be stressed in conservation education, and what difficulties were encountered in implementing conservation education. Neither reliability nor validity were reported.

RESULTS: The data were not reported specifically. Generally, data indicated that conservation education would increase in the schools, particularly since there seemed to be an awareness on the part of the principals that this was a needed emphasis. Biology and agriculture were the primary areas where conservation education was taught. The main hindrances to conservation education were a lack of trained teachers and, the authors implied, the lack of a state curriculum. The authors compared the results of this survey with one taken in 1949 and found similar results in the overall emphasis of conservation education in the public school curricula. Data are not generalizable beyond the sample area.

REFERENCES: 1 cited.

179. Miller, Jon D. "The Development of Pre-Adult Attitudes toward Environmental Conservation." School Science and Mathematics, 1975, 75(8):729-737.

DESCRIPTORS: affective, attitudes, cognitive, descriptive research, elementary issue awareness/knowledge of issues, issue-based, middle school.

VARIABLES: Attitude toward and cognitive structure of environment; environmental conservation and pollution.

PURPOSE: To survey pre-adult attitudes toward environmental conservation and pollution.

SUBJECTS: 505 second through eighth graders from four metropolitan Chicago schools. Two were public schools and two were private Catholic schools.

RESEARCH DESIGN: The selection procedure was designed so as to include a mixture of students broadly representative of the income, religious, and racial distributions in the area. Within schools, classrooms and students were selected through the use of random numbers. Individual interviews were used to survey the sample. The interviews began with questions on personal biographic data, proceeded to general open-ended questions about science and technology, and then ended with a series of specific questions concerning environmental conservation and pollution. Interviews were conducted by undergraduate students at Chicago State University during December 1973. Scorers rated interviews using the Piagetian Model for determining the basic dichotomies between concrete and abstract, and simple and complex thinking ability. Reliability and validity scores were not reported.

RESULTS: The data indicated that a significant portion of the development of attitude toward environmental conservation and pollution occurs during the elementary school years. These data also suggested that the attitudes of eighth grade students do not significantly differ from adult populations. In addition, responses toward conservation and pollution questions indicated a movement from simple and concrete understandings to complex and abstract understandings.

REFERENCES: 10 cited.

180. Milson, James L. "Evaluating an Environmental Education Symposium for Secondary Teachers." The Journal of Environmental Education, 1975, 7(1):11-13.

DESCRIPTORS: attitudes, knowledge, pre-experimental research, secondary, teacher training inservice.

**INDEPENDENT VARIABLE:** 15-day symposium for secondary teachers.  
**DEPENDENT VARIABLE:** Knowledge, attitudes, reaction to symposium.  
**PURPOSE:** To assist teachers in developing the content knowledge necessary to understand and select positions on various environmental problems and to determine which environmental topics could be included in the secondary curriculum. A secondary purpose of the study was to determine if the teachers perceived the symposium as an effective method for presenting environmental topics.

**SUBJECTS:** Random selection of 45 secondary teachers each in control and experimental groups.

**RESEARCH DESIGN:** Instruments--three questionnaires; a slight modification of instruments developed by Dr. Delmar Janke, Dept. of Education Curriculum, Texas A. and M University. 30 items on each questionnaire:

1. agree or disagree to natural resources statements, pre and posttest.
2. statements related to environmental topics that might be in secondary education curriculum, pre and posttest.
3. determine participants' reaction to symposium, posttest only.

**RESULTS:** First two instruments compared by use of analysis of variance

1. Ex. group--23 significant changes between pre and posttest.
1. Control----0 significant changes between pre and posttest.
2. Ex. group--27 significant changes between pre and posttest.
2. Control----0 significant changes between pre and posttest.
3. Ex. group--90 percent of participants rated symposium as average or above.

**Conclusion:** The structure of the symposium was highly acceptable, had some effect on opinions and affected the way participants would select content for curriculum.

**REFERENCES:** None cited.

181. Mirka, George. "Factors Which Influence Elementary Teachers' Use of Outdoor Classrooms." The Journal of Environmental Education, 1973, 4(4):31-33.

**DESCRIPTORS:** descriptive research, elementary, formal, middle school, outdoor classroom, outdoor education, teacher training inservice, teacher training preservice.

**VARIABLES:** The actual use of and ranking of items concerning the use of outdoor instructional activities by teachers.

**PURPOSE:** (1) to determine those variables which impinge upon a teacher's use of outdoor instructional activities, and (2) subsequently to infer the role those variables should play in both pre and inservice teacher training in outdoor education.

**SUBJECTS:** 324 teachers of grades 1 through 6 in the Parma Public Schools. This school system is the largest suburban school system in the Cleveland area. All teachers of grades 4 through 6 were surveyed via the mail in the spring of 1973. Teachers of grades 1 through 3 from 14 of Parma's 21 schools were surveyed via mail in the fall of 1973. Of the 324 surveys mailed, 267 were completed and returned, 244 in a usable form.

**RESEARCH DESIGN:** Building principals in the Parma schools received, distributed, collected and returned the mailed surveys. The survey instrument consisted of two parts: (1) questions pertaining to personal and professional background including age, home background, educational background, class size and outdoor work with youth, and (2) 24 items associated with various aspects of outdoor instructional activity use. On the basis of responses in part one, two groups were established. Teachers were characterized as either 'haves' (i.e. outdoor activity users) or 'have nots' (i.e., nonusers). In the second part, teachers were asked to select and rank order 10 of the 24 items based upon the importance of that item to the use of outdoor instructional activities (1 for most and 10 for least important). The group rankings for each of the 24 items were computed. Instrument validity and reliability scores were not reported.

**RESULTS:** No significant differences were found between the two groups regarding members' personal and professional characteristics. Concerning the members' selection and ranking of 10 items in part two of the instrument, unweighted and weighted responses were found to be equivalent. In comparing the unweighted responses of the two groups, the authors reported similarities and differences in both the selection and ranking of items. The specific results of selection and ranking were presented in a table format. From those results, conclusions were drawn regarding teaching training needs and practices.

**REFERENCES:** None cited.

182. Mitchell, Bruce. "Behavioral Aspects of Water Management: A Paradigm and a Case Study." Environment and Behavior, 1971, 3(2):135-153.

**DESCRIPTORS:** citizenship, continuing education, descriptive research, issue awareness/knowledge of issues, knowledge, model building

**INDEPENDENT VARIABLE:** Environmental decision makers and the general public.

**DEPENDENT VARIABLE:** Perceptions, attitudes and behavior.

**PURPOSE:** To explore the behavioral aspects of water pollution based on problems of public participation and education programs in water resources management.

**SUBJECTS:** Residents of Waterloo County, Ontario were stratified into three groups. The strata used were urban, urban-rural, and rural.

Having divided the lay public population into three strata, a sample of 400 was selected. Of these, 200 were urban, 70 urban-rural and 130 rural. The allocation procedure was disproportionate relative to the numbers contained in each strata. This breakdown was used to ensure a substantial number of rural residents. Respondents from each stratum were selected from land assessment registers, using a systematic sampling procedure.

**RESEARCH DESIGN:** Descriptive Survey. A questionnaire using a rank-order scaling system was used. Some data based upon modified Likert scale with categories horizontally aggregated into agree, neutral and disagree. Yes/no/don't know questions were also administered. Reliability and validity coefficients were not reported.

**RESULTS:** Data was analyzed using two statistical tests: Chi-square and Kolmogorov-Smirnov. Kolmogorov-Smirnov significant between the public and professionals at .001. With data horizontally aggregated into agree, neutral and disagree categories, chi-square significant between public and professionals at .005. Chi-square not significant among urban, urban-rural, and rural at .05. Evidence suggests that significant differences do exist between the professional decision makers and the lay public regarding the nature of the water pollution problem and the role of the public in the managerial process. Secondly, the evidence shows that differences among the subgroups as defined by place of residence cannot be accepted. Implications and recommendations for further research were noted.

**REFERENCES:** 15 cited.

183. Mitchell, Robert Cameron. "How 'Soft,' 'Deep,' 'Left'? Present Constituencies in the Environmental Movement for Certain World Views." Natural Resources Journal, 1980, 20(2):345-358.

**DESCRIPTORS:** affective, attitudes, beliefs, descriptive research, issue-based, preferences, values.

**VARIABLES:** Attitudes, beliefs, values.

**PURPOSE:** To assess members of environmental organizations regarding their attitudes toward appropriate technology (soft), the deep ecology movement, and their personal political ideology.

**SUBJECTS:** 5,000 total questionnaires were sent to the members of the following five national environmental organizations (1,000 to each organization): Environmental Action, Environmental Defense Fund, National Wildlife Federation, Sierra Club, and The Wilderness Society; 65 percent of the surveys were returned. The author classified the respondents as "almost entirely white, relatively well-off, and very well-educated."

**RESEARCH DESIGN:** The study was a descriptive survey format, using a questionnaire with a Likert scale. Portions of the questionnaire were included in the paper. Environmental organizations were chosen to

compare any differences between the members of more-recently formed clubs (10 years)(Environmental Action and Environmental Defense Fund) and the older, more conservation-based organizations (Sierra Club, National Wildlife Federation, Wilderness Society). The participants were randomly selected, and the survey was done by mail.

RESULTS: Author used descriptive analysis. In general, respondents believed the energy crisis to be serious and were strongly in favor of soft energy paths (appropriate technologies). Approximately 10 percent of the respondents strongly held deep ecological views, and another 15 percent were sympathetic to them. As for personal political ideologies, 60 percent of the group members rated themselves from moderately liberal to radical.

REFERENCES: 9 cited.

184. More, A. Thomas, and Brian R. Payne. "Affective Responses to Natural Areas near Cities." Journal of Leisure Research, 1978, 10:7-12.

DESCRIPTORS: affective, descriptive research, outdoor education.

VARIABLE: Mood of visitors.

HYPOTHESIS: During the course of a visit to a nature center, the level of negative moods (aggression, anxiety) declines, while the level of positive moods (elation, social affection) increases.

SUBJECTS: 385 visitors to the Audubon Society wildlife sanctuaries near suburban communities in Massachusetts. The socioeconomic background was established but no other information is given in relation to the samples.

RESEARCH DESIGN: A descriptive survey design was utilized with no control groups. Questionnaires containing the Mood Adjective Checklist (MACL) were taken before and after the visit. The reliability and validity of this test were established for previous studies. Changes in mood in each area were assessed by means of a paired t-test and visitors' moods across areas by sample t-tests. Means and standard deviations of mood scores were calculated for each of the 11 mood dimensions.

RESULTS: Entering mood scores were very low for negative effects (3.47 to 4.50) and moderately high for positive effects (7.39 to 9.38). Most negative effects decreased significantly in all areas. Of the positive effects, vigor decreased in the three areas, urgency and social affection in one area each. Concentration decreased at all areas and fatigue increased at two areas. Visitors of one area scored significantly lower on anxiety, sadness and fatigue and higher on elation than visitors to the other areas.

Attempts to predict entering mood based on the socioeconomic background with the use of multiple regression were failures. The measurement of



people's affective responses to recreation using a mood adjective checklist appears to be a promising area of research.

REFERENCES: 15 cited.

185. Moore, Judith Hoffman. "Defining and Interpreting Ecology." The Journal of Environmental Education, 1971, 3(1):54-57.

DESCRIPTORS: attitudes, descriptive research, ecology education, issue awareness/knowledge of issues, knowledge.

VARIABLES: Knowledge, attitudes, social background.

PURPOSE: The author tested the comprehension of ecology for two selected groups, and also correlated one group's comprehension with their environmental attitudes.

SUBJECTS: Two selected groups of unspecified numbers served as subjects for this study. The first group was a high school biology class. The second group consisted of volunteer members from the Madison, Wisconsin, area League of Women Voters.

RESEARCH DESIGN: Subjects were given a 22-item multiple-choice test that covered 10 basic ecological concepts. These concepts were derived from a larger group of ecological concepts generated by seven theoretical ecologists from the University of Wisconsin faculty. Each question was based on a contemporary issue that illustrated the concept. These issues were generated by seven applied ecologists from the same university. The faculty members did not write the actual questions for the test, which was used to determine each group's ecological comprehension.

In addition, the League of Women Voters group was given 10 items that described two choices which a firm or community could take vis-a-vis an environmental problem. For each item, there were seven steps the subject could choose, ranging from 'strongly prefer' at either extreme to 'can't decide' in the center. These items tested the subject's attitude toward reversing current trends in environmental management. Neither reliability nor validity were reported.

RESULTS: For the first part of the research, the author ranked for each group the order of concept difficulty. The concepts dealing with evolution, population, and environmental adaptations were the most difficult for both groups, though not in that exact order for each. The concept dealing with cycles and the balance of energy and nutrients was easiest for both groups. Overall, the number of errors made by League members (6.3, maximum errors = 22) was less than the number of items missed by the students (8.6).

In some items, the correct response was a biological principle; in others, the correct answer was a sociological response. A two-tailed t-test was performed to determine if either response type drew more correct answers. More correct answers were given for biological answers, but this was not significant at the .05 level.

The author stated that for the second part of the research, neither observations nor statistics revealed any correlation between attitudes and ecological comprehension. The author stated that research of this type could be useful to environmental communicators in alerting them to the level of understanding of their audiences. The author also hypothesized that the results for the League group could be representative of well-educated, middle and upper-middle housewives.

REFERENCES: 4 cited.

136. Moyer, Richard H. "An Investigation of Factors Influencing Environmental Attitudes." School Science and Mathematics, 1975, 75(3):266-269.

DESCRIPTORS: affective, attitudes, cognitive, descriptive research, formal, issue awareness/knowledge of issues, secondary.

VARIABLES: Environmental attitudes, environmental knowledge, courses of study, grade point average, socioeconomic factors.

PURPOSE: To investigate possible factors in the formation of environmental attitude.

SUBJECTS: A cognitive test was administered to 224 high school seniors and an affective measure to 241.

RESEARCH DESIGN: The Syracuse Environmental Awareness Test, Forms A and D, were utilized in data collection. Form A is a 52-question multiple-choice cognitive test; Form D is a 105-question forced-choice affective test.

RESULTS: Student grades in all courses were correlated with their scores on both the affective and cognitive test scores. Additional correlations were examined between the test measures and overall grade point average, and social economic level. A correlation of .38 ( $p < .01$ ) was found between the cognitive and affective measures. A correlation between the cognitive test score and the students' grade point average was found to be .58 ( $p < .01$ ). However, even at the .05 level, no significant correlation was found between students' attitude toward the environment and student grade point average.

A correlation of .25 was found between the cognitive scores and the student socioeconomic level. No significant correlation was found between the affective measure and the socioeconomic level ( $p = .05$ ). Grades in electricity ( $r = .88$ ), astronomy ( $r = .63$ ), geology ( $r = .81$ ), biology ( $r = .55$ ), science ( $r = .54$ ), history and social studies (no  $r$  values given) correlated higher with the cognitive test scores than did grades in other courses. Three courses had a significant correlation with the affective test results. They were: Electricity ( $r = .41$ ), biology ( $r = .19$ ), and individualized reading ( $r = .15$ ).

REFERENCES: 11 cited.

187. Murch, Alvin W. "Public Concern for Environmental Pollution." Public Opinion Quarterly, 1971, 35(1):100-106.

**DESCRIPTORS:** attitudes, behaviors, citizen action, descriptive research, issue awareness/knowledge of issues, social background, values.

**VARIABLES:** Awareness of pollution, attitudes toward pollution, attitudes toward solutions, satisfaction with residency in the community.

**PURPOSE:** The author reported results of a survey that sought to measure the subjects' awareness of pollution, who or what they felt was responsible for it, and how it might be solved. The author also correlated the subjects' satisfaction with living in the community with their awareness of pollution.

**SUBJECTS:** Approximately 300 questionnaires were randomly distributed in an unspecified manner to residents of Durham, North Carolina in late March, 1970; 205 questionnaires were completed and returned for a response rate of nearly 68 percent.

**RESEARCH DESIGN:** Subjects were asked to indicate on a Likert scale whether pollution was a problem nationally in their own community, and in several geographic areas increasing steadily in distance away from their community. Respondents could answer: serious, moderate, minor, no problem, no opinion. Subjects were also asked open-ended questions related to: home ownership versus renting, satisfaction with residency in the community, perceived causes of pollution, where they learned about pollution, belief in whether solutions to pollution were possible, and what the solutions might be. Subjects were also given three items, in the form of proposals for dealing with environmental problems, that measured (1) the political importance they assigned to pollution (one item) and (2) what they would be willing to pay to check environmental damage (two items). Neither reliability nor validity were reported.

**RESULTS:** The data were generally presented in a narrative form. Three tables presented percent response to selected questions; 74 percent of the respondents perceived pollution to be a serious national problem and 13 percent saw it as a serious local problem. The inclination to perceive it as a serious problem increased as the reference point moved away from the community. The author attributed this to (1) the tendency of the local media to focus on national and global problems (data were presented to affirm this belief) and (2) a psychological factor where people are reluctant to acknowledge serious defects in their own surroundings (data were presented to affirm this belief). Correlations between those with economic investment in the community (home ownership) and satisfaction with residency in the community with perceived seriousness of pollution showed that homeowners and those who were satisfied residents perceived less seriousness resulting from pollution than did renters and dissatisfied residents.

40 percent saw causation of environmental problems in human terms (greed, man as cause, etc.) compared to 8 percent who blamed machines

like automobiles; 35 percent had no opinion as to what caused environmental problems; 73 percent felt environmental problems could be significantly reduced, though 50 percent of the sample couldn't name a specific solution possible; 40 percent said they personally could do something to help stop pollution, but 44 percent couldn't decide what they might be able to do, or skipped the question; 71 percent said a politician's stand on environmental pollution would affect their vote either 'a great deal' or 'some'; 50 percent would oppose construction of a polluting industry in the community even if it meant a loss of new jobs, while 20 percent favored construction; 39 percent were willing to continue indefinitely an income tax surcharge and use the money to abate environmental pollution, and 26 percent were unwilling. No level of significance was reported.

The author concluded that subjects demonstrated a willingness to believe in a solution to environmental problems, but had no clear ideas as to what the solution(s) might be. He suggested that the environmental problem had been effectively dramatized and that the need was for generating clear and specific proposals for dealing with it.

REFERENCES: 5 cited.

188. Nau, Paul, Ron Van Houten, and Zopito Marini. "An Analysis of Public Posting in Reducing Speeding Behavior on an Urban Highway." Journal of Applied Behavior Analysis, 1980, 13(3):383-395.

DESCRIPTORS: attitudes, behaviors, experimental research, knowledge, urban.

INDEPENDENT VARIABLE: Public posting of a feedback sign.

DEPENDENT VARIABLE: Speeding behavior.

PURPOSE: To determine whether public posting of driver performance can reduce speeding in a residential area.

SUBJECTS: The participants in this study were drivers traveling along a section of public highway between specified times on weekdays. The highway studied was a four-lane undivided highway entering a residential area of Dartmouth, Nova Scotia. According to police, this section of roadway had one of the worst speeding problems in the city.

RESEARCH DESIGN: This pre-experimental study involved a multiple baseline design. During baseline, the percentage of drivers speeding was measured with a concealed radar unit. During the daily posting condition, a highway sign was installed which provided feedback to motorists on the percentage of drivers not speeding the previous day and the best record to date. This sign was then covered and reintroduced a number of times. The radar unit was calibrated and inspected at two-month intervals throughout the experiment. The unit functioned normally on all occasions. Drivers' speeds were recorded for 20 consecutive minutes during both morning and afternoon sessions. Interobserver agreement for radar meter readings ranged from 98 to 100

percent. The mean number of cars recorded each day during the experiment was 244, ranging from 201 to 286.

**RESULTS:** The percentage of drivers in violation of the 50 km/hr speed limit were calculated for each day of the study. The speeders were divided into categories according to whether they were exceeding the speed limit by 5, 10 or 15 mph. Results indicated that the sign was effective in reducing speeds of the faster drivers. Weekly postings were found to be as effective as daily postings. The weekly posting procedure remained effective during a six-month follow-up condition. No levels of significance were reported by the author. The author suggests that the change in behavior of many drivers may have been reinforced by the improvements in the posted percentages of drivers not speeding or that the sign may have introduced a social comparison factor that further influenced drivers' behavior. Other possible explanations for the effectiveness of the sign were discussed.

**REFERENCES:** 21 cited.

189. Orr, Robert H. "The Additive and Interactive Effects of Powerlessness and Anomie in Predicting Opposition to Pollution Control." Rural Sociology, 1974, 39(4):471-486.

**DESCRIPTORS:** attitudes, citizen action, descriptive research, economic background, educational background, personality type.

**VARIABLES:** Issue support, powerlessness and anomie, age, sex, education, occupational prestige and income.

**PURPOSE:** To determine the additive and interactive effects of different aspects of alienation (powerlessness and anomie) on attitudes towards a community issue (pollution control).

**SUBJECTS:** The subjects (N = 213) were selected from a by-the-block residence listing--every fourth residence, with only one respondent per residence and alternating by sex. All subjects were from Momence, Illinois.

**RESEARCH DESIGN:** The survey was correlational research. The semantic differential was used to measure the direction and strength of the meaning respondents attached to the relevant concepts (sewage treatment and anti-pollution bond referendum). Powerlessness and anomie were determined by how the respondents ranked themselves relative to a spectrum of other roles which are found in the community. Questionnaires were hand-delivered and collected.

**RESULTS:** Powerlessness and anomie, while not additive were found to act interactively to explain opposition to pollution control. Alienation produced negativism toward the issue up to a certain point, with a subsequent increase in alienation serving to lessen opposition to the issue. The alienation variables are separate predictors that cannot be explained away as simply socioeconomic and demographic factors.

**REFERENCES:** 23 cited.

190. Palmer, Michael H., Margaret E. Lloyd, and Kenneth E. Lloyd. "An Experimental Analysis of Electricity Conservation Procedures." Journal of Applied Behavior Analysis, 1977, 10(4):665-671.

DESCRIPTORS: behaviors, conservation education, energy education, experimental research, knowledge, urban.

INDEPENDENT VARIABLE: Daily prompts and daily feedback concerning household energy usage.

DEPENDENT VARIABLE: Daily electricity consumption.

PURPOSE: To analyze procedures designed to reduce the total daily electricity consumption of residential consumers.

SUBJECTS: Four families living in a suburb of Des Moines, Iowa were selected from 253 families identified by the utility company as having outdoor meters. Every tenth file was pulled as potential subjects. Four families were selected on the basis of the number of school-age children they had and based on the fact that they used gas heat.

RESEARCH DESIGN: A pre-experimental design, consisting of various treatments interspersed between repeated baseline conditions was used. During experimental conditions, daily prompts (written conservation slogans attached to subjects' front doors) and/or daily feedback (daily kilowatts consumed and daily energy cost information) were provided. Each of the four families' electric meters were read daily for the entire duration of the study (106 days).

RESULTS: Median consumption for the last ten days of each treatment was determined. Maximum consumption occurred during the initial baseline for all four families. Both prompting and feedback techniques were effective in reducing daily electricity consumption in three of the four families. The mean decrease from the maximum to the minimum level of consumption was 35 percent. No levels of significance were reported by the author.

REFERENCES: 5 cited.

191. Pampel, Fred, Jr., and J. C. Van Es. "Environmental Quality and Issues of Adoption Research." Rural Sociology, 1977, 42(Spring):57-71.

DESCRIPTORS: behaviors, citizen action, descriptive research, environmental action skills, resource management education, rural.

VARIABLES: Farmer characteristics, farm characteristics, commercial and environmental farm practices.

PURPOSE: To investigate the adoption of soil conservation practices (environmental practices) and commercial practices by

farmers and to relate these practices to specific demographic variables.

**SUBJECTS:** 340 farmers from Illinois participated. Names were obtained at random from lists held by the Illinois Crop Reporting Service.

**RESEARCH DESIGN:** Fieldwork consisted of telephone interviews using a standard interview schedule. Information was obtained on the use of commercial and environmental innovations, on perceived profitability of these innovations, and personal characteristics of farmers. Interview scores were standardized by use of stem scores (based on respondents' position in normal curve of scores for all respondents). Standardized multiple regression coefficients were calculated (significant at .05 level) relating farm and farmer characteristics to environmental and commercial practices.

**RESULTS:** Farmers appear to be innovative either with respect to commercial practices or environmental practices, but not both. The adoption of commercial practices is well predicted by variables relating to size of farm business while the adoption of environmental practices is less successfully predicted.

**REFERENCES:** 31 cited.

192. Parks, Marshall E. "A Description and Evaluation of an Environmental Science Education Workshop for K-12 Teachers." School Science and Mathematics, 1971, 71(9):775-780.

**DESCRIPTORS:** descriptive research, elementary, science education, secondary, teacher training inservice.

**MAIN SUBJECT:** Nonexperimental evaluation.

**SUBJECTS:** 20 K-12 teachers (twelve K-6 and eight 7-12) participated in a 15-day workshop at Indiana State University-Science Teaching Center.

**RESEARCH DESIGN:** The workshop was activities-oriented and provided daily interaction between instructor and students to provide immediate feedback for course improvement. Students wrote critical evaluation for entire course.

**RESULTS:** Include in future workshop activities:

1. specific performance objectives.
2. programmed instructions to help students understand science concepts and techniques related to teaching science outdoors.
3. work in heterogeneous groups to promote enthusiasm and concepts to be shared by secondary teachers.
4. include night activities.
5. lengthen workshop to provide a greater number of experiences and more time for in-depth study.

Daily interaction with students provided immediate feedback for course improvement.

REFERENCES: None cited.

193. Peters, Richard O. "To Perceive the Urban Environment in Maine:" The Journal of Environmental Education, 1971, 3(2):49-50.

DESCRIPTORS: community resource, descriptive research, field trip, knowledge, middle school, pre-experimental, program evaluation, urban.

INDEPENDENT VARIABLE: In-class preplanning and follow-up activities related to field trips.

DEPENDENT VARIABLE: Perceived bond between classroom and community activities.

PURPOSE: Student opinions concerning various aspects of urban field trips were assessed as they relate to in-class instruction.

SUBJECTS: Two separate studies were reported. In Study 1, N = 128 seventh through ninth graders in Portland, Maine. Method of selection was not reported. For assessment of the independent and dependent variables subjects were broken into identical groups, N = 64. Method of breakdown was not reported. Other data reported on the basis of N = 128. In Study 2, N = 26 seventh graders picked at random from population of 284 students at King Junior High School, Portland, Maine.

RESEARCH DESIGN: Data were collected utilizing factual recall tests and open-ended questionnaires. Neither validity nor reliability were reported.

RESULTS: For Study 1, the group receiving field trip preplanning and follow-up activities perceived a higher bond between classroom and community activities than the group not receiving preplanning/follow-up activities. The majority of all subjects reported that the field trips positively aided classroom instruction, and that the field trips positively aided their understanding of the community's character. In Study 2, the majority of students reported that the field trips were of positive value.

All data were reported on a percentage basis only. No level of significance was reported. The author concluded that field trips: aid in perceptions of the community, enhance in-class learning, stimulate student participation in classroom discussions and activities, and help show relationships between education and the world of work.

REFERENCES: 3 cited.

194. Peterson, George L. "A Comparison of the Sentiments and Perceptions of Wilderness Managers and Canoeists in the Boundary Waters Canoe Area." Journal of Leisure Research, 1974, 6(3):194-206.

DESCRIPTORS: attitudes, beliefs, descriptive research, economic background, preferences, social background, values.



**VARIABLES:** Attitudes between managers and canoeists about what constitutes "proper" use of the Boundary Waters Canoe Area (BWCA).

**PURPOSE:** To discuss the results of a comparative study of attitudes of wilderness managers and paddle canoeists in the BWCA.

**SUBJECTS:** 185 BWCA visitors of Superior National Forest in northern Minnesota and 17 managers of U.S. Forest Service.

**RESEARCH DESIGN:** Descriptive survey research was employed. A pilot study made in summer 1970 using the Environmental Response Inventory (ERI) to measure environmental dispositions of 185 visitors was administered. Other inventories consisting of objectives, conditions, activities relating to the BWCA were used to construct questionnaires mailed to the same 185 visitors and 17 managers. Visitor mail response rate was 70 percent, providing 127 responses. Manager response rate was 100 percent, providing 17 responses. All who responded to mail survey also completed ERI.

**RESULTS:** Correlation between mean responses of managers and canoeists was made ( $\alpha = .05$ ). In spite of strongly similar environmental dispositions, there were found important differences between managers and canoeists about what constitutes "proper" use of the BWCA. The principal result of this study is an illustration (1) that important differences exist, and (2) that they can be measured in detail using available methods.

**REFERENCES:** 24 cited.

195. Pettus, Alvin M., and Karl E. Schwaab. "A Survey of Virginia Public School Principals on the State of Environmental Education." The Journal of Environmental Education, 1978, 19(2):35-43.

**DESCRIPTORS:** descriptive research, formal, interdisciplinary, program evaluation.

**VARIABLES:** Components of environmental education curricula; principals.

**PURPOSE:** (1) to survey public school principals in the State of Virginia to assess nature and extent of environmental education in their schools, and (2) to survey the needs within these schools regarding environmental program development.

**SUBJECTS:** The sample consisted of 525 principals chosen by a stratified sampling technique; 313 responded.

**RESEARCH DESIGN:** A questionnaire was sent to the sample group. The questionnaire consisted of five dimensions within the field of environmental education: (1) percent of programs in existence, (2) method of presentation, (3) preparation of personnel, (4) need for

curriculum development, and (5) future training programs. No validity or reliability estimates were given. Data were tallied one month after the questionnaires were mailed.

**RESULTS:** The data indicated that 72 percent of the responding principals had some type of environmental education program. However, 63 percent of this number indicated that it consisted of less than one hour a week. In general, science teachers were the most involved in the presentation and preparation of the programs. The main preparation of the staff seemed to be workshops (35 percent) and continuing education courses (33 percent). Finally, 63 percent of the principals indicated a need for more curricular guidance as well as workshops in the implementation of programs.

**REFERENCES:** 2 cited.

196. Peyton, R. Ben, and Harold R. Hungerford. "An Assessment of Teachers' Abilities to Identify, Teach, and Implement Environmental Action Skills." Current Issues VI, 1980, 155-172. ED 197 947.

**DESCRIPTORS:** environmental action skills, hypothesis generation, teacher training inservice, teacher training preservice.

**VARIABLES:** Knowledge and source of knowledge relating to identification and application of environmental action skills, perceptions of their abilities to implement and develop curricular materials, extent or intent of involvement in environmental problem solving.

**PURPOSE:** To assess the competency level of teachers in environmental action skills.

**SUBJECTS:** Samples of teachers enrolled in graduate or undergraduate methods courses in science education. 225 participants were assessed (Northern Kentucky State College, N = 80; University of Missouri at St. Louis, N = 79; Southern Illinois University at Carbondale, N = 66). Participation was voluntary. Of the total number of participants, about 84 percent were female and 59 percent were at a preservice level.

**RESEARCH DESIGN:** A three-part survey based on a model for environmental action was administered to the participants. The model identifies skills which fit into six different categories, and it lists 13 criteria to be considered when selecting a specific action for an environmental issue. A six-man jury criticized the instrument; it was revised, and face validity was accepted. The survey was administered by either the researcher or two other trained educators. Monitors observed participants and were asked to note uninterested individuals (those who completed the survey in less than 15 minutes). This group numbered 14, and their surveys were withdrawn. The environmental action competency score (EAC) was assessed to equate the three different groups (college orientation). Due to the phenomenological nature of certain tasks or parts, an inter-scoring reliability was established and the Pearson

product moment correlation computed. Limitations existed in the sample population, the instrument design, and scoring procedures.

**RESULTS:** It is indicated that the population of preservice and inservice teachers is not prepared to help build environmentally literate students. Therefore, some form of future intervention is necessary. Several ideas for future research are listed.

**REFERENCES:** 15 cited.

197. Powers, Richard B., J. Grayson Osborne, and Emmett G. Anderson. "Positive Reinforcement of Litter Removal in the Natural Environment." Journal of Applied Behavior Analysis, 1973, 6(4):579-586.

**DESCRIPTORS:** attitudes, behaviors, beliefs, conservation education, experimental research, values.

**INDEPENDENT VARIABLE:** Positive reinforcement of litter removal.

**DEPENDENT VARIABLE.** Number of filled garbage bags deposited.

**PURPOSE:** To examine the effectiveness of a long-term program that rewarded participants with money for picking up litter.

**SUBJECTS:** Data were collected on 88 participants ranging in age from 4-41 years; 66 percent of these were between the ages of 11 and 25. The ratio of males to females responding was 7:2. 70 percent of the participants were students. All subjects were visiting an undeveloped U.S. Forest Service area where the study took place.

**RESEARCH DESIGN:** A pre-experimental design was used with two-week baseline periods alternating with three-week experimental conditions for a period of 21 weeks. During experimental conditions participants received a payment of 25 cents or a chance to win \$20.00 in a weekly lottery for each bag of litter turned in. Data were collected on the number of litter bags turned in and on the type of payment participants requested.

**RESULTS:** Over the 21 weeks of the study, 70 percent of the total number of litter bags turned in were deposited during the experimental conditions. Ground surveys of the area showed a decrease in overall litter of approximately 40 percent between baseline and experimental periods. Of the total number of bags turned in during the experimental period, 73 percent were turned in for a lottery chance; 24 percent for payment of 25 cents; and 3 percent by those requesting no payment. No levels of significance were reported by the authors. The present study demonstrates that the presence of an individual is not a necessary component of a positive reinforcement system for litter control in the natural environment.

**REFERENCES:** 9 cited.

198. Ramsey, Charles E., and Roy E. Rickson. "Environmental Knowledge and Attitudes." The Journal of Environmental Education, 1976, 8(1):10-18.

**DESCRIPTORS:** affective, attitudes, descriptive research, formal, issue awareness/knowledge of issues, ised-based, knowledge, secondary.

**VARIABLES:** Knowledge of ecological concepts as to the extent and causes of pollution; knowledge of tradeoff costs; rating categories of attitudes; actual attitudes toward environmental quality; various demographic variables.

**PURPOSE:** To measure the relationships between: (1) knowledge of the ecological concepts and knowledge of tradeoff costs, (2) the attitude categories of passionate interest, favorability, resignation, and tradeoff priority, and (3) the combinations of the knowledge and attitude variables regarding specific environmental problems.

**SUBJECTS:** 482 high school seniors from three different locations were the sample population. One school was located in a small rural community in central Minnesota, one in a relatively affluent suburb, and one in the inner city of Minneapolis, Minnesota. The response rate was over 98 percent.

**RESEARCH DESIGN:** A questionnaire was given to the sample group. It contained six scales, one for each of the variables being studied. All knowledge and attitude questions were presented in five sets covering: air pollution resulting from automobile exhausts, pollution problems resulting from the population explosion, industrial waste disposal, oil spillage effects on plankton, and diseases resulting from atomic wastes. Items were constructed on an agree-disagree format for both knowledge and attitude scales. Instrument validity and reliability estimates were not reported.

**RESULTS:** Since no significant difference was found between the schools sampled, all data were collapsed. In analyzing the data, a Tau C correlation was used due to the skewness of the ecological concept knowledge scale. A significant correlation of .19 was found between the knowledge scales ( $p < .0001$ ). A patterned relationship was found between the attitude scales: there was a positive correlation between the two favorable attitude (i.e., passionate and moderate Tau = .31), and each was negatively related to the resignation and tradeoff attitudes (i.e., resignation and tradeoff priority, Tau = .27) and each was negatively related to the more favorable attitudes. The highest correlation value (Tau = .32) obtained was between the passionate interest and tradeoff priority attitudes. The null hypothesis of no relationship between attitudes was rejected ( $p < .0001$ ). Finally, a series of patterns was identified between the two knowledge and the four attitude scales. Increased knowledge of ecological concepts, i.e., pollution was associated with the more moderate position on pollution abatement (Tau = .12,  $p < .05$ ) and to a lesser extent to passionate interest in unqualified control of pollution (Tau = .08,  $p < .05$ ). Likewise, a greater acceptance of knowledge concerning tradeoff costs was associated with resignation to pollution (Tau = .20,  $p < .05$ ) and top priority to tradeoff costs (Tau = .08,  $p < .05$ ). None of the other known

factors were related to either knowledge or attitudes with the exception of grades in school. Conclusions and implications were discussed.

REFERENCES: 14 cited.

199. Reid, Dennis H., Paul D. Luyben, Robert J. Rawers, and Jon S. Bailey. "Newspaper Recycling Behavior: The Effects of Prompting and Proximity of Containers." Environment and Behavior, 1976, 8(3):471-482.

DESCRIPTORS: behaviors, citizenship, experimental research, issue-based.

INDEPENDENT VARIABLE: Prompting and proximity of recycling containers.

DEPENDENT VARIABLE: Amount of newspapers recycled.

PURPOSE: To determine the impact of prompting and proximity of recycling containers on recycling behavior.

SUBJECTS: Residents of eight apartment complexes in a southeastern community of 1:7,000.

RESEARCH DESIGN: A multiple baseline design was used. Baseline conditions consisted of recycling boxes placed in the apartment complex laundry room. The experimental condition consisted of the prompt, individually explaining to the apartment dwellers that recycling containers were available, and proximity, providing additional recycling containers near the large garbage dumpsters. Paper placed in each recycling container was weighed daily.

RESULTS: Chi-square analysis indicated that the number of residents in complexes with recycling containers who claimed to recycle was significantly greater than (.01) those who lived in complexes without containers. Recycling during the baseline condition was significantly less (.001) than that during the proximity and prompt condition.

REFERENCES: 11 cited.

200. Reyburn, Jerry H., and Douglas M. Knudson. "The Influence of Advertising on Attendance at Park Programs." The Journal of Environmental Education, 1975, 7(2):59-64.

DESCRIPTORS: behaviors, experimental research, outdoor classroom, outdoor education.

INDEPENDENT VARIABLE: Advertising techniques.

DEPENDENT VARIABLE: Attendance at park programs.

PURPOSE: To determine the influence of advertising on attendance at park interpretive programs.

SUBJECTS: Five state parks were selected which contained similarities. The parks selected were Shades, Turkey Run, McCormick's Creek, Brown

County, and Spring Mill. They are located fairly close to each other, in a bend across central-south Indiana. The study took place throughout the summer of 1972, in one-week units. Data were collected from a random sample of persons attending the interpretive programs during one-week survey units within each park. The random sampling technique was based on the month of birth of the visitors.

**RESEARCH DESIGN:** A posttest only control group design was used in this study. Four types of advertising were randomized into four-week use periods with three replications. The four types of advertising treatments used were: No Advertising, Personal Invitation, Signs, and Innovation or Wild Advertising. The influence of advertising was measured in two ways: (1) by the attendance at interpretive programs, and (2) by the way attendees learned of the programs. A simple card questionnaire was filled out at each program, part of which was devoted to the influence of advertising, the visitor awareness of interpretive programs, and their source of information. Instrument validity and reliability estimates were not reported.

**RESULTS:** Attendance counts showed that an average of the three advertising treatments increased attendance about 47 percent over no advertising. An index was developed and used to test comparisons of efficiency of treatments between parks and advertising techniques. Since no park attendance figures were available, this index was based upon the number of campsites occupied. The total number of attendees at interpretive programs was divided by the number of campsites occupied. As it was assumed that four persons occupied each campsite, a maximum index of 4.00 could be attained if everyone attended the programs. The average attendance index over all parks was 0.53, indicating that 13 percent of the potential audience was reached, if one held to the assumption that four persons per campsite was representative of the park population.

Attendance index means for the four treatments were compared and the Newman-Keuls test was used to test for significant differences between treatment means. All treatment means were significantly different from the no advertising treatment ( $p < .05$ ). A significant difference was found between signs and wild, advertising treatments, and between signs and personal treatments, but not between wild and personal advertising treatments. In the conclusion, the researchers state that 30 percent of the program attendees learned of the programs through personal invitation by park personnel. The researcher emphasizes personal contact and its importance but also acknowledges that other forms of advertising were helpful.

**REFERENCES:** None cited.

201. Rickson, Roy E. "Self-interest and Pollution Control." The Journal of Environmental Education, 1972, 4(1):43-48.

**DESCRIPTORS:** attitudes, beliefs, descriptive research, knowledge, values.

**VARIABLES:** Self-interest, attitudes, beliefs.  
**PURPOSE:** To determine the effects of self-interest on individual beliefs about facts and solutions in environmental quality control.

**SUBJECTS:** 485 high school seniors from three schools--one urban, one suburban, and one rural.

**RESEARCH DESIGN:** Subjects were given a two-part questionnaire two weeks prior to Earth Day 1970. The first part asked the subjects to indicate on a Likert scale whether 12 miscellaneous items (high prices, law and order, civil rights, government interference with industry, health and long life, etc.), affected them not at all, somewhat or very much. Subjects then indicated on the same scale how these items affected society in general. The second part of the questionnaire consisted of 30 pollution-related items, six items for each of five problem areas: Automobile, Population Explosion, Industrial Wastes, Spillage of Oil in the Ocean, and Atomic Power Plants. The items presented fact and solution statements in each of the problem areas, and subjects were asked to indicate agreement or disagreement with the statements. Neither reliability nor validity were reported.

**RESULTS:** For the first part of the questionnaire, the data were presented in footnotes to the article, the percentage of subjects responding "very much" being reported. The subjects considered pollution to be the sixth most important item (being marked so by 53 percent) affecting them personally. They considered pollution to be the third most important item affecting society, being marked so by 76 percent.

Data for the second part of the questionnaire were presented as percent agreeing with each statement of fact and solution. The author considered the problem areas of Automobile and Population Explosion to be indicative of self-interest, since certain solution statements were in reference to restrictions on personal freedom. The other three problem areas strictly pertained to industry.

For all problem areas, the majority of subjects indicated agreement that pollution and population growth are problems, and that steps should be taken to alleviate these problems, usually steps emanating from government control. The agreement was higher for the industry-related areas, but over 70 percent agreed that car owners should be forced to modify their engines to reduce pollution. The author concluded that self-interest motivation had little relevance to the perception of facts and solutions about pollution from automobile use. For population problems, the author found that subject perceptions were in the same direction, but not as strongly evident indicating concern for the individual's right to have children.

In general, the author concluded that self-interest does not influence the decisions of high school seniors regarding facts and solutions about pollution and overpopulation. No level of significance was reported.

**REFERENCES:** None cited.

202. Ris, Thomas F. "Report Card on Industry's Educational Materials."  
Public Relations Journal, 1977, 33(6):8-11.

DESCRIPTORS: descriptive research, formal. issue-based, program development, program implementation.

VARIABLES: National issues, sources of information, perceived credibility.

PURPOSE: To identify national issues of educational significance, sources of information used in the study of these issues, and the perceived credibility of industrial educational materials via data selection from a sample of teachers. Subsequently, this information would be utilized in generating guidelines for the development and implementation of industry-sponsored educational materials.

SUBJECTS: A representative sample of 88 teachers from urban and suburban schools in the states of Washington, New York and California.

RESEARCH DESIGN: A survey consisting of three questions, one covering each variable, was administered to the sample.

RESULTS: 55 percent of the respondents identified environment/energy as the major national problem; 16 percent of the respondents identified economics as the next most common national problem of educational significance. The top sources of assistance and information on environmental issues were, in rank order: local programs/personnel, mass media, and federal agencies, while on energy issues they were mass media, public and/or private utilities, and local programs/personnel. The credibility of information responses indicated teachers were nearly evenly split concerning the balance, objectivity and factual basis of industry materials. Yet, nearly 75 percent did not see these materials as patronizing or promotional; 98 percent did not see them as anti-environmental. These findings were utilized in generating a list of 13 guidelines for developing and implementing industry-sponsored educational materials.

REFERENCES: None cited.

203. Rossman, Betty B., and Z. Joseph Ulehla. "Psychological Reward Values Associated with Wilderness Use: A Functional-Reinforcement Approach." Environment and Behavior, 1977, 9(1):41-66.

DESCRIPTORS: affective, descriptive research, higher education, issue investigation/evaluation skills, values.

VARIABLES: Wilderness use, attitudes toward wilderness.

PURPOSE: The psychological study of the influence of wilderness areas on human behavior, and the development of analytic techniques and models to study these environmental effects.



**SUBJECTS:** 47 male and 47 female undergraduate students in an introductory psychology course.

**RESEARCH DESIGN:** The complete test instrument included four questionnaires: the Reward Value Questionnaire, the Expectation Questionnaire, the Environmental Use Questionnaire, and a final questionnaire (demographic data). Questionnaires were based on information gained in informal interviews with "wilderness users" in Colorado. Pearson product correlation coefficients between two predictor and five criterion measures of wilderness behavior potential are reproduced in text. Reliability and validity coefficients were not reported.

**RESULTS:** A principle components factor analysis was performed on the matrix of intercorrelations among importance judgments for the 30-item Reward Value Questionnaire. Five factors were retained and rotated to achieve simple structure using Kaiser's Varimax procedure. Analysis of the environmental usage questionnaire was based on applications of Rotter's theory (behavior potential function of expectation and reinforcement value). Results suggest that inclusion of primitive environments in one's orbit enables one to obtain valued rewards unavailable in developed settings.

**REFERENCES:** 22 cited.

204. Roth, C.Z., and R.W. Hodgson. "The Contribution of Perception Training to Interpretation Effectiveness: An Experiment." The Journal of Environmental Education, 1977, 9(1):23-30.

**DESCRIPTORS:** affective, experimental research, nonformal, outdoor classroom.

**INDEPENDENT VARIABLE:** Perception training; time spent in camp.

**DEPENDENT VARIABLE:** Time spent reflecting on an environmental encounter and number of senses identified in writing in oral and written descriptions of the environmental encounter.

**PURPOSE:** To test the effects of perception training on the quality of sensory experience during and personal reflection following an environmental encounter hike. Specifically, the authors hypothesized that subjects receiving perception training would: (1) spend more time with their eyes closed thinking about the environmental encounter than would subjects not receiving that training, and (2) refer to a larger number of senses in verbal and written descriptions of the environmental encounter than would subjects not receiving that training.

**SUBJECTS:** 192 girls aged 7 to 10 attending a 19'5 summer camp in the San Bernadino Mountains of California. The subjects attended inner-city

Los Angeles schools, were predominantly from lower income families, and represented a variety of races.

**RESEARCH DESIGN:** A posttest only control group experimental design was integrated into the camp's environmental education program. All subjects spent 14 days at the camp, during which time many participated in a nature/environmental encounter hike of approximately one hour duration. 24 groups of 8 subjects were randomly assigned to the perception training treatment, or the control treatment preceding the hikes. The experiment worked with one group at a time, providing each group with a pre-hike warm-up experience.

Following this, the control group members were asked to individually prepare for the hike while seated. The experimental groups received a pre-hike treatment which consisted of having subjects identify and subsequently utilize their senses via cues from the experimenter. At the end of these pre-trip treatments, both groups hiked for about one-half hour. After the hike, all groups sat in a semicircle, closed their eyes and reflected upon their experience. The authors measured the length of time each subject spent with eyes closed. Subsequently, the subjects were asked to record their experiences in word via paper and pencil. Validity and reliability estimates were not reported.

**RESULTS:** A two-way analysis of variance was used to evaluate differences between the groups on each of the dependent variables. As hypothesized, the perception training significantly increased that length of time ( $F = 6.48$ ,  $p < .01$ ). Finally, perception training significantly increased the total number of references to the series ( $F = 23.77$ ,  $p < .01$ ) and to the number of different senses referred to ( $F = 16.93$ ,  $p < .01$ ). Previous in-camp time did not prove to be a significant factor here. A Pearson correlation for time spent on reflection and the number of senses referred to was positive and statistically significant ( $p < .01$ ). A discussion of the results and a summary were presented.

**REFERENCES:** 3 cited.

205. Russell, James A., and Albert Mehrabian. "Approach-Avoidance and Affiliations as Functions of the Emotion-Eliciting Quality of an Environment." Environment and Behavior, 1978, 10(3):355-387.

**DESCRIPTORS:** affective, hypothesis generation, locus of control, model building, preferences.

**INDEPENDENT VARIABLE:** Different physical settings, represented by color photographic slides.

**DEPENDENT VARIABLE:** Approach toward setting, desire to affiliate.

**PURPOSE:** To explore two behaviors as functions of the emotion-eliciting quality of a setting: approach toward the setting, and the desire to affiliate.

**SUBJECTS:** In Study 1, 200 University of California undergraduates served as subjects as part of a course requirement. A sample of 160 subjects who were not part of this sample of 200 had participated in a previous rating of the photographic slides. A third separate sample of 65 subjects rated additional slides. In Study 2, 310 University of California students participated. None of these individuals participated in Study 1.

**RESEARCH DESIGN:** Quasi-experimental. Study 1 was a factorial design and Study 2 was a regression design for the purpose of cross-validation. Subjects were asked, one at a time, to imagine how they would feel in each setting shown in the slides. They then rated their emotional reaction to the setting on scales of pleasure, arousal and dominance. Each of these three scales of pleasure, arousal and dominance consisted of six differential type items. Evidence of the reliability and validity of these ratings was made reference to. Replication sets were also administered to each group of subjects. In Study 2, slides were selected to correspond to two rather than three independent variables; pleasantness and arousing quality were varied, whereas dominance-eliciting quality was controlled. Of 90 slides used, only 30 had been in Study 1. Procedure was identical to the procedure employed in Study 1, except that a total of nine slides was shown to each subject and no personality measure was administered.

**RESULTS:** Reliabilities of two composite dependent measures were assessed and approach and desire to affiliate were found to correlate at .50. Analysis of variance was also cited as all F-values were listed as significant to the .01 level. T-tests were also conducted with cell means differing at the .01 level for each level of pleasure. In Study 2, a step-wise regression analysis explored each dependent measure as a function of the mean and interactive effects of the pleasantness and arousing quality of the settings. At each step, a significance test at the .01 level was conducted on the increment in the multiple correlation coefficient. Both studies indicated a strong direct relationship between pleasantness of a setting and the approach toward that setting; persons expressed a desire to approach more pleasant settings and avoid unpleasant settings. Other expected and unexpected conclusions were drawn in regard to various dependent variables. Implications of research were noted and recommendations for further research were put forth.

**REFERENCES:** 30 cited.

206. Sakedo, Rodolfo N., Hadley Read, James F. Evans, and Ana C. Kong. "Rural-Urban Perspectives of the Pesticide Industry." Rural Sociology, 1971, 36(4):554-562.

**DESCRIPTORS:** attitudes, beliefs, descriptive research, educational background, ex post facto, issue awareness/knowledge of issues, rural, urban.

**VARIABLES:** Attitudes of farmers and city dwellers toward pesticides, number of children, education and amount spent on pesticides.

**PURPOSE:** To determine the attitudes of farmers vs. city dwellers on the pesticide industry.

**SUBJECTS:** 300 subjects--199 urban and 101 rural (farmers)--were selected by a systematic random sample. All subjects were adults (sex not indicated) and from Illinois.

**RESEARCH DESIGN:** The research was descriptive--ex post facto. Ten questions--5-point (Likert-type) scale--were given to the subjects via personal interview. Reliability and validity were not reported.

**RESULTS:** Responses by both farmers and city dwellers were essentially the same for 7 of the 10 questions. Overall, farmers were significantly ( $p < 0.02$ ) more favorable toward the pesticide industry. When controlling for three variables--number of children, education, and amount spent on pesticides--the urban-rural differences decreased.

**REFERENCES:** 20 cited.

207. Sandman, Peter M. "Madison Avenue vs. the Environmentalists." The Journal of Environmental Education, 1973, 5(1):45-50.

**DESCRIPTORS:** attitudes, cognitive, descriptive research, issue awareness/knowledge of issues, issue-based, knowledge, nonformal, program evaluation.

**VARIABLES:** Knowledge about the F-310 gasoline additive, exposure to and recall of media-reported F-310 issues, attitudes toward F-310 issues.

**PURPOSE:** To survey and analyze the effects and effectiveness of the F-310 advertising campaign and related news reports.

**SUBJECTS:** A telephone book sample of 200 homes from Palo Alto and San Jose, California. Refusals and incomplete interviews totaled 55 in Palo Alto and 70 in San Jose, narrowing total responses to 275. Of these, 168 were women and 107 were men.

**RESEARCH DESIGN:** A telephone survey of Bay Area residents was used for data collection. Several survey questions were asked regarding each of the variables listed above. Methods for recording data were not reported. Survey validity and reliability scores were not reported.

**RESULTS:** Data were presented in a percentage distribution format. The F-310 product and brand were correctly identified by the majority of respondents. In a free choice situation the majority of respondents could not identify key advertising personnel/agencies, while in a forced choice situation a majority was able to identify the person responsible for initial product promotion. For all forms of media, responses on F-310 advertising outweighed responses on F-310 news reporting. While the Federal Trade Commission reports considered F-310 "almost useless," respondents were more enthusiastic, rating the product as "somewhat useful." Despite this response, a substantial majority of respondents :

saw air pollution problems at least as large as ever--if not greater. The author concludes that the F-310 advertising campaign appeared successful, despite "bad press" and the questionable effectiveness of the product.

REFERENCES: 6 cited.

208. Sanford, Fonda L., and Stephen B. Fawcett. "Consequence Analysis: Its Effects on Verbal Statements about an Environmental Project." Journal of Applied Behavior Analysis, 1980, 13(1):57-64.

DESCRIPTORS: affective, behaviors, citizenship education, experimental research, issue investigation/evaluation skills, values.

INDEPENDENT VARIABLE: Consequence analysis procedures.

DEPENDENT VARIABLE: Favorability rating changes to proposed roadway project; justification for voting and voting for or against proposed project.

PURPOSE: To determine if an analysis of the consequences of a proposed roadway project would change the favorability of residents toward the project.

SUBJECTS: 13 residents were randomly selected from two randomly identified blocks within the neighborhood of the proposed roadway project. Ten of the selected residents agreed to participate in the study.

RESEARCH DESIGN: Residents' verbal statements regarding favorability of the proposed roadway project were measured using a 7-point Likert-type scale community impact survey. The impact survey was given eight times at three-day intervals. The five residents of Block 1 were given the consequence analysis guide following three surveys. Residents of Block 2 were given the consequence analysis guide containing 48 possible consequences of the proposed roadway project after five surveys. All residents were given a ninth impact survey one month after the eighth survey. A second independent observer also scored each of the statements. The mean percentage interobserver agreement was 100 percent. Two collateral behaviors about favorability were also observed: justification statements and votes for or against the project. Both before and after intervention, participants were asked to justify their position for or against construction. The quality of randomly ordered pre- and postintervention audio taped justifications were rated by peers of the participants. Participants were asked to vote for or against the roadway following each survey administration.

RESULTS: Residents in Blocks 1 and 2 showed little change in ratings during baseline. Residents in Block 1 showed a mean favorability rating change of -.7 points after introduction of the consequence analysis procedure. Residents in Block 2 showed a change of -1.3. The ninth impact survey showed that the effects were maintained for all 10 residents. The author states that the findings suggest that the consequence analysis procedure was responsible for producing the observed changes in verbal statements, though a casual relationship was

not unequivocally established. Data obtained for justification behavior were judged to be higher in overall quality than preintervention statements. The author stated that the mean increase of 1.3 justifications was not statistically significant. Participants' votes on whether to build the proposed roadway changed for two of ten participants following intervention. Future research might address such issues as who are the most appropriate consumers of such a procedure, what possible consequences should be selected for consideration, and how might citizens educated with this procedure influence decisions affecting their communities.

REFERENCES: 16 cited.

209. Schaeffer, David J., and Konanur G. Janardan. "Communicating Environmental Information to the Public: A New Water Quality Index." The Journal of Environmental Education, 1977, 8(4):18-26.

DESCRIPTORS: cognitive, instrument development, resource management education.

VARIABLES: Qualitative perception of and descriptors for water quality conditions; water quality indices.

PURPOSE: To test a hypothesis related to use of a water quality index for subjectively evaluating stream water quality. The null hypothesis stated: "Number rated better = number rated same = number rated worse."

SUBJECTS: Four regional engineers and field staff assistants associated with the Illinois stream sampling network.

RESEARCH DESIGN: The literature on water quality indices was reviewed. Numerous indices were identified by the authors. In the report several of these were presented and evaluated against a partial list of desirable and/or necessary characteristics of a good index. The authors reported that the index of Janardan and Schaeffer (i.e., their own) was the most satisfactory, both qualitatively and quantitatively. The index ( $P_1^*$ ), and its statistical properties were first studied through computer simulations of the sampling distribution of that index. The authors presented statistical explanations for the reliance upon ranked as opposed to raw data when using the index, thus for the subsequent use of the final index  $P_1$  (i.e., where  $P_1 = P_1^*/b$ ). The four engineers were provided with a complete list of indices, and were asked to compare the authors' evaluation of water quality to their own evaluations of water quality at stations within the engineers' respective regions. Field staff assisted in the data collection. Responses from 308 stations (of 550 total stations) were received.

RESULTS: Data results indicated that the Janardan and Schaeffer index overrated water quality for 150 stations by one class, 21 stations by two classes, agreed for 119 stations, and underrated 18 stations by one class. The authors concluded that the agreements between the objective, quantitative index and the subjective survey evaluation of the engineers were very good. When comparisons were corrected for the one standard

deviation limit of the index, the agreement between the calculated and survey derived values exceeded 90 percent. A chi-square analysis used to test the null hypothesis led to the rejection of that null hypothesis. Conclusions regarding the use of the index were presented.

REFERENCES: 11 cited.

210. Schnelle, John F., M. Patrick McNeese, Murphy M. Thomas, John G. Gendrich, and Gwen P. Beagle. "Prompting Behavior Change in the Community." Environment and Behavior, 1980, 12(2):157-166.

DESCRIPTORS: behaviors, citizen action, cognitive, experimental research, issue-based, unobtrusive.

INDEPENDENT VARIABLE: Newspaper prompting.

DEPENDENT VARIABLE: Littering behavior.

PURPOSE: Documented an experimental relationship between a particular newspaper media campaign to reduce littering and quantified estimates of litter.

SUBJECTS: The residents of Murfreesboro, Tennessee, served by one daily newspaper.

RESEARCH DESIGN: Three target areas within the city were selected for observation (selected because of high levels of litter). Observations were made weekday afternoons by University observers. A one-page feature article was published in the newspaper appealing to citizens to help clean up Murfreesboro. Pictures of each of the target areas were shown (each target area was handled individually), and the newspaper each day published a descriptive statement concerning the litter level on the target streets. Histograms labeled "Sad-O-Graph or Glad-O-Graph" were published with the description depending on the level of litter found. A multiple baseline design was utilized to evaluate the effects of newspaper publicity. The reliability ratio of agreement between observers of litter was 92 percent.

RESULTS: A reduction in litter was observed in all three target areas following the newspaper publicity. This evidence supports the contention that there exists an experimental relationship between the newspaper intervention and reduced levels of litter. One month after publicity amounts of litter increased back to baseline levels. The temporary effects produced suggest the need for continued or more prolonged coverage.

REFERENCES: 8 cited.

211. Schoenfeld, Clay, and John Disinger. "Environmental Studies Programs in Colleges and Universities Today." Current Issues IV, 1978, 145-158. ED 167 407.

DESCRIPTORS: case studies, descriptive research, issue awareness/knowledge of issues, higher education, issue

investigation/evaluation skills, program development.

**PURPOSE:** Assessment of general university adaptation to the upsurge in environmental interest.

**SUBJECTS:** 45 out of 50 four-year universities responded to the initial request for response concerning the adaptation. Size, location, structure, and mission vary.

**RESEARCH DESIGN:** 45 case studies describing what each representative program was, what it did, for whom, why, how, where it came from, where it was going, how it was representative of developments across the nation, measures of performance, funding, etc. Selected deans, directors, or chairman replied.

**RESULTS:** A definition of environmental studies and different values important in an environmentally ethical world are discussed.

**REFERENCES:** 15 cited.

212. Schuster, Arnold A. "The Minnesota Teacher Attitude Inventory (MTAI) as a Prediction of Leadership Styles in a Recreation Setting." Journal of Leisure Research, 1971, 3(3):168-177.

**DESCRIPTORS:** affective, attitudes, descriptive research, outdoor education, preferences.

**VARIABLES:** Counselors' attitudes (toward campers), counselor leadership perception, counselor leadership behavior, camper preference for leadership types, camper group satisfaction, camper group achievement.

**PURPOSE:** To measure the attitudes of day camp counselors and determine the degree of relationship between these attitudes and the leadership styles perceived and enacted by these individuals and the relationship between counselor attitudes and camper preferences.

The study had two hypotheses: (a) Day camp counselors who scored high on the attitude inventory would tend to perceive and demonstrate leadership roles in a democratic manner, while those who scored low on the attitude inventory would tend to assume authoritarian styles of leadership; (b) Children participating in groups with counselors who attained high scores on the attitude inventory would indicate greater group satisfaction than would those with low scores on the attitude inventory.

**SUBJECTS:** 72 counselors divided in three groups: Spring study (22 students at the University of Illinois), summer study (22 adults from different backgrounds), fall study (28 students at the University of Illinois). The age of students ranged from 8-12 in spring and fall and 6-13 in summer. Neither the number of students, nor the method of selection in each study is given. All subjects were from Indiana and Illinois.



**RESEARCH DESIGN:** It is a correlational study using the Minnesota Teacher Attitude Inventory (MTAI), the Leadership Perception Test, the Leader Observation Schedule, the Camp Director's Rating Scale and the Camper's Reaction Questionnaire. Only samples from the instrument items are described. The measurements were taken during the camp sessions. Interrater reliability was computed for the results of the leader observation schedule. No reliability or validity are given for the other measures.

**RESULTS:** A high positive correlation was found between the MTAI scores and democratic response (.77 and .72), democratic leadership techniques (.79, .75, and .74), democratic behavior in the role-playing experiment (.89, .92), campers satisfaction (.46), achievement (.61) and like versus dislike. High negative correlations were found between MTAI scores and authoritarian answers (-0.74 and 0.72), authoritarian roles (-.74, 0.75 and -0.70), authoritarian leader in the role playing experiment (-.86 and .84). There was also a significant relation between leaders' MTAI scores and campers' satisfaction (.46), group achievement (.61) and like versus dislike (.41). High correlations between children's like or dislike of counselors and group satisfaction (.53) and achievement (.41) were also found. The author suggests that MTAI is a good research instrument for nonacademic settings because it may be measuring a personality pattern. With additional adaptations, the MTAI may be a meaningful way for administrators to predict leadership behavior and the resultant group satisfaction.

**REFERENCES:** 4 cited.

213. Schwartz, Richard A. "A Simple Mathematical Model for Population Growth." The Journal of Environmental Education, 1980, 12(2):38-41.

**DESCRIPTORS:** cognitive, issue investigation/evaluation skills, mathematics education, model building, population education.

**VARIABLES:** Population models in the literature, assumptions for and explanations of a model of population growth.

**PURPOSE:** To extend the applications and implications of a model of population growth reported by L. Schaefer for use in Population/Environmental Education.

**SUBJECTS:** Not applicable.

**RESEARCH DESIGN:** Though the study of population growth appears complex, the author suggested that very basic mathematical operations may be used to understand important concepts related to population growth. The author based his work upon the population growth model reported by L. Schaefer in Population, Environment, Society--A Teacher's Resource Manual. Definitions of terms and assumptions associated with the author's adapted model are presented. The author develops the mathematical basis associated with the use of the model in a series of charts and associated explanations. Model validity estimates were not reported.

**RESULTS:** The author reports the results of an analysis of population growth through seven birth cycles (i.e., 15-year periods) using the model. From this he draws explanations regarding theoretical and nationally-based relationships between birth rate and replacement level per couple. The limitations of this simplified model were presented.

**REFERENCES:** 6 cited.

214. Seaver, W. Burleigh, and Arthur H. Patterson. "Decreasing Fuel-Oil Consumption through Feedback and Social Commendation." Journal of Applied Behavior Analysis, 1976, 9(2):147-152.

**DESCRIPTORS:** behaviors, conservation education, energy education, experimental research, knowledge, values.

**INDEPENDENT VARIABLE:** Feedback and social commendation.

**DEPENDENT VARIABLE:** Fuel-oil consumption rate.

**PURPOSE:** To test the effects of feedback and social commendation on facilitating fuel-oil conservation.

**SUBJECTS:** A sample of 180 households, mortality of 58, was drawn randomly from a list of continuing accounts of a local fuel-oil distributor. Home fuel-oil consumers were randomly assigned to one of three experimental groups. The households were located in a university community in central Pennsylvania.

**RESEARCH DESIGN:** The pretest-posttest control group design had three levels--no feedback (control), informational feedback (Treatment 1), and informational feedback plus commendation (Treatment 2). Informational feedback consisted of personal energy data for each subject for the current and previous winters. The commendation consisted of decals with the words "We are saving oil." The rate of fuel-oil consumption of each household was computed and mean rates of consumption were computed for the control and treatment groups.

**RESULTS:** An unweighted means analysis of variance was computed on the 1974 consumption rates and showed the effect of feedback conditions to be statistically significant ( $p < .01$ ). A multiple comparisons test was performed on the condition means using Tukey's WSD technique and revealed that the consumption rate for the feedback plus commendation group was significantly ( $p < .01$ ) lower than that of either the control or the informational feedback group. The informational feedback group did not differ significantly from the control group. The results demonstrate that the short-term fuel-oil consumption of households can be affected by an operant technique.

**REFERENCES:** 12 cited.

215. Sharma, Navin C., Joseph E. Kivlin, and Frederick C. Fliegel. "Environmental Pollution: Is There Enough Public Concern to Lead to Action?" Environment and Behavior, 1975, 7(4):455-471.

DESCRIPTORS: citizen action, descriptive research, issue awareness/knowledge of issues, issue-based, knowledge.

VARIABLES: Public concern and citizen action.

PURPOSE: To investigate the extent to which the public was informed on pollution problems, what they thought about alternative solutions, and what could be learned about problem-solving processes in this community that would be useful to other communities in dealing with pollution problems.

SUBJECTS: A random sample of 225 adults in a town of 3,000 people located in northern Illinois.

RESEARCH DESIGN: A questionnaire was administered, and a causal model with four stages was constructed. The model was then subjected to path analysis. Attitudes toward water pollution were obtained through use of factor coefficient weights for the scales in the evaluative factor. Correlation and path coefficients are reported in the text.

RESULTS: Data suggest that pollution may be less of a political issue than a passing topic of private conversation. Concerns have not crystallized into a coherent movement toward solution. The researchers did not find that the mass media influenced attitudes toward water pollution. Results further indicate that the usual political process and involvement in that process are not effective in generating antipollution sentiment. Authors conclude that much more research is needed.

REFERENCES: 21 cited.

216. Silvernail, David L. "The Assessment of Teachers' Future World Perspective Values." The Journal of Environmental Education, 1978, 10(2):7-11.

DESCRIPTORS: descriptive research, instrument development, issue awareness/knowledge of issues, teacher training inservice, teacher training preservice, values.

VARIABLES: World value constructs; preservice and inservice teachers.

PURPOSE: To design a future world perspective value scale, to test its validity and reliability, and to collect descriptive data on teachers.

SUBJECTS: 225 preservice and inservice teachers enrolled in undergraduate and Master's level education courses in universities in Georgia (N = 36), Iowa (N = 81), and Maine (N = 108) comprised the sample. 44 respondents failed to complete all items on the scale which led to a sample size of 181.

RESEARCH DESIGN: Four value constructs in the areas of (1) economic growth, (2) technological development, (3) international relations, and

(4) world economic justice, were used to construct a 32-item Likert-type instrument. A pilot study conducted on an equivalent population (N = 202) at a Midwest university showed that while three constructs were relatively independent, the presence of several poorly worded items limited the overall validity and reliability of the draft scale. After revisions, the final instrument was administered to the sample group.

**RESULTS:** Cronbach's Alpha coefficient was used to determine the instrument validity and reliability. Data were analyzed using factor analysis. A Pearson correlation was used to compute correlations between inservice and preservice responses. The factor analysis showed that 20 items measured four relatively independent constructs. Twelve items were found to have low or equal loading for all factors. All factor loading for the 20 items ranged between .322 and .894. Cronbach's alpha coefficients for the items used ranged from .81 for the word economic justice construct to .59 for the international relations construct. A significant difference existed between responses of the preservice and inservice teachers ( $F = 4.118$ ,  $df = 1.179$ ,  $p < .009$ ). In addition, a significant difference was found between the groups from Maine and Iowa. Georgia was not compared because of the N size. The analysis revealed that the difference in scores by state approached the .05 level of significance ( $F = 3.33$ ,  $df = 1.148$ ,  $p < .0673$ ). No significant differences were found between the responses of males and females or between elementary and secondary teachers ( $p < .05$ ).

**REFERENCES:** 11 cited.

217. Simon, Rita James. "Public Attitudes toward Population and Pollution." Public Opinion Quarterly, 1971, 35(1):93-99.

**DESCRIPTORS:** descriptive research, educational background, issue awareness/knowledge of issues, rural, urban.

**VARIABLES:** Attitudes, knowledge of issues, demographics, political affiliation.

**PURPOSE:** Reported the results of an opinion survey on attitudes concerning population and pollution.

**SUBJECTS:** A sample of 345 names was drawn from telephone directories covering 60 counties in Illinois. Eighty persons could not be contacted. Of the 265 persons who were contacted, 170 (65 percent) agreed to participate and completed the interview. Based on selected demographic characteristics, the sample was equated with the population of Illinois and was determined to be representative for educational, occupational distribution, and Chicago/non-Chicago residency characteristics.

**RESEARCH DESIGN:** All interviews were conducted by phone and were partially open-ended; occasionally, what questions were asked were dependent upon previous responses. Respondents were asked to name the most important and next most important domestic problems the United States faced. They were then asked questions concerning population

growth, food supply, air and water pollution, and whether they supported the high priority President Nixon had placed on these issues. Neither validity nor reliability were reported.

**RESULTS:** All data were presented in narrative form. 23 percent thought population, food supply or 'environment' were the most or next most important problems; 60 percent thought the United States population was growing too fast; and 67 percent thought the same for the world population. The reasons the subjects gave for the population problem varied. (The author noted that many of these data agreed with results found in a Look magazine survey taken five years earlier.) 85 percent of the subjects thought there was or would be within 25 years a food shortage in the world; 20 percent said the reason for the shortage was 'too many people.' Respondents with a college education were more likely to perceive problems with population and food scarcity than those with less education.

95 percent thought air pollution was a problem, and 91 percent said water pollution was a problem. There was no urban-rural difference. 65 percent blamed air pollution on automobiles and industry. 41 percent blamed industrial waste for water pollution followed by 20 percent naming municipal sewage and dumping policies. No one mentioned population control as a remedy for either air or water pollution.

50 percent approved of the priority Nixon placed on these issues, with political affiliation having no significant effect. College-educated people showed less support for Nixon's priority (45 percent approval) than those with a grade-school education (67 percent approval).

The author concluded that when asked about these issues, the subjects indicated high concern, but this concern did not manifest itself without specific cues. Further, though many had high concern for air and water pollution (95 and 91 percent), only 50 percent approved Nixon's high priority, indicating that other issues were more important to the subjects. Also, the author concluded that the subjects did not consider 'people' to be a prime source of pollution. No level of significance was reported.

**REFERENCES:** .None cited.

218. Smith, Geoffrey, and David Alderdice. "Public Responses to National Park Environmental Policy." Environment and Behavior, 1979, 11(3):329-350.

**DESCRIPTORS:** attitudes, behaviors, descriptive research, knowledge, preferences resource management education, rural, social background, urban.

**VARIABLES:** Place of residence (urban-rural), attitudes and awareness of park policy.

**PURPOSE:** To compare the attitudes held by urban and semi-rural residents concerning the functional role of a Canadian national park to see if people holding contrasting views

could be defined according to spatial and social criteria. Relative awareness of office park and overt patronage of the park were also investigated.

**SUBJECTS:** Were elicited from residents of an urban area (Windsor, Ontario) and three small towns (Essex County towns of Lemington, Kingsville, and Wheatley) comprised the rural sample communities. Windsor is 40 miles from the park and the small communities are located within 12 miles of the park. 300 residents were sampled on the basis of information elicited from the local telephone directory, 150 of whom were from Windsor.

**RESEARCH DESIGN:** A descriptive survey. Mail back questionnaires with open-ended, closed and Likert-type foils were utilized.

**RESULTS:** An awareness of park policy using the chi-square test disclosed that a greater number of county residents ( $p < .05$ ) were aware of the new park policy. However, only 34 percent of county residents and 19 percent of Windsor residents were classified as aware. The chi-square test indicated that significantly more county residents ( $p < .005$ ) visited the park. The Attitude Scales, based on a Spearman rank correlation analysis of the two sets of data, disclosed a  $r_s$  value of .92, which is significant at the .01 level, offered no support for the hypothesized incongruity in environmental attitudes among urban and semi-rural residents, nor for the publicized claim that newly implemented park policy was responsible for the decrease in the number of park visitors. Implications of the research were noted.

**REFERENCES:** 16 cited.

219. Sofranko, Andrew J., and William Bridgeland. "Illinois Mayors and the Environment." The Journal of Environmental Education, 1973, 5(2):43-48.

**DESCRIPTORS:** attitudes, community resource, descriptive research, issue awareness/knowledge of issues, knowledge.

**VARIABLES:** Definition of environmental quality, seriousness and importance of environmental quality, perception of industrial vs. environmental interests, knowledge of sources of air and water pollution, felt pressure from the EPA, perception of obstacles to municipal environmental improvement, effectiveness of strategies for protecting the environment.

**URPOSE:** To examine the knowledge and attitudes of a sample of Illinois mayors regarding various aspects of environmental quality issues. In 1973, the authors interviewed various public officials, community leaders and environmental activists in 130 middle-sized Illinois towns to determine the level of concern public officials have for environmental improvement.

**SUBJECTS:** 124 Illinois mayors of cities in the 10,000 to 50,000 population range. They tended to be middle-aged, well-educated, and

long-standing residents. Nearly three-quarters of the sample had held office five years or less.

**RESEARCH DESIGN:** Between May and June of 1973, an interview with each of the mayors was conducted. The interview consisted of eight questions, one pertaining to each variable listed above. Demographic data were also collected. The authors did not report procedures for recording data nor categorizing responses. Interview validity procedures and reliability scores were not reported.

**RESULTS:** Data were presented by percentage of response for each response category associated with each question. Averages and percentage figures were presented for demographic data. Nine of a possible 15 items were included as environmental quality matters by at least 90 percent of the sample; 38 percent of the sample rated environmental quality as at least a serious problem. It was rated the most serious problem from among a listing of 11 problems. The mayors tended to seek higher environmental quality standards, and suggested that a cleaner environment would go hand in hand with attracting business/industry. On questions concerned with sources of pollution and focus of EPA pressure, industry received the highest rating. Municipalities were perceived as receiving nearly as much EPA pressure as industry. Lack of funding was seen as the predominant obstacle to environmental improvement, while prohibition by law and taxation of violators were seen as the most effective methods for protecting their environment. More extensive discussion on each of the eight variables was presented.

**REFERENCES:** None cited.

220. Stahl, Robert J. "Population Education in Florida Secondary Schools: Where Are the Science Teachers?" Science Education, 1976, 60(1):29-37.

**DESCRIPTORS:** descriptive research, issue awareness/knowledge of issues, knowledge, middle school, population education, secondary, teacher training inservice.

**VARIABLES:** Determination of inclusion of population education courses or units in pre-established science curricula.

**PURPOSE:** To examine the population education courses and units available to secondary school students and their implementation into specific programs and departments.

**SUBJECTS:** 1,416 teachers were given questionnaires regarding their course and whether or not a unit on population education was taught. 244/1,000 teachers were identified by principals as teaching a unit on population education. 623/1,000 questionnaires were actually completed and returned. Teachers were randomly selected from 300 urban and rural Florida middle and high schools and were asked to respond to questions pertaining to the status of population education in their schools.

**RESEARCH DESIGN:** This survey was descriptive research. The responses indicated that 36/300 schools had classroom teachers who taught population education information in at least one course. 64.5 percent of these population education units were part of a required course; 75 percent population units in public secondary schools; 14.7 percent parochial secondary schools; 7.3 percent private schools; 2.9 percent private religious schools.

**RESULTS:** Population education courses were taught within a wide range of subjects areas. Social studies courses included population education units more than did other courses. Teachers also desired more instructional aids and inservice workshops to help them improve their particular units.

**REFERENCES:** 3 cited.

221. Stahl, Robert J., and S. Dennis Baker. "Population Education in Florida Schools: A Status Study." The Journal of Environmental Education, 1977, 8(4):43-46.

**DESCRIPTORS:** cognitive, descriptive research, formal, population education, secondary.

**VARIABLES:** Identification of topics and areas taught in population education by secondary school teachers in Florida.

**PURPOSE:** To collect descriptive data pertaining to the status of population education within the curricula of Florida's secondary schools.

**SUBJECTS:** 300 randomly selected Florida middle, junior high and senior high schools. Responses were obtained from 136 teachers within the selected schools (102 public school teachers; 20 Catholic school teachers, 10 nonreligious/private school teachers; 4 religious/private school teachers).

**RESEARCH DESIGN:** A 23-item questionnaire was designed to obtain data from classroom teachers on a broad range of topics and areas pertaining to the status of population education within their respective schools. Tables were presented showing objectives set forth by teachers for their population education units, topics and concepts included, and types of instructional resources desired. Instrument validity and reliability scores were not reported. Percentages and correlations were computed.

**RESULTS:** While individuals varied among themselves in terms of their population education instructional units, the survey data revealed a tremendous similarity between public and private school teachers (as a group) and their population units (when taken collectively). Significant correlations ( $p < .01$ ) between those two groups of teachers for course objectives, course content and desired a-v aids were reported. Explanations were reported. The respondents recognized their lack of knowledge on population education content and showed preference for more inservice education (85.7 percent). Discussion of results was presented.



REFERENCES: 4 cited.

222. Stamm, Keith R. "Strategies for the Resolution of Environmental Issues." The Journal of Environmental Education, 1979, 11(1):25-27.

DESCRIPTORS: attitudes, hypothesis generation, issue-based, issue investigation/evaluation skills, theoretical research.

VARIABLES: Attitudes regarding the resolution of environmental issues.

PURPOSE: To discuss new concepts for describing the individual's resolution of environmental policy issues.

SUBJECTS: Not applicable.

RESEARCH DESIGN: The author examined previous studies that he had conducted and, by synthesizing the results, generated the hypotheses found in this paper.

RESULTS: Data collected in three studies supported the idea that the resolution of environmental issues involves the use of cognitive strategies that are situationally determined. The following three variables have emerged from the search for situational explanations. First, that reversal of trends (i.e., a trend toward the scarcity of a resource which should be reversed) is generally a solution that people apply in more than one situation. Yet functional substitution (i.e., a functional substitute for a scarce resource which should be employed) is more often formulated in specific solutions that are perceived to have an impact upon the individual. Secondly, when the person's self-interest is at stake, a combination of both types of solutions may be evident. Third, the manner in which an individual defines an environmental issue is related to the solution developed.

REFERENCES: 7 cited.

223. Stamm, Keith R., and John E. Bowes. "Communication During an Environmental Decision." The Journal of Environmental Education, 1972, 3(3):49-55.

DESCRIPTORS: attitudes, beliefs, descriptive research, issue awareness/knowledge of issues, knowledge, rural, social background, urban.

VARIABLES: Rural vs. urban background, awareness of issue, information sources, community's perception of Corps' view about projects, community attitudes toward projects.

PURPOSE: The authors studied various aspects of the communication process between the Army Corps of Engineers and local residents concerning two proposed alternative flood control projects.

**SUBJECTS:** The sample consisted of 262 residents of Park River and Grafton, North Dakota and their outlying regions, areas within the watershed to be affected by the proposed projects. Within the two cities, random lists from the city directories were drawn up. Procedures for selection from this list were adjusted daily to maintain an even sex balance. Only adult heads of households were included. The rural sample consisted of all inhabited households (adult heads only) within the region to be flooded, as well as inhabitants along the river upstream from Grafton. The total sample was broken down as follows: Urban (N = 170), Rural (N = 92), Grafton (N = 112), Park River (N = 58), flooded area (N = 30), and upstream (N = 62).

**RESEARCH DESIGN:** All subjects were personally interviewed. The following information was assessed: Awareness of Corps study (by community location); first source of information about project; exposure to information sources (by community location); personal effect of project on subject; anticipated benefits and disadvantages of project; anticipated benefits and disadvantages (by community location and views of community compared to their perception of Corps' position on anticipated changes brought about by projects). Neither validity nor reliability were reported.

**RESULTS:** Data were presented on a percent basis. For those information categories labeled 'by community location,' chi-square values were determined. In addition, these values were also assessed in comparing the undecidedness of the community's perception of the Corps' view with their own views of the project.

Results indicated that the majority of both samples were aware of the issue but the rural sample had greater knowledge. Mass media and interpersonal contact were the most important channels in spreading awareness of the project. However, a difference was noted in the types of interpersonal contact held most important. For the urban sample, group meetings surpassed face-to-face contact; the opposite was true for the rural sample. Half the sample felt the project did not concern them, and of the half that did perceive an effect, the majority viewed the project as being beneficial. Respondents generally had far greater knowledge of the project's benefits than they did of its disadvantages. Those who favorably viewed the project viewed the Corps' views as being similar, but the sample also indicated that they did not feel the Corps recognized the project's disadvantages.

No level of significance was reported. The authors stated that the one-sided nature of the community's attitude toward the project reflected an efficient publicity campaign on the part of the Corps. What little attention was paid by the local media to the issue echoed official Corps releases until vocal opposition by the persons directly affected became pronounced. By that time, a positive image of the project was implanted in the community. The authors implied that new laws requiring earlier public debate on proposals affecting environmental quality should be enacted.

**REFERENCES:** 7 cited.

224. Stamm, Keith R., and John E. Bowes. "Environmental Attitudes and Reaction." The Journal of Environmental Education, 1972, 3(3):56-60.

**DESCRIPTORS:** attitudes, descriptive research, instrument development, issue awareness/knowledge of issues, knowledge.

**VARIABLES:** Views on scarcity, support for the Corps, knowledge of the issue, perceived agreement with the Corps.

**PURPOSE:** The authors compared subjects' views on how to avoid scarcity of resources (termed scarcity orientation) with support for the Army Corps of Engineers, knowledge of a proposed Corps project, and perceived agreement with the Corps. In addition, the authors reevaluated the validity of a concept and scale used for measuring environmental attitudes.

**SUBJECTS:** 174 residents of Grafton and Park River, North Dakota. These represented a subsample from a population of 262 subjects picked partially at random from a previous study. The extent of randomness in the present study could not be determined from the data presented.

**RESEARCH DESIGN:** Data were collected by the following means. Scarcity orientation was measured by two separate Likert item scales. Each scale had seven items and was scored 1:7 for a total summation of 7-49. The two orientations were labeled "reversal of trends," indicating an attitude favoring the reversal of any trend toward scarcity, and "functional substitution," indicating an attitude favoring the replacement of scarce resources with substitutes. Support for the Corps was measured by a single Likert item. Knowledge of the issue was measured by two open-ended questions asking respondents to list benefits and disadvantages of the project. The perceived similarity between the subjects and Corps' views was measured by giving subjects a list of 13 potential effects and have them mark each as a benefit or disadvantage. Those that were marked benefits were then rechecked by the subjects if they thought the Corps would actually provide the benefit; those effects that were marked as disadvantages were then rechecked by the subjects if they thought the Corps would try to avoid them. Reliability was not reported. Construct validity was partially determined.

**RESULTS:** For purposes of analysis, each attitudinal score, after summation, was reduced to one of three categories: low (7-20), moderate (21-35), and high (36-49). The attitudinal scales were correlated with the following data: support for the Corps, number of project benefits named, number of project disadvantages named, number of project benefits perceived in common, and number of project disadvantages perceived in common. All data were presented in percentages, and chi-square values were determined for each correlation. Each of the attitudinal scales underwent factor analysis to determine the unidimensionality of their respective items. A varimax rotation was used.

Persons scoring high on "reversal of trends" had less support for the Corps than those scoring low; those scoring high on "functional

substitution" had greater support for the Corps than those scoring low; the latter correlation was stronger. Those scoring moderately on "reversal of trends" named more project disadvantages than those scoring either high or low; those scoring high on "functional substitution" named more project benefits than those scoring low. As persons scored higher on "reversal of trends," the number of benefits perceived in common decreased. This reversed on the "functional substitution" scores--more benefits were perceived in common as scores increased.

Factor analysis for "functional substitution" yielded three factors, accounting for 66 percent of the variance. All factors were conceptually consistent, thereby imparting construct validity for this scale. Factor analysis for "reversal of trends" yielded three factors accounting for 55 percent of the variance, the factors not being conceptually consistent. The authors suggested the need for further refinement of this scale.

Alpha levels were not specified. The authors concluded that the strength and nature of a person's environmental attitudes are related to (1) the information they are exposed to, (2) previous knowledge of environmental issues, and (3) those who they perceive themselves in agreement with.

REFERENCES: 4 cited.

225. Stamm, Keith R., Brenda Dervin, and Robert Laing. "Communication Research and Environmental Policy Decisions: Seattle's Solid Waste Planning." The Journal of Environmental Education, 1976, 8(2):26-36.

DESCRIPTORS: affective, citizenship education, descriptive research, issue awareness/knowledge of issues.

VARIABLES: Environmental concern, knowledge of issues and of consequences, and willingness to act.

PURPOSE: This policy study started with a concern for predicting citizen readiness to help reduce solid waste problems. Specifically, it attempted to answer the following research question: "Do increases in environmental knowledge and concern contribute to greater public willingness to support environmental action?"

SUBJECTS: Respondents (N = 1,306) were randomly selected in a four-stage area probability design. The respondents: (1) represented various occupations (i.e., professional and managerial, clerical skilled, unskilled), (2) had a mean level of education of 12.6 years; (3) had percent employment of 50 percent, and (4) were all males. The four stages of random selection included census tracts, blocks with tracts, households within blocks, and respondents within households. All respondents were drawn from the Municipality of Metropolitan Seattle.

**RESEARCH DESIGN:** The School of Communications at the University of Washington conducted a survey of public opinion, behavior, and knowledge concerning solid waste management for the Municipality of Metropolitan Seattle during the fall of 1973. Respondents were interviewed for 45 minutes. The survey data were used to test the relationship between environmental concern, knowledge, and willingness to act. Likert scale indices were constructed. According to the authors, those indices were chosen for their face validity and prior literature support.

**RESULTS:** Correlation coefficients ( $p < .001$ ) for seven causal patterns linking the three variables listed above were reported for both issues and consequences. The correlations among concern, knowledge, and willingness were all moderately strong ( $r \geq .20$ ) and significant ( $p < .001$ ). Knowledge was more strongly related to willingness ( $r = .35$  for issue knowledge,  $r = .40$  for consequences knowledge) than was concern ( $r = .31$ ). Also, concern was more strongly related to willingness ( $r = .31$ ) than it was to either measure of knowledge ( $r = .20$ , and  $r = .22$ ). A partial correlation approach for focusing on causal relations produced all significant coefficients for the seven models. However, the findings of this study did not permit inferences that answered the questions posed on the policymaker's terms. The mechanisms which account for the citizen's readiness on environmental problems were not identified, and though some of the processes that appeared viable were eliminated. Implications for research were stated.

**REFERENCES:** 8 cited.

226. Stapp, William B. "International Environmental Education: The UNESCO-UNEP Programme." The Journal of Environmental Education, 1976, 8(2):19-25.

**DESCRIPTORS:** citizenship, descriptive research, program development, program evaluation.

**VARIABLES:** Goals, objectives, guiding principles and problems in EE, participants from UNESCO member states, EE experts.

**PURPOSE:** To report on the events which preceded and transpired during the 1975 International Belgrade Workshop on Environmental Education. The purpose of the study which preceded the Workshop was to assess needs and priorities in EE among member states.

**SUBJECTS:** Before the Workshop, education ministers and other authorities in all UNESCO member states received a questionnaire regarding the variables mentioned above. Twelve EE experts undertook exploratory and explanatory missions to 81 member states in the developing world. Fifteen leading international specialists in EE prepared state-of-the-art papers on different aspects of EE.

**RESEARCH DESIGN:** During the first half of 1975, efforts were made to identify needs, priorities and trends in EE. Input into the October 1975 Workshop included: (1) the UNESCO world survey of EE needs and priorities; (2) consultant missions to member countries; (3) proceedings

of previous international conferences on EE; (4) the 15 trend papers presented for the workshop; and (5) the experiences of the Workshop participants. Participants at the Workshop amended and refined papers, formulated guidelines and made recommendations for the promotion of worldwide EE.

**RESULTS:** The participants established eight major guiding principles for EE (abbreviated here): (1) to consider the environment in its totality; (2) to be a continuous, life-long process, (3) to be interdisciplinary in its approach; (4) to emphasize active participation in preventing and solving problems; (5) to examine major issues from a global perspective while respecting regional differences; (6) to focus on current and future situations; (7) to examine all development and growth from an environmental perspective; and (8) to promote the value and necessity of local, national and international cooperation in solving problems. Over 100 recommendations were generated, sorted, and sent to their appropriate target groups including U.N. agencies and other international bodies. Regarding needs and problems nine areas were identified and discussed: (1) EE at the International, (2) Regional and Subregional; and (3) National and Local Levels, (4) Research in EE; (5) Development of EE Programmes; (6) Training of EE personnel; (7) Development of EE Instructional Materials; (8) Funding of EE Programmes; and (9) Evaluation of EE Programmes. As a follow-up to the Workshop UNESCO/UNEP gave its support to a series of approximately 25 pilot projects in accord with the Workshop presented above.

**REFERENCES:** None cited.

227. Stapp, William B., Michael J. Caduto, Lori D. Mann, and Paul F. Nowak. "Analysis of Pre-Service Environmental Education of Teachers in Europe and an Instructional Model for Futhering this Education." The Journal of Environmental Education, 1980, 12(2):3-10.

**DESCRIPTORS:** citizenship, descriptive research, model building, teacher training preservice.

**VARIABLES:** Types and characteristics of preservice EE teacher training in Europe, role of and constraints upon preservice EE and elements of an instructional model.

**PURPOSE:** (1) to review information received on pre and inservice EE training of teachers in Europe; (2) to identify features of an instructional model for furthering the training of preservice EE teachers; and (3) to develop an instructional model for the preservice environmental education of teachers.

**SUBJECTS:** Letters requesting information on pre and inservice education of teachers in Europe were sent to leading environmental educators throughout Europe. Over 250 publications were received.

**RESEARCH DESIGN:** The authors reviewed the publications received in response to their letters. An appraisal of what should be going on in

the preservice environmental education of teachers was drawn from the list of recommendations established at the Intergovernmental Conference on EE held in Tbilisi, USSR in 1977. Subsequently, an appraisal of what was actually going on was summarized by the learning domains, methodologies, site utilization and national/regional cooperation. Three roles and six common constraints upon preservice environmental education of teachers were identified. From this informational base, elements of an instructional model for preservice environmental education of teachers were identified.

**RESULTS:** A model designed to provide basic training in EE for teachers at the preservice level was presented with the intention that colleges or universities should consider the ideas expressed if interested in furthering the EE of teachers at the inservice level. The major components of the model include: (1) basic competencies in the biological, physical, social and behavioral sciences; (2) understanding of the interrelationships of the human ecosystem, including a group community problem-solving project; (3) educational theory and teaching skills; and (4) a group EE teaching experience prior to student teaching and final teacher certification. Subcomponents for each of these major components were outlined and explained. Recommendations were drawn and presented for these learning domains, national and regional cooperation, and for the evaluation of EE programs.

**REFERENCES:** 50 cited.

228. Steiner, Robert L. "Attitudes of Oregon High School Seniors toward Some Environmentally Oriented Science Related Issues." Science Education, 1973, 57(4):417-435.

**DESCRIPTORS:** attitudes, program development, science education, secondary.

**VARIABLES:** Attitudes and their determination in environmental issues.  
**PURPOSE:** To determine attitude toward specific issues. attitude scales development and attitude determination as measured by the factor scales developed by the author.

**SUBJECTS:** Inventory was administered in May 1970 to a representative sampling of Oregon high school seniors. The sample was drawn based on random selection procedure.

**RESEARCH DESIGN:** The responses of the seniors to Likert-type questionnaires were submitted to factor analysis utilizing principal components extraction and orthogonal rotation by Varimax criterion. Twelve factors accounting for about 40 percent of the item response variation were extracted. 88 of the items loaded over 0.300 on the extracted factors, with 72 of the items loading singly. The reliability of the 60-item ISI and of each of the seven Factor Attitude Scales was estimated and given in a table. The validity was that of factor validity, but still limited in that the factor had to be subjectively identified by the experimenter.

**RESULTS:** Much of the student criticism of traditional educational institutions has been related to relevancy, in that they do not address the issues with which society must be concerned.

**REFERENCES:** 16 cited.

229. Stoltman, Joseph P. "Allocating Environmental Education Act Monies." The Journal of Environmental Education, 1975, 6(3):16-19.

**DESCRIPTORS:** descriptive research, program development.

**VARIABLES:** Number of proposals submitted to and funded by U.S. Office of Education; dollars of funding per state.

**PURPOSE:** (1) to rank the number of proposals submitted to the U.S. Office of Education for funding under the Environmental Education Act for FY 1972, the number of proposals funded, and the dollar amount funded by state populations, and (2) to compute the dollar amount funded per 1,000 population in an effort to further compare the distribution of EE Act funds.

**SUBJECTS:** Not applicable.

**RESEARCH DESIGN:** The author consulted the Second Annual Report of the Advisory Council on Environmental Education, published by the U.S. Office of Education, to obtain his data.

**RESULTS:** In FY 1972, 1,567 proposals were submitted, while 160 proposals from all 50 states were funded. A total of \$2,944,540 was distributed among funded projects. The author analyzed these data, and computed rankings for the 50 states and the District of Columbia by population. Subsequently, he computed the dollar amount per 1,000 population for the purposes of further comparing the distribution of funds. The data were presented in the form of figures and tables. The acceptance proposals ranged from a high of 2 of 3 in Arkansas to a low of 1 of 31 in Michigan. The dollar amount funded per 1,000 population ranged from a high of \$291.30 in Alaska, to a low of \$2.05 in Iowa. Regionally, the Northeast, Midwest and Mid-Atlantic states appeared to receive the heaviest funding. On a state-by-state basis, New York and California were ranked first and second, respectively, for the number of proposals submitted, funded, and in total dollars received. While both received over \$200,000, the actual dollars per 1,000 population was \$11.35 for New York and \$10.29 for California. The author drew two conclusions from the data: (1) there simply weren't enough funds appropriated to meet the demand; and (2) although the U.S. Office of Education used general services regions to somewhat equate overall funding for various parts of the nation, wide disparities still occurred between states. He ended by suggesting that this may be due to the quality and type of proposal submitted.

**REFERENCES:** None cited.



230. Tanner, Thomas. "Formative Influences in the Lives of Citizen Conservationists." Current Issues V, 1979, 189-200. ED 180 822.

DESCRIPTORS: descriptive research, program development, program evaluation, program implementation.

PURPOSE: The discovery of important formative influences which shaped (and continue to shape) active, informed, responsible citizen conservationists. Very simple, qualitative, preliminary data were gathered. The author believed that environmental educators could then prepare curriculum materials better suited to the students' needs.

SUBJECTS: Population of interest: environmentally informed and politically active citizen conservationists. Over 180 requests for response were sent to citizen conservationists who were involved in the National Wildlife Federation, the Nature Conservancy, the National Audubon Society, and the Sierra Club. Of these, 45 usable responses were returned (a response "in which at least one formative influence is cited"); 37 male and 8 female.

RESEARCH DESIGN: Accomplished through the use of a cover letter addressed to a senior executive in each group asking him/her to distribute a "Dear Citizen Conservationist" letter to appropriate staff members. This letter asked for four items of information from each individual: (1) autobiographical sketch of formative influences or events, (2) resume of conservation activities and accomplishments, (3) age, (4) individual's preference regarding direct quotes and anonymity.

RESULTS: Nine major formative influences were mentioned with varying degrees of importance to each individual. Topic for further research are listed.

REFERENCES: 1 cited.

231. Tanner, Thomas. "Significant Life Experiences: A New Research Area in Environmental Education." The Journal of Environmental Education, 1980, 11(4):20-24.

DESCRIPTORS: affective, continuing education, descriptive research, hypothesis generation, preferences, social background.

VARIABLES: Influences which played a formative role in individuals becoming environmentally concerned and active persons.

PURPOSE: To investigate the formative influences which professional staff and/or chapter officers of selected citizen groups identified as being instrumental in their selecting an occupation in an environmental field.

SUBJECTS: 37 male and 8 female professional staff from the National Wildlife Federation, The Nature Conservancy, the National Audubon Society, and the Sierra Club.

**RESEARCH DESIGN:** In autumn of 1978 a letter was sent asking for information on formative experiences which led to their choosing conservation work, including approximate occurrences of influences, demographic information, and a resume of conservation activities. Nine categories were derived from the preliminary examinations of responses. No intercoder reliability data were presented.

**RESULTS:** Of the 45 subjects' responses, youthful experiences in the outdoors and relatively pristine environments emerged as a dominant influence. About one-half of respondents reported that parents had an influence on them. Teacher influences, habitat alteration, solitude, and miscellaneous experiences were cited as other influences. Of those subjects that named a specific outdoor activity, hunting and fishing were cited most often. The author suggests that these results indicate that much needs to be done in our educational system to give children significant experiences which would lead them to develop environmental sensitivity.

**REFERENCES:** 41 cited.

232. Teich, Thea, and Robert D. Townsend. "An Analysis and Evaluation of a Field Trip Series." Current Issues VI, 1980, 45-51. ED 197 947.

**DESCRIPTORS:** descriptive research, field trip, outdoor classroom, program evaluation.

**VARIABLES:** Effects of field trips on adults and family groups.

**PURPOSE:** Analysis and evaluation of the "hands-on" field trip series offered by the Carnegie Museum of Natural History and the Western Pennsylvania Conservancy to benefit adults and family groups.

**SUBJECTS:** All participants (N = 253) of the field trips, young and old alike (ages 5-75). Participants under 20 years comprised 16.4 percent of the population; 54.3 percent of the participants were over 40 years of age; people over 60 years constituted 22.9 percent of the total. Student was the largest occupation represented (22.2 percent) followed by education (16.9 percent), retired (14.7 percent), homemaker (11.6 percent), science/technology (11.6 percent), business (8.9 percent), other (7.6 percent), clerical (4.9 percent), blue collar (1.8 percent).

**RESEACH DESIGN:** Questionnaires concerning different aspects of the field trips (i.e., original source of information, strong and weak points of the program, etc.) were distributed to all participants.

**RESULTS:** Data were analyzed and tabulated using the Statistical Package for Social Sciences (SPSS) Subprograms: Frequencies. Pearson Correlation, and Crosstabs. Several main conclusions were made concerning the audience, reasons for attending a field trip, and future participation.

REFERENCES: 3 cited.

233. Thelen, L.J., and Warren Litsky. "Teacher Attendance at a Summer Institute and High School Student Achievement." Science Education, 1972, 56(3):293-302.

DESCRIPTORS: cognitive, knowledge, pre-experimental, science education, teacher training inservice.

INDEPENDENT VARIABLE: Six-week summer institute for teachers.

DEPENDENT VARIABLE: Knowledge and adaption of materials into curriculum.

MAIN SUBJECT: Evaluation of students' knowledge.

PURPOSE: To provide evidence of the impact that attendance at a six-week summer water pollution control problems institute had on the students of participating teachers.

SUBJECTS: 20 high school teachers--not random selection; teachers taught in the following structures--8 and 9 general science, general biology, chemistry, and advanced biology.

RESEARCH DESIGN: Null hypothesis was developed and tested: There is no significant difference in the achievement of experimental and control groups as evidenced in their mean scores on a Water Pollution Control Information Test. True experimental-treatment-posttest (279 students in experimental classes. 611 students in control classes). Both experimental and control were encouraged to integrate materials related to water pollution problems into the curriculum. Three instruments were used: (1) Water Pollution Control Information Test (WPCI), (2) Verbal Reasoning Test, (3) Numerical Ability Tests of the Differential Aptitude Tests. A factorial design analysis of variance was utilized in the treatment of the data.

RESULTS: The F values reported for the treatment were significant. This indicated that there is a mean difference in achievement as evidenced by the mean scores on the WPCI between the experimental and control group. Hypothesis was tested at the .01 and .05 levels of significance. Attendance at a summer six-week institute does or may result in a significant impact on students taught by the teachers.

REFERENCES: 2 cited.

234. Tillis, C. Richard, and David E. LaHart. "Teachers Teaching Teachers--Inservice Training in Environmental Education." Journal of Teacher Education, 1974, 25(2):160-162.

DESCRIPTORS: descriptive research, teacher training inservice.

PURPOSE: Model for inservice in Florida; by teaching teachers to teach other teachers, a multiplier effect is achieved.

**SUBJECTS:** -Estimated 35,000 teachers in Florida.

**RESEARCH DESIGN:**

**Inservice Model:**

- Phase 1 = 1 state meeting - attendance 130
- Phase 2 = 7 regional workshops = attendance 600
- Phase 3 = 35 district workshops = attendance 3,500
- Phase 4 = 350 local school workshops = estimated attendance 35,000

**RESULTS:** This model resulted in teacher involvement in planning, conducting, and evaluating environmental education workshops. Produced teachers with an awareness and understanding of the environment and equipped them with the methods and techniques to help others learn about it and from it:

**REFERENCES:** 5 cited.

235. Tognacci, Louis N., Russell H. Weigel, Marvin F. Wideen, and David T.A. Vernon. "Environmental Quality: How Universal is Public Concern?" Environment and Behavior, 1972, 4(1):73-86.

**DESCRIPTORS:** attitudes, citizen action, descriptive research, economic background, educational background, ethnic group, hypothesis generation, social background.

**INDEPENDENT VARIABLE:** Sociodemographic background.

**DEPENDENT VARIABLE:** Environmental concern.

**PURPOSE:** Designed to probe the extent to which environmentally concerned individuals share general patterns of ideological and demographic characteristics.

**SUBJECTS:** 141 randomly selected white adults (18-65 years of age) from the community of Boulder. Respondents were young (mean age = 37), well-educated, middle-class college graduates (male-female mix); 51 percent listed Protestantism as their religious preference.

**RESEARCH DESIGN:** In this descriptive study, all data were obtained from a single Likert-type questionnaire administered in subjects' homes by graduate students. Variables measured were environmental concern and sociodemographic background. Alpha: coefficients for environmental concern variables were .81 for the Importance of Pure Environment Scale and .80 for the Attainment of Pure Environment Scale. The alpha coefficients for the socio-demographic variables were .68 for the Domestic Social Welfare Scale; .84 for the Importance of Social Stability Scale; and .63 for the Importance of Social Justice Scale.

**RESULTS:** Scores on both scales were compared and were found to be highly significant. Complete results reproduced in the text. Concluded that younger, well-educated individuals holding a more liberal sociopolitical outlook are more concerned about environmental issues. Study indicates that socioeconomic status may be directly associated with environmentalism.

REFERENCES: 10 cited.

236. Towler, John O. "A Survey of Canadian Pre-Service Training in Environmental Education." The Journal of Environmental Education, 1980, 12(2):11-16.

DESCRIPTORS: citizenship, descriptive research, formal, interdisciplinary, multidisciplinary-infusion, teacher training preservice.

VARIABLES: Teacher training institutions, EE methods course offerings and emphasis, student enrollment in methods courses, ecology/environmental course offerings and emphasis, student enrollment in these courses, faculty background and involvement in EE, EE teacher training sequence, faculty views on how EE is incorporated into elementary and secondary schools, faculty news on EE teacher certification, faculty views on problems in teaching EE, faculty views on exemplary EE projects and programs.

PURPOSE: To determine the status of EE preservice training in Canada via data collection from Canadian teacher training institutions for the variables mentioned above.

SUBJECTS: The entire population (N = 48) of teacher training institutions in Canada. The response rate was 85 percent.

RESEARCH DESIGN: For this survey, a 13-item questionnaire comprised of checklists, forced-choice items, and open-ended questions was designed and prepared for mail distribution in the fall of 1978. A letter accompanying the questionnaire was sent to the dean or department head of the appropriate section of the institution with the request that the instrument be passed on to the faculty member most qualified to respond. Instrument validity and reliability scores were not reported.

RESULTS: During the 1977-1978 academic year 18 of the institutions offered an EE methods course. They emphasized ecological, outdoor education and biological perspectives (enrollees = 1,104). 25 institutions offered a nonmethods course in ecology as environmental concerns (enrollees = 1,210). The faculty for responding institutions included 33 full-time and 31 part-time members. Their backgrounds varied considerably, though most had degrees in education, biology or science. Eight percent were involved in funded projects and fewer than 30 percent were involved in curriculum materials design. EE was most often handled in science (i.e., predominantly secondary), social science (predominantly primary) or separate courses. Respondees were relatively evenly split over EE teacher certification: 17 for and 15 against. Few if any provinces offer such certification, in part due to the 'newness' of EE. Despite a lack of consensus regarding problem ranking, funding and lack of communication within the field were ranked first. Explanations, a summary and implications were reported.

REFERENCES: 2 cited.

237. Townsend, Robert D., and Robert E. Roth. "The Ohio State--Youth Conservation Corps Experiences." Current Issues VI, 1980, 52-54. ED 197 947.

DESCRIPTORS: affective, attitudes, cognitive, conservation education, descriptive research, outdoor education, program evaluation, psychomotor, resource management education, secondary.

VARIABLES: Attitudes, YCC camping experiences.

PURPOSE: Analysis of the YCC program via camper attitudes.

SUBJECTS: All campers, on a voluntary basis, were asked to fill out the evaluation form. All of them did (N = 48). The average age of the campers (who were randomly selected for the YCC program) was 16.1; 72.7 percent of the total were from cities of more than 100,000 people. Minorities accounted for 13.6 percent of the total; 52.7 percent of the campers were male.

RESEARCH DESIGN: An evaluation form was answered on a voluntary basis by all campers. The End-of-Camp Questionnaire assessed camper attitudes toward the EE program, the work program, the staff, and the facility. Demographic variables were also gathered.

RESULTS: Conclusions were made relating to minority group attitudes, older camper versus younger camper attitudes, camper desire to go into a natural resource occupation.

REFERENCES: None cited.

238. Tremblay, Kenneth R., and Riley E. Dunlap. "Rural-Urban Residence and Concern with Environmental Quality: A Replication and Extension." Rural Sociology, 1978, 43(3):474-491.

DESCRIPTORS: attitudes, ex post facto, rural, urban

VARIABLES: Pollution concern, rural/urban residence, and rural farm/nonfarm.

PURPOSE: An extension of previous work to study: (a) the effects toward the environment; (b) the differences in concern between the two groups on problems at the local vs. state or national level; and (c) contrast the concern of rural farmers to that of rural nonfarmers.

SUBJECTS: 866 residents of Oregon--312 rural (of which 287 were nonfarm and 25 were farm), 212 small-town, 130 urban fringe, and 212 urban. All were male and female participants of a 1970 Louis Harris public opinion survey for which no response percentage was reported.

**RESEARCH DESIGN:** An ex post facto design, using data from a 7-year-old public opinion interview. Items used were both open-ended and closed. No reliability or validity coefficients were reported.

**RESULTS:** Pollution concern/residence relationships and differences of the residence groups on community versus state level problems were analyzed by a gamma measure of association. The greater concern of rural nonfarmers was supported by the percentages of farm/nonfarm contrast, but should be viewed with caution, because of the small number of farm respondents (25).

Urban residents were found to have greater concern about pollution than rural. Pollution concern and residence are highly-associated at the community (local) level and only slightly at the state (national) level. Rural farmers were the least concerned with pollution. (The authors feel this may be a result of their more utilitarian attitudes toward the environment.) Future research should study a joint residential-occupational variable and more fully operationalize the "nature extractive versus nonextractive" occupation variable to further separate the effects of utilitarian attitudes from exposure to pollution.

**REFERENCES:** 35 cited.

239. Trent, John H. "Changes and Trends in Environmental Education (1970-1975)." The Journal of Environmental Education, 1976, 7(3):51-60.

**DESCRIPTORS:** descriptive research, formal, teacher training inservice, teacher training preservice.

**VARIABLES:** Changes and trends in environmental education, 1970-1975.

**PURPOSE:** To determine, via data collected from colleges and state departments of education, existing trends in EE teacher education from 1970 to 1975.

**SUBJECTS:** Questionnaires were sent to a random sample of the approximately 777 teacher institutions of education listed in the 1967 Yearbook of the American Association of Colleges of Teacher Education. A second questionnaire was sent to all 50 state departments of education. The data were tabulated for each of the respective years from 1970 to 1975.

**RESEARCH DESIGN:** In this descriptive study, two questionnaires were developed and sent to teacher institutions and the state departments respectively. Data were collected for the years 1970 to 1975. Questionnaires consisted of yes/no, and a few Likert-type questions. Instrument validity and reliability estimates were not reported.

**RESULTS:** An analysis of the data indicated that in 1970 a majority of the colleges of education that responded: (1) were not offering a course in methods of teaching environmental science; (2) were offering a

course involving content in environmental science; (3) had faculty who were involved in environmental science coursework or curriculum development; (4) had no faculty who were involved in federal, state, county, or local environmental science projects; and (5) were offering either a major or minor in environmental education. Using a chi-square analysis of data, it was determined that there were significant differences in data collected from 1970 to 1975 for: (1) the number of colleges of education offering an environmental course in methods ( $p < .001$ ); (2) number of faculty involved in federal, state and local projects ( $p < .05$ ); and (3) the number of colleges of education offering environmental science as a teaching major ( $p < .001$ ) or a teaching minor ( $p < .01$ ).

As there was not a significant increase in these areas between 1974 and 1975, it would appear that these trends have peaked and leveled out. In data collected from the states' departments of education, it was found that there was a significant difference ( $p < .001$ ) between 1972 and 1975 in the increased development of environmental courses, syllabi, and materials for use in schools by the state departments. Also, there was a significant increase ( $p < .001$ ) in the percentage of teachers participating in state environmental inservice and preservice instruction. Between 1974 and 1975 there remained a significant difference ( $p < .001$ ) in the continually increasing number of inservice and preservice workshops being offered within the states and the increased percentage of teachers attending those workshops. The researcher states that from all data collected, it was difficult to detect trends. Continued study of trends in environmental education was suggested by the researcher.

REFERENCES: 4 cited.

240. Trent, John H. "Energy Education Workshop for Secondary Teachers." The Journal of Environmental Education, 1978, 9(4):30-35.

DESCRIPTORS: affective, attitudes, continuing education, energy education, formal, issue awareness/knowledge of issues, knowledge, pre-experimental.

INDEPENDENT VARIABLE: Energy Education Workshop.

DEPENDENT VARIABLE: Attitudes toward and knowledge of energy-related problems.

PURPOSE: To examine the effect an energy workshop had on the attitude and knowledge of teachers toward energy-related problems.

SUBJECTS: 25 secondary teachers attending an energy education workshop at the University of Nevada at Reno during July 1976 were the sample group.

RESEARCH DESIGN: A pretest-posttest with no control format was used. A 14-item forced choice questionnaire developed by the researcher was the assessment tool. Half of the questions focused on attitudes and



concerns about energy and energy education and the second half surveyed information about energy. While the researcher states no formal evaluation of the questionnaire was made to determine either its validity or reliability, it was administered twice to a secondary science method class. Correlations were given for the two respective sections as being .6 and .85. The treatment consisted of four days of lectures, films, presentations, activities and simulations.

**RESULTS:** Percentage responses for each item of each question were calculated for the pre and post workshop responses. In addition, a chi-square analysis was done on each instrument item comparing the pre and post workshop scores. Significance beyond the .05 level was obtained only on the energy definition item and the demand for energy item in the knowledge section. No significance ( .05) was obtained on any attitude item. The author concluded that attitudes and knowledge about energy changed radically in some cases and more moderately in others. He inferred that there is a great need for energy education workshops for secondary teachers. Further discussion is included in the article.

**REFERENCES:** None cited.

241. Trent, John H. "How One State Tackles Environmental Education." The Journal of Environmental Education, 1975, 6(3):32-33.

**DESCRIPTORS:** attitudes, descriptive research, program evaluation, secondary.

**VARIABLES:** The current status of EE, and the preferences and opinions of secondary teachers toward EE in the secondary schools of Nevada.

**PURPOSE:** (1) to determine the current status of EE in Nevada's secondary schools; and (2) to identify preference and opinions of secondary teachers within those schools.

**SUBJECTS:** A questionnaire was sent to each secondary school in Nevada during the 1971-72 academic year. Responses were received from over 70 percent of the schools.

**RESEARCH DESIGN:** The population of secondary schools in Nevada was surveyed via questionnaire. The instrument contained eight items: (1) a question asking for a listing of any full-year environmental science courses currently being taught; (2) a question asking for a list of any courses in which units on the environment are taught; (3) a question on preferences for a full year environmental science, a science course with environmental units or social studies course with environmental units; (4) a question on the adequacy of inservice environmental science teacher training courses; (5) a question on the adequacy of textbooks available for the type of environmental science courses desired; (6) a question on the teacher's desire for inservice courses; (7) a question asking for a listing of workshops attended; and (8) a question on the adequacy of resource persons to assist teachers. Instrument validity and reliability scores were not reported.

**RESULTS:** While only six schools offered a full-year course, 31 schools offered environmental units in either science (26) or social studies (5) courses. Their preference responses reflected that trend: 5 preferred the full-year course, 25 the environmental units in science courses, and 14 the environmental units in social studies; 29 indicated inservice courses were inadequate, while 23 desired inservice training in their county, and 12 at the University of Nevada. 25 schools indicated that textbooks were inadequate, while 7 indicated that they were adequate; 25 schools had not attended any workshops in EE, while 8 had attended one or more. The school respondents were evenly divided (16 yes's and no's) on the 'adequacy of resource persons in the area to assist teachers' item. More specific results and a brief summary were reported.

**REFERENCES:** None cited.

242. Trent, John H. "Status of Environmental Science in Colleges of Education." The Journal of Environmental Education, 1972, 3(4):53.

**DESCRIPTORS:** descriptive research, higher education, teacher training preservice.

**VARIABLES:** Methods courses offered; environmental science content courses offered; faculty involvement in curriculum development; faculty involvement in federal, state, county and local science projects; majors and minors offered.

**PURPOSE:** Assessed the status of environmental science education in colleges of education.

**SUBJECTS:** A random sample was chosen from 700 colleges listed in the 1967 Yearbook of the American Association of Colleges for Higher Education. 108 questionnaires were returned from a mailing of 140, a response rate of 77 percent.

**RESEARCH DESIGN:** Respondents were asked seven yes-no questions related to the variables listed above. Neither reliability nor validity were reported.

**RESULTS:** Data were presented as raw score answers. The author found that few schools offered majors or minors in environmental science, that a minority of schools had faculty involved in any type of science projects (though more were involved in state, county and local projects than federal projects), and that few offered a methods course in environmental science. A majority of schools offered courses in environmental science content, and a majority had faculty involved in curriculum development. The author suggested that written comments accompanying the data indicated that more schools were interested in updating their environmental science offerings than the data indicate.

**REFERENCES:** None cited.

243. Trent, John H. "Trends in Environmental Education as Perceived by Colleges of Education and State Departments of Education." The Science Teacher, 1973, 40(8):36-37.

**DESCRIPTORS:** descriptive research, program implementation, science education.

**VARIABLES:** The variables in determining trends in environmental education were time and discrepancies between the responses given by responding colleges in different years.

**PURPOSE:** To determine trends in environmental education as perceived by colleges of education and state departments of education.

**SUBJECTS:** The sample included randomly selected teacher education institutions (700) as well as all 50 state departments of education.

**RESEARCH DESIGN:** Questionnaires were sent to the aforementioned subjects in the years 1970, 1972 and 1973. Data were received December 1970, January 1972 and February 1973.

**RESULTS:** In 1970 a majority of the colleges of education that responded to the questionnaire were not offering a course in methods of teaching environmental science, environmental science course or curriculum development, not involved in environmental science projects with federal, state, county or local funding, and not offering a major or minor in environmental education.

Chi-square calculation was made on each question to determine whether or not there were any significant differences between the responses given by a college in different years. During the period 1970-73 there was a significant increase (.05 level) in the number of colleges offering courses in methods of teaching environmental science. Between 1970 and 1973 there was a significant increase (.01 level) in the number of faculty members reported involved in federally funded environmental science projects. However, most of this increase was between 1970 and 1972. It appears that federal financing for environmental programs and the number of colleges offering courses involving content in environmental science have peaked and leveled off.

**REFERENCES:** 2 cited.

244. Trigg, Linda J., Daniel Perlman, Raymond P. Perry, and Michel Pierre Janisse. "Anti-Pollution Behavior: A Function of Perceived Outcome and Locus of Control." Environment and Behavior, 1976, 8(2):307-313.

**DESCRIPTORS:** behaviors, descriptive research, hypothesis generation, knowledge, locus of control.

**VARIABLES:** Locus of control, perceived outcome of pollution, knowledge, and anti-pollution behavior.

**PURPOSE:** To examine the moderating effects of perceived outcome on the relationship between activism and locus of control.

**SUBJECTS:** Multi-stage probability and clustering sampling techniques were used to draw a sample from the adult population of Winnipeg. 433 individuals were interviewed.

**RESEARCH DESIGN:** Each participant was interviewed for approximately 40 minutes. The interview instrument contained questions designed to assess locus of control, knowledge of pollution, perceived outcome, and anti-pollution activities. Reliability and validity coefficients were not reported.

**RESULTS:** 3 x 2 x 2 analyses of variances were performed on the data. Internally-oriented respondents were better informed (.05) and were engaged in more anti-pollution activities (.05). Optimistic internals were engaged in more anti-pollution activities than optimistic externals. Virtually no relationship between locus of control and activities was found among pessimistic respondents.

**REFERENCES:** 12 cited.

245. Trojcek, Doris A., and Gary D. Harvey. "Environmental Education in Missouri." The Journal of Environmental Education, 1976, 7(4):46-50.

**DESCRIPTORS:** descriptive research, elementary, formal, middle school, secondary.

**VARIABLES:** The current status, future plans, and needs for environmental education (EE) within Missouri's school districts as identified by district superintendents.

**PURPOSE:** To obtain information on the current status, future plans, and needs for EE throughout Missouri.

**SUBJECTS:** 459 superintendents of Missouri's public school districts were sent questionnaires. After three different mailings, and numerous phone calls during a six-month period, 270 responses were returned (58.8 percent).

**RESEARCH DESIGN:** A multiple-choice type questionnaire was used to survey/gather background information, and data on three major areas of interest: (1) the current status of the school districts' environmental education programs, (2) the future plans for environmental education within the school district, and (3) the districts' needs for implementing the current or proposed environmental education programs. The questionnaire was developed by the Missouri Association for Supervisory and Curriculum Development Special Study Group on Environmental-Conservation Education in the fall of 1973. Instrument validity and reliability estimates were not reported.

**RESULTS:** A breakdown of the number of positive responses given for each of the questionnaire items was listed. Data results from questions reported to be important by the researchers included: 69 percent of the responding districts did not require environmental education; 36 percent

of the school districts did not include environmental education as a curricular option; only 8 percent of the districts used commercial environmental/conservation programs; only 1 percent planned to use commercial products; a low interdisciplinary involvement in conducting EE programs, yet a surprising variety in the number of other curricular areas in which EE was incorporated; that plans for implementing a program within the next two years were not impressive (8 percent for elementary, 12 percent for secondary); and that responding districts indicated strong needs for EE materials. The researchers discussed possible implications and presented interpretations which help explain the present status of EE in Missouri.

REFERENCES: None cited.

246. Tucker, Lewis K., Jr. "The Environmentally Concerned Citizen: Some Correlates." Environment and Behavior, 1978, 10(3):389-418.

DESCRIPTORS: behaviors, citizenship, descriptive research, locus of control, social background.

INDEPENDENT VARIABLE: Members of Sierra Club and Audubon Society and subjects from general population.

DEPENDENT VARIABLE: Attitudes and behaviors relative to environmental responsibility.

PURPOSE: To examine the relationship between measures of internal-external control, social responsibility, social class, age, income and environmental responsibility, from the operational or deepened marketing perspective of private and public strategic decision-making.

SUBJECTS: 166 female homemakers make up the sample of which 139 were solicited through local newspaper, radio, and television announcements. In addition to these general population subjects, 27 homemakers were recruited through membership lists of the local Sierra Club and Audubon Society.

RESEARCH DESIGN: Descriptive Survey--Correlational. Data collection was undertaken as a two-stage process. The first stage involved questionnaires containing personality and attitude scales as well as demographic and self-report behavior items. The second stage was concerned with the recording of behavioral observations which indicated environmentally responsible behavior. Subjects' attitudes were determined using four centigrade thermometer-type scales. An internal-external control of reinforcements measure consisted of a 29-item forced choice scale consisting of five filters. A social responsibility scale consisted of a 22-statement 5-point Likert-type instrument. Social class was measured by Hollingshead's two-factor index of social position. Data collection procedures are detailed. Validity and reliability are not noted. A Gamma test to assess the validity of the organizational affiliation as a measure of environmental responsibility, as well as mean and proportion tests were utilized.

Attitudinal measures were determined using Hotelling  $T^2$  analysis of the mean vectors. T-tests of individual mean differences were also noted.

RESULTS: Correlates of environmental responsibility were evaluated with tests of mean differences and discriminant analysis. F-matrix values were noted. Classifications were significant at the .05 level in all but two of the replications. Three discriminant analysis replications were performed in investigating the multivariate predictor relationships. F-matrix values and significance of variables are noted. The generalized social responsibility correlates of internal-external control and social class were proven to be significant univariate and multivariate predictors of environmental responsibility across all criterion measures. Implications for future research were put forth.

REFERENCES: 51 cited.

247. Vinchattle, Kevin, Kevin Baxter, Douglas Allen, Vicki Allen, and Craig B. Davis. "Foreign Students as an Educational Resource in an Undergraduate Environmental Studies Course: An Experiment." Current Issues IV, 1978, 40-45. ED 167 407.

DESCRIPTORS: affective, descriptive research, higher education, program evaluation.

INDEPENDENT VARIABLE: Perspectives on Environmental Problems, an experimental course.

DEPENDENT VARIABLE: The value of using foreign students as a reservoir of information concerning environmental problems; the U.S. students' reactions to the seminar.

PURPOSE: Evaluation of a program which explores the attitudes foreign people have toward environmental problems and American students' reactions to these attitudes.

SUBJECTS: Approximately 20 foreign students at Iowa State University were chosen by the student coordinating team primarily on the basis of interest. Secondly, geographical location of the native country was taken into account to obtain diversity.

RESEARCH DESIGN: The foreign students themselves led the mini courses and the discussion groups. Evaluation of the seminar was based on extraction of critical comments (positive and negative) from group papers and by administering or evaluating questionnaires at the end of the quarter.

RESULTS: The students repeatedly expressed their wishes to see the program continued. The impact of environmental education can expand greatly.

REFERENCES: None cited.

248. Voelker, Alan M. "Population and Children's Literature." The Journal of Environmental Education, 1975, 6(3):57-64.

**DESCRIPTORS:** descriptive research, elementary, issue awareness/knowledge of issues; issue investigation/evaluation skills, middle school, population education.

**VARIABLES:** Children's literature on population education and criteria for analyzing that literature.

**PURPOSE:** (1) to locate a body of literature which would provide a data base for determining the content of children's books related to population problems; and (2) to analyze that literature according to pre-established criteria, notably its nature, focus and concern.

**SUBJECTS:** Not applicable.

**RESEARCH DESIGN:** The literature analysis was restricted to materials appropriate for use by children in elementary and middle schools, and to materials typically classified as trade books. Books were sought at four locations in the Madison, Wisconsin area. Consultation with the directors of the various centers, and others who work extensively with children's books, led to the decision that analysis of the obtained books would be more than adequate in meeting the first purpose stated above. The initial search yielded approximately 200 books which were published during the years 1944 through 1972, and which appeared appropriate on the basis of titles and overviews. A preliminary analysis was conducted on each book according to seven criteria. 75 books did not meet that initial criteria screening and were, therefore, eliminated from the study. The remaining 125 books, meeting both grade level and contribution to issue understanding criteria, were subjected to two further analyses. The books were first rated on a scale ranging from 0 to 3 according to the initial seven criteria. 92 books received a composite rating of 1 or more and were included in the second analysis. In the second analysis these 92 books were rated on three criteria: the nature of the prose, the population(s) with which the book was concerned, and the books' prime concerns (i.e., factual, issue and/or solution orientation). As a result of the last two analyses, each book was described and rated in terms of breadth and depth on the population issue. Validity and reliability estimates were not reported.

**RESULTS:** 75 percent of the books dealt strictly with animal populations, about 11 percent strictly with human populations, and about 14 percent with both. All books which considered only human populations were nonfiction. About one quarter of the final sample of books targeted children in primary grades. Until 1966, the number of books published was limited, and most (8 of 11) considered only animal populations. From 1966 on, 60 to 83 percent of the books included some major factual information. An increased percent devoted major rather than minor coverage to issues, while the percentage of books ignoring problem solutions ranged from 40 to 100 percent in any one year. On the average, fiction books received a higher rating than nonfiction books on awareness, action, and respect for the environment. A discussion of these and other results was reported.

REFERENCES: 11 cited.

249. Voelker, Alan M., and Robert E. Horvat. "Elementary School Children's View on Solving Environmental Problems." Science Education, 1976, 60(3):353-361.

DESCRIPTORS: descriptive research, issue awareness/knowledge of issues, issue-based, program evaluation, teacher training inservice, teacher training preservice.

VARIABLES: Values and awareness toward environmental conditions and possible solutions to these conditions.

SUBJECTS: 435 children in grades 5 to 8 from schools in southern Wisconsin. Student distribution by grade level and community included: rural school, 50; small town school A, 108; small town school B, 135; medium-sized city school, 60; innercity school, 82.

RESEARCH DESIGN: Sixteen random arrangements of four stories produced the various forms of the instrument for use in this study. Each student reacted to four stories and at the end of each story the question, How do you think this problem could be solved? appeared. 56 of the students were randomly selected to provide verbal responses to the stories.

RESULTS: Children's responses to environmental problems often reflected a concern for themselves and their families, illustrated by the frequency of personal orientation responses observed for four of the stories. This concern could be a powerful entry point for environmental education curriculum and instruction. Student responses indicated a strong adherence to technologically-based improvements of the environment, rather than to a change in people's attitudes and values.

REFERENCES: 16 cited.

250. Voelker, Alan M., and Christine L. Kolb. "The Presence of Environmental Resource Management Themes in Selected Problems-of-Democracy Textbooks." The Journal of Environmental Education, 1973, 5(2):52-60.

DESCRIPTORS: descriptive research, resource management education, science education, secondary, social science education.

VARIABLES: Presence of 26 social science-oriented environmental themes in selected Problems of Democracy textbooks.

PURPOSE: To determine the extent to which selected social science-oriented environmental resource management themes were included in selected high school Problems-of-Democracy textbooks.

SUBJECTS: Not applicable.



**RESEARCH DESIGN:** Six textbooks currently used in high school problems-of-democracy courses were selected by the researchers with the aid of a professional social studies educator. They were considered representative of problems of democracy texts used in Wisconsin schools. 26 themes representing a broad social studies-oriented foundation for understanding environmental problems were selected from 11 of the 12 categories of Roth's 1970 list of environmental resource management themes. Text referrals to these 26 themes were identified and classified as either pictorial or verbal. Referrals were also tabulated according to whether they stated, paraphrased, supported or obviously alluded to the select themes. The average number of lines per book and words per line, and number of lines per referral was used to determine the number of words per referral.

**RESULTS:** Result for pictorial, word and total referrals for each theme were presented, including the number of referrals and percentage of occurrence, and were ranked relative to other themes. Four themes received 100 percent ratings in pictorial, word and/or combined referrals: the socio-cultural environment, cultural, family and psychological aspects themes. Three of the nine management, management techniques and ecological themes received substantial ratings. Results of a rank ordering of texts by referral or by words suggests that textbook 'F' was superior on both counts. Theme findings, conclusions, implications and recommendations were stated.

**REFERENCES:** 16 cited.

251. Wall, Geoffrey. "Public Responses to Air Pollution in South Yorkshire, England." Environment and Behavior, 1973, 5(2):219-248.

**DESCRIPTORS:** descriptive research, issue awareness/knowledge of issues, issue-based, knowledge.

**VARIABLES:** Concern and awareness of atmospheric pollution.

**PURPOSE:** To ascertain public awareness and concern for atmospheric pollution in the South Yorkshire coalfield.

**SUBJECTS:** A total of 120 adults from the following areas: Treeton, Rawmarsh, and Wath-Upon-Deerne (40 subjects from each). Selected at random from the electoral register.

**RESEARCH DESIGN:** A combination questionnaire-interview was administered to respondents in their homes. Study areas were selected to satisfy two criteria: availability of pollution records and diversity of smoke control experience. Reliability and validity coefficients were not reported.

**RESULTS:** Questionnaires were analyzed with three aims in view: public perception of air pollution and actual pollution present, public knowledge of smoke control legislation and evaluations of its effectiveness, and attitudes to alternative adjustments to air pollution. Perceived pollution levels to be quite high, mentioning

particulates more than invisible gases. Exhibited considerable awareness of smoke control legislation. Alternative adjustments (stay inside more, etc.) varied little. Complete results reproduced in text.

REFERENCES: 12 cited.

252. Watkins, George Alfred. "Developing a 'Water Concern' Scale." The Journal of Environmental Education, 1974, 5(4):54-58.

DESCRIPTORS: affective, attitudes, cognitive, community resource, instrument development, issue awareness/knowledge of issues, knowledge, resource management education.

VARIABLES: Attitudes toward water resources; underlying attitudinal factors.

PURPOSE: (1) develop an attitude scale to measure the attitudes of a particular population of respondents toward water resources; and (2) to determine attitudes toward water resources.

SUBJECTS: The technique of area probability sampling was used to select subjects. In the first stage, residential units from the two target areas, West Palm Beach and Homestead, Florida, were sampled. Subsequently the West Palm Beach sample (N = 313) was reinterviewed. "In essence, the sampled population had small families, was highly educated, had high incomes, was mostly white-collar, and had a substantial number of water-using appliances."

RESEARCH DESIGN: In the initial field work stage, interviews were used in gathering initial attitudinal data from the residential samples. The data were subjected to a factor analysis and to the Guttman technique of scalogram analysis. A factor analysis was used to identify the underlying factors determining the respondents' attitudes toward water resources. Factor loadings were used to develop an index using the weights of the items. The index consisted of 19 items within 6 factors, which the author labeled: Willingness, Awareness, Knowledgeability I, Economic Commodity, Knowledgeability II, and Rationality. In the second field work stage, these 19 attitudinal items were readministered to 313 West Palm Beach respondents. They were asked to respond to each statement on a five-point Likert-type scale. Four trials were necessary to provide the final scale of five items within an acceptable coefficient of reproducibility of .895. The author states that these five attitudinal items were validated via the factor analysis.

RESULTS: The final five instrument items were drawn from three of the initial six factors determined via the factor analysis (i.e., Knowledgeability I and II, and Awareness). These five items seemed to measure concern for and about water resource problems, and included the following statements: (1) We really haven't thought about cutting down our water consumption; (2) Water reclaimed from waste is as good as any other water; (3) Mankind has the right to free and unlimited use of water; (4) Nature has a way of solving water supply problems before they get serious; and (5) It's the people who should do something about the

water problem. The author named this the 'Water Concern Scale' and reports on the way that responses to it should be interpreted. Suggestions on the application and use of the scale, as well as conclusions, were reported.

REFERENCES: 14 cited.

253. Watkins, George A. "Scaling of Attitudes toward Population Problems." The Journal of Environmental Education, 1975, 7(1):14-19.

DESCRIPTORS: attitudes, community resource, instrument development, issue awareness/knowledge of issues, issue-based, population education.

VARIABLES: Socioeconomic variables, attitudes toward population problems.

PURPOSE: To construct an attitudinal scale which focused on population problems.

SUBJECTS: The data were collected in the Tulsa, Oklahoma, SMSA using a stratified proportionate sample. Using information from a local housing study and census tracts, 450 households were selected from representative neighborhoods. There were 372 respondents which, according to available census tract data and geographic location, represented a 1 percent sample of the total SMSA. An extensive listing of demographic information is given, covering marital status children, income, education, religion, race, and age.

RESEARCH DESIGN: This study centered around the development of an instrument which was intended to measure an attitude toward population problems. Based on review of relevant literature and a pretest, 18 attitudinal statements were administered to respondents. Three trial scales were necessary to provide the final scale of six items with an acceptable coefficient of reproducibility of .913. The Guttman scalogram analysis technique was used in development of the instrument. The author states that the validity of the final set of attitudinal items was established by factor analysis. Subsequently, the scale scores of the respondents were compared with selected socioeconomic variables in an effort to empirically validate the scale.

RESULTS: A student's "t" was used to modify Spearman rank correlation coefficients for all variables except occupation. The student's "t" associated with those correlation coefficients, and a Kruskal-Wallis one-way analysis of variance, were used in data analysis. Only the variables number of children, education and occupation proved to be associated with the population problem scale scores (Alpha = .05). According to the author, these variables were found to be significant in other studies, and helped in establishing the empirical validity of the scale. The lack of association of the other selected variables suggests that further investigation of the empirical validity of such relationships is advisable.

REFERENCES: 20 cited.

254. Weigel, Russell, and Joan Weigel. "Environmental Concern: The Development of a Measure." Environment and Behavior, 1978, 10(1):3-15.

DESCRIPTORS: attitudes, behaviors, citizen action, citizenship, instrument development.

VARIABLES: Long-term behavioral predictions.

PURPOSE: To report the results of several independent investigations of the reliability and validity of the Environmental Concern Scale and to suggest ways in which this attitude scale might be employed productively.

SUBJECTS: In 1974 and 1976, the ECS was administered to two independently selected random samples of a medium-size New England town. The first sample had 91 respondents with 71 in the second, representing 87 percent and 97 percent, respectively, of those originally designated by random sampling procedures. Respondents ranged in age from 19 to 70 years (mean = 43, S.D. = 14) of which 79 were male and 83 were female. In Study II, 25 residents from a different New England city were randomly selected and given a public opinion poll which included the ECS. Six weeks later, respondents were contacted again to complete the questionnaire a second time. In Study III, 126 currently active members of two chapters of the Sierra Club were chosen as a known group for a validity check. In Study IV a follow-up study involved 44 respondents from the Study I sample to test long-term behavioral predictions.

RESEARCH DESIGN: Both survey and correlational measurements were utilized. Broad public opinion surveys were utilized which included the ECS Retests for the control group was administered. Mean scores and vacancies were recorded and compared between control groups. Scores on the attitude measure were correlated with the behavior scores reflecting the degree of participation in ecologically relevant projects. After subjects, two scores on each of the three behavioral measures were computed and summed to yield a more comprehensive behavioral index, scores on this index were correlated with scores on the attitude measure.

RESULTS: The Environmental Concern Scale exhibited satisfactory internal consistency on two samples separated both geographically and temporarily. The alpha coefficient was .85 and the homogeneity ratio was .26. A test-retest correlation of .83 indicates very adequate stability over the six-week interval employed. The correlation between scores on the environmental-behavior index and scores on the attitude scale were quite strong ( $r = .62$ ,  $p < .001$ ). The study concludes that the ECS emerges as a valid and reliable research tool of great value to attitude research. Implications of research were noted and the potential ability of the ECS for further research was discussed.

REFERENCES: 19 cited.

255. Willhite, Robert G., Donald R. Bowlus, and Donald Tarbet. "An Approach for Resolution of Attitude Differences over Forest Management." Environment and Behavior, 1973, 5(3):351-366.

DESCRIPTORS: attitudes, descriptive research, higher education, resource management education.

VARIABLES: Attitudes toward forests and forestry.

PURPOSE: Designed to see if major attitude dimensions could be developed and later related to perception of forest scenes.

SUBJECTS: 259 adults at California State University-Humboldt. Subjects were representative of students in forestry psychology, natural sciences, and general education, forestry professors, Sierra Club members, and forest managers.

RESEARCH DESIGN: A questionnaire containing 115 statements and utilizing a 9-point Likert Scale was administered. A correlation matrix for the total sample (generated by intercorrelating all statement responses) was subjected to factor analysis utilizing the Thurstone Centroid method. Using the factor scores, means and variances were determined for each of the subgroups.

RESULTS: Simple one-way analyses of variance tests were conducted to determine the significances of differences between subgroups. Three factors emerged: Factor A--forest industry practices and motives; Factor B--emotional and social values; and Factor C--clearcutting and forest dynamics. Reports and conclusions for each factor are listed in the text.

REFERENCES: 10 cited.

256. Wilson, R. J., and Audrey N. Tomera. "Enriching Traditional Biology with an Environmental Perspective." The Journal of Environmental Education, 1980, 12(1):8-12.

DESCRIPTORS: affective, attitudes, case studies, experimental research, issue-based, program evaluation, secondary, simulations.

VARIABLES: Units of taxonomic biology instruction supplemented with environmental case studies and simulations; attitudes related to environmental issues presented in the case studies and simulations.

PURPOSE: (1) to develop materials associated with the affective component of environmental literacy, (2) to incorporate them into a traditional biology curriculum, and (3) to test the attitudes of students resulting from the use of these materials.

SUBJECTS: 44 tenth grade students enrolled in two general biology courses. The two classes served as two distinct treatment groups. The

students' background was a mix of rural farming, rural mining and urban dwelling common to southern Illinois. Students were largely drawn from upper-lower and lower-middle socioeconomic classes.

**RESEARCH DESIGN:** The study consisted of two separate treatment phases, administered to the groups in a pre-post rotation design format. In Phase I of the experiment, the two groups served as either the treatment or control group. In Phase II, the experimental status of groups was reversed. In each treatment phase the treatment group was presented with one of two supplemental environmental case studies developed for use in this study. The case studies consisted of a three-day series of activities centering around an actual environmental problem, with materials constructed from periodical literature. Following each treatment phase, both groups were asked to complete two 18-item Likert scale-type attitude inventories. These instruments were developed by the researchers to assess the impact of the case study treatment. Construct validity procedures and test-retest reliability scores were reported.

**RESULTS:** Responses to the instruments were analyzed by using appropriate dependent and independent t-tests for differences between group means. Alpha level was set at .05. No significant differences between groups were exhibited on pretest measures. Following the first treatment phase, pretest to posttest results for the experimental group did not yield significant differences. These results did indicate a shift toward positive environmental attitudes. Also no significant differences were found between the two groups on Phase I posttest scores, and, following rotation, on Phase II pretest scores. Further, there was a significant difference found in Phase II pretest to posttest scores for the experimental group but not the control group. Again the attitude shift in the experimental group was in a positive environmental direction. Implications and recommendations were made.

**REFERENCES:** 4 cited.

257. Witmer, Jill F., and E. Scott Geller. "Facilitating Paper Recycling: Affects of Prompts, Raffles, and Contests." Journal of Applied Behavior Analysis, 1976, 9(3):315-322.

**DESCRIPTORS:** attitudes, behaviors, conservation education, experimental research, resource management education, values.

**INDEPENDENT VARIABLE:** Prompts raffles, and contests promoting paper recycling.

**DEPENDENT VARIABLE:** Pounds of paper delivered to the collection rooms.

**PURPOSE:** To determine the effects of prompts and reinforcement to promote paper recycling in university dormitories.

**SUBJECTS:** The residents of four male (N = 1,170) and of two female (N = 513) dormitories on the campus of Virginia Polytechnic Institute and State University, served as subjects. An organization on campus had

promoted paper recycling in all campus dorms for more than 16 months prior to the study, in the form of one poster on each dorm floor's bulletin board.

**RESEARCH DESIGN:** A pre-experimental design was used beginning with a two-week baseline measurement. For the next three weeks, two dorms received a prompt condition (flyer delivered to each room), two dorms received a raffle contingency (each person delivering one pound of paper to the recycling center would receive a raffle chance), and two dorms received a contest contingency (the dorm delivering the most paper to be paid \$15.00 for its treasury). Measurements were made on the pounds of paper turned into the recycling centers in each dorm involved. Reliability of these measurements was checked by the author, the largest discrepancy being 0.8 percent of the total weekly poundage.

**RESULTS:** The total quantity of paper delivered under each treatment was computed. Flyers alone had little effect on increasing paper recycling behaviors (147 pounds). The raffle (2,459 pounds) substantially increased and the contest (1,633 pounds) somewhat increased the amount of paper brought to the recycling center. Students whose rooms were closest to the collection center showed the greatest participation. Removal of the reinforcement contingencies resulted in a return to baseline levels. Weekly resident participation was calculated for each contingency. The raffle contingency reached a peak of 14.4 percent participation, 5.4 percent for the prompt dorms, and 9.9 percent for the contest dorms. The levels of significance were reported by the author.

**REFERENCES:** 12 cited.

258. Wohlwill, Joachim F., and Harry Heft. "A Comparative Study of Users' Attitudes towards Development and Facilities in Two Contrasting Recreation Areas." Journal of Leisure Research, 1977, 9(4):264-280.

**DESCRIPTORS:** descriptive research, environmental center, nonformal, outdoor education, preferences.

**VARIABLES:** Development of an area, users' attitudes toward development.

**HYPOTHESIS:** Attitudes toward development and provision of facilities will be more favorable among users of the highly developed areas.

**SUBJECTS:** All subjects were visitors to two state parks in the State of Pennsylvania. The parks were different in the amount of development and amenities provided to the visitors. In Study I (Campers), 110 campers took part in the main portion of the study and 45 during the replication studies. In Study II (Leasees), 111 visitors took part. Subjects were selected randomly. The age, sex, marital status, amount of formal education, income level and place of residence of each subject were determined.

**RESEARCH DESIGN:** A descriptive, on-site survey design was utilized on Study I. A questionnaire was used to establish: (1) background; (2) preference for facilities (Likert scale); and (3) civilism-wilderness scale (adaptation of Hendee's scale). A mail survey was utilized for Study II. The questionnaire used was an adaptation of the one used in Study I. No reliability or validity measures are reported.

**RESULTS:** In Study I (Campers), the preference ratings for facilities in two contrasting areas of development were compared by means of a paired t-test (2.62,  $p < .01$ ). Between campers, group differences in the civilism-wilderness index were analyzed by a paired t-test showing a significant difference between the two groups. Visitors to the least developed areas showed the strongest antidevelopment sentiment and the most wilderness orientation ( $t = 2.33$ ;  $p < .025$ ). In Study II, preferences for development among leasees of cabins in the same contrasting two parks, when analyzed with a paired t-test, showed a significant difference ( $t = 2.93$ ,  $p < .01$ ). The results of the wilderness-civilism scale showed a small significant difference among users ( $t = 2.32$ ,  $p < .05$ ). The two studies confirm the hypothesis.

**REFERENCES:** 10 cited.

259. Wood, Harold W., Jr. "Internships in Environmental Interpretation and Environmental Education." The Journal of Environmental Education, 1978, 9(3):18-28

**DESCRIPTORS:** affective, descriptive research, environmental centers, model building, formal, outdoor education, program evaluation, teaching preservice.

**VARIABLES:** University standards and mechanisms; sponsoring agencies; and internship participants.

**PURPOSE:** To explore: (1) an effective support mechanism which can be used by universities to encourage, sustain and academically reward students participating in internship programs, (2) the benefits that sponsoring agencies can derive from their participation in internship programs, and (3) how students can best obtain a meaningful educational experience through participation in an internship.

**SUBJECTS:** 43 professors, university internship administrators, agency supervisors and interns from American colleges and universities on the Pacific coast which offered internships in environmental education or interpretation.

**RESEARCH DESIGN:** An extensive literature research as well as surveys of existing curricula were undertaken. Observations of trends or patterns were noted. In addition, personal interviews were conducted with the sample group of interns using open-ended questions to obtain information on the knowledge base of the experience and on the affective component. A general model was then constructed for the roles of university, cooperating agency and interns.



**RESULTS:** The qualitative data reported indicated that the internship concept has proved valuable in both career exploration and professional development. However, a large variety of programs guidelines were found to exist. There also exists a broader range of types of internships that could be offered in addition to these in parks and recreation areas. Fifteen problem areas were identified and general internship guidelines were offered.

**REFERENCES:** 11 cited.

260. Wurzelbacher, Thelma Marie. "Population Education: Case Studies on the Implementation Process in Secondary Schools." Current Issues III, 1977, 55-74. ED 150 018.

**DESCRIPTORS:** case studies, descriptive research, interdisciplinary, population education, program implementation, secondary.

**VARIABLES:** Include five teachers at varying grade levels teaching different subjects.

**PURPOSE:** Exploration of the circumstances and events that occur when individual teachers recognize the need for population education and attempt to place population topics within traditional curriculum and schedules.

**SUBJECTS:** Five teachers selected from a group of teachers who had taken a course on population education in 1975, and were willing to implement population education in the next term in their schools. Teachers were ninth grade to adult level teachers in different cities within a 70-mile radius of the University of Michigan campuses in Dearborn and Detroit. Experience varied. Three teachers were men, two were women. Type of school, location, student body, and subject matter varied from school to school.

**RESEARCH DESIGN:** Four data sources were used to document the implementation process a pre-course survey, written and telephone logs, school site visits, and a final interview.

**RESULTS:** The two primary categories of implementation were related to classroom activities, or to nonclasswork, communication with others.

**REFERENCES:** 9 cited.

261. Young, R.A. "The Relationship between Information Levels and Environmental Approval: The Wilderness Issue." The Journal of Environmental Education, 1980, 11(3):25-30.

**DESCRIPTORS:** background, continuing education, descriptive research, issue awareness/knowledge of issues, resource management education, social background.

**VARIABLES:** Relationship between knowledge and attitudes concerning wilderness areas found in the U.S.

**PURPOSE:** To investigate the relationship between information levels and the degree of approval toward an environmental issue.

**SUBJECTS:** 870 telephone numbers were selected from the state of Illinois. The sample was a multi-stage cluster probability sample containing representatives from each of the SMSA's in the state. Of the 607 calls completed there was an 83 percent completion rate resulting in 503 completed interviews.

**RESEARCH DESIGN:** The data were collected in May 1977 by a telephone survey of adults in Illinois. Telephone numbers were selected from current directories, except Chicago where a random digit dialing process was used. To determine the respondents' informational level of an environmental issue, eight multiple-choice questions were developed. Eight Likert-type questions were used regarding wilderness management (Approval Scale).

**RESULTS:** All (item-total) correlations between the eight informational index questions and the total score were found to be significant ( $p < .05$ ). The same was true for the Approval Scale. The information level of wilderness was generally low but the vast majority of the public was favorable to the concept of wilderness. There existed a direct relationship between amount of knowledge of wilderness and approval of wilderness (chi-square = 30.846 with  $df = 4$ ,  $p < .001$ ). The relative importance of informational levels on wilderness approval was tested with a multiple regression analysis. The findings support Smith's early theory that the informational context or level was a major factor in influencing opinions on environmental issues. Five demographic variables were related to the informational index, education being the most important and age the least.

**REFERENCES:** 12 cited.

262. Zimmerman, Donald E. "Source of Conservation Education." The Journal of Environmental Education, 1972, 4(1):62-63.

**DESCRIPTORS:** attitudes, beliefs, descriptive research. issue awareness/knowledge of issues, knowledge.

**VARIABLES:** Attitudes, mass media, demographics.

**PURPOSE:** Sought to determine correlations between conservation attitudes and knowledge, demographics, and the use of conservation mass media.

**SUBJECTS:** 363 Kansas sportsmen, segregated into three subgroups: 149 picked randomly from the Kansas State Wildlife Federation roster (hereafter called Federation subjects), 192 picked randomly from the Kansas Fish and Game magazine mailing list (hereafter called magazine subjects), and 22 officers and former officers of the Kansas Wildlife Federation and other clubs (hereafter called officers). The total number of subjects represent 68.5 percent of an initial population pool of 532, divided among the three groups  $N = 250$ , 250, and 32, respectively.

**RESEARCH DESIGN:** Questionnaires were mailed to all subjects with return stamped self-addressed envelopes. The questionnaire consisted of 35 multiple-choice questions seeking to determine: (1) the mass media sources of conservation education (2) demographic characteristics, and (3) the subjects' conservation knowledge and attitudes. Mass media sources were scored by the following response categories: never, seldom, occasionally, often, always. Response categories to determine demographics were not reported. Conservation attitudes and knowledge were reflected by answers to questions on management practices. An original questionnaire was pretested by 39 subjects not in this study's population, and then refined into its final form. Neither validity nor reliability were reported.

**RESULTS:** All data were presented in narrative form, using percentage figures. The two top mass media sources of information, totaling response categories of occasionally, often, and always, were television (88.7 percent) and sporting magazines (83.0 percent). Conservation books scored lowest at 11.6 percent.

Demographic data revealed that most respondents were males, 18 years and older, with two or more children and annual income greater than \$5,000. Most had completed high school. A wide range of attitudes and knowledge was reported. Generally, magazine subjects were the most knowledgeable. To determine correlations between the variables, chi-square statistics were used. The author reported varying levels of confidence for the resultant comparisons, but did not specify what the comparisons were.

**REFERENCES:** 2 cited.

263. Zimmerman, Donald E., Clifford Scherer, and Mark Larson. "The Use of Conservation and Environmental Mass Media by Pennsylvania Educators." The Journal of Environmental Education, 1978, 10(2):43-48.

**DESCRIPTORS:** continuing education, descriptive research, nonformal, program evaluation.

**VARIABLES:** Extent and types of mass media used by environmental educators; group use differences between inexperienced and experienced environmental educators.

**PURPOSE:** To identify: (1) the types of mass media used, (2) types of special media used, (3) the use environmental educators make of Pennsylvania Game Commission information, (4) the levels of outdoor activities being used, (5) general characteristics environmental educators have in common, (6) the kind of job the Pennsylvania Game Commission is doing to reach the educators, and (7) what might be done to improve the agency's effort.

**SUBJECTS:** Two sets of environmental educators from Pennsylvania were used. 130 individuals who attended workshops in environmental education during the spring and summer of 1971, 1972 and 1973 and those who

attended workshops held by the Pennsylvania Game Commission in 1973 composed the first. The second group consisted of 250 working environmental coordinators in Pennsylvania's intermediate school units; 127 responded.

**RESEARCH DESIGN:** A questionnaire was adapted from research literature to survey the sample groups. Instrument reliability and validity were not discussed. The instrument included general categories: (1) specialized and general mass media use, (2) exposure to the Pennsylvania Game Commission's media efforts and personnel, and (3) background information of respondents.

**RESULTS:** The responses for each item were tallied percentages calculated, and a chi-square test made to see if there were any differences between the groups. The data indicated that there was no significant difference between the use of general mass media between the groups. However, coordinators (57 percent) tended to use specialized outdoor recreation and conservation television more than the workshop participants. In addition, a significant difference was found in the use of outdoor magazines. Coordinators had a 20 percent higher use rate.

In terms of the information produced by the Game Commission, significant use was made by those who subscribed and/or read the materials monthly. Coordinators indicated that 40 percent subscribed to the information and 44 percent read the publications. Educators in the workshops indicated use percentages of Commission literature of 21 percent and 31 percent. Data regarding the background information indicated three significant differences between groups: (1) more coordinators taught biology (79 percent), (2) more classes were taken to the outdoor area by the coordinators (44 percent), and (3) of the coordinators, 46 percent indicated having conservation-type clubs.

**REFERENCES:** 15 cited.

SUMMARIES - DISSERTATIONS

264. Alaimo, Samuel Joseph, Ph.D. A Study of Factors Influencing Value Preferences in Environmental Problems of Seventh through Twelfth Grade Students. State University of New York at Buffalo. Dissertation Abstracts, 1979, 39(9):5427-A. UMI 7905240; 196pp.

DESCRIPTORS: affective, instrument development, issue awareness/knowledge of issues, middle school, preferences, secondary, values.

Environmental and/or ecological degradation is becoming more serious as our style of living, demands on natural resources, and technological developments continue unabated. Teaching students about the environment and encouraging in them a life-long commitment to the basic values of society is one approach in attempting to solve this dilemma. The teaching of environmental education often involves value-laden issues. There is a need for developing affective measuring instruments to ascertain what environmental values students possess. The purpose of this study was to investigate factors influencing value preferences of junior and senior high school students with respect to environmental problems.

Among the factors investigated were students' grade level, sex, and self-perception of: environmental concern, chances of solving environmental problems, chances of personally helping to solve environmental problems, knowledge about environmental problems, and sources of environmental information (TV, science classes, magazines, parents, social studies classes, and newspapers).

In addition to assessing the above-mentioned "inner" variables, the Environmental Inventory (EI) instrument was composed of ten problems exemplifying environmental occurrences that result from man's actions. Each occurrence and its result was visually depicted on 33mm. slides. The problem-result statements on the slides corresponded to those in the students' test booklet. A situational question was followed by five value-oriented activities based on Spranger's value types of men (aesthetic, economic, political, social, and theoretical). All statements were read aloud and students were asked to select the one activity they preferred the most. Lastly, "cause" and "solution" statements concerning environmental problems were ranked by the students.

Data were collected from 615 students in grades seven through twelve who were currently enrolled in a science course, and 70 "nonscience" twelfth grade students who had not taken a science course since ninth grade. Multivariate analysis of variance was computed in order to determine if there were significant grade level effects on environmental values. Junior high students were found to have higher aesthetic and economic, and political value means. Senior high students had higher theoretical value means.

There was no significant effect of sex on environmental values. Comparing twelfth grade "science" students to "nonscience" students it was found that science students have higher theoretical value means

while nonscience students have higher aesthetic and economic value means.

Results from a multiple regression indicate that there is a significant effect between the criterion variables (aesthetic, political, social, and theoretical values) and the predictor "inner" variables. It was concluded that students in all grade levels perceive economic reasons as a primary "cause" of environmental occurrences. Considerations deemed important to environmental "solutions" were perceived differently by students in various grade levels. For example, economic "solutions" to environmental problems were preferred by seventh grade students; aesthetic (eighth grade); political (ninth and tenth grades); theoretical (eleventh and twelfth grades).

It appears from the results of this study that instruction on environmental topics could vary with the grade level and science-nonscience orientation of students. Some possible implications to instruction of these topics can be extrapolated. Teachers can enhance environmental education material by presenting lessons that are in agreement with students' values, thus attracting their interest. Conversely, they can create dissonance in the classroom by presenting lessons opposing students' environmental values in order to stimulate discussion.

265. Andren, Richard Johnson, Ed.D. The Use of a Problem-Solving Model in Environmental Education. Columbia University Teachers College. Dissertation Abstracts, 1979, 39(12):7263-A. UMI 7913179; 115pp.

DESCRIPTORS: higher education, instrument development, issue awareness/knowledge of issues, issue identification skills, model building.

Many environmental educators have cited the need for the development of problem-solving skills to aid in the understanding and solving of environmental problems. There is a profound lack of problem-solving models proposed that would sufficiently aid interested individuals in a thorough investigation of the causes of environmental problems, the interrelationships that exist among environmental problems and the nature of the solutions. Research that investigates the usefulness of those models is scarce. This study presents a model for problem solving which is applicable to a wide range of environmental problems as well as data that indicate this model's usefulness. This model consists of 21 questions grouped into six areas of problem identification, historical context, proposing and testing solutions.

This problem-solving model was tested for its effectiveness in increasing environmental awareness by counting the number of generalized statements that referred to interrelationships found in 89 investigative reports on local environmental problems written by students at Montgomery County Community College in Blue Bell, Pennsylvania. These students were enrolled in a one-semester

environmental awareness course. This course is part of the general education program at the college and it has no prerequisites. These reports were analyzed for items (key words or phrases) and categories (broad areas of environmental interest) in order to measure the breadth and detail of the investigations.

The results of this study showed that this problem-solving model significantly increased the number of categories discussed between the experimental and control group. An increase in the amount or detail (items) was also noted. The analysis of the content of these investigative reports showed that the experimental group discussed economics, law, transportation and population issues to a significantly greater extent than the control group. The categories with the greatest number of items associated with them were (in order of frequency) economics water pollution, land use, alternatives, government, health, waste water treatment and air pollution. Conspicuous by their lack of discussion were the categories of education, politics, planning and attitudes.

An analysis of the use of the model showed that the students had difficulty in using the parts of the model that dealt with the historical aspects of the problem as well as the testing of proposed solutions.

This study also includes an Environmental Awareness Questionnaire developed to measure the students' awareness of environmental interrelationships.

In conclusion, this model was useful in systematically focusing the students' attention to some of the necessary components of environmental problem solving. The study also indicated that greater emphasis should be placed on problem-solving concepts during class discussion.

266. Andrews, David Michael, Ed.D. The Interrelationships among the Cognitive, Affective, and Behavioral Domains in an Outdoor Environmental Education Program. University of Maine. Dissertation Abstracts, 1978, 39(6):3493-A. UMI 7822777; 159pp.

DESCRIPTORS: affective, attitudes, behaviors, cognitive, middle school, outdoor education.

Background: This study was undertaken to examine the relationships among the cognitive, affective, and behavioral domains in a six-week long series of outdoor activities concerned with investigating several ecological principles. The study took place from early September 1976 to the end of October 1976. The outdoor activities were adapted from those developed by project O.B.I.S. (Outdoor Biology Instructional Strategies) at the University of California at Berkeley under a National Science Foundation grant in 1973. Additionally, the study was concerned with the identification of factors which may influence subjects' attitude toward their natural environment, such as sex, socioeconomic status, previous outdoor experiences, and academic aptitude.



The research sample consisted of 58 sixth grade students (25 males, 33 females) under the leadership of one teacher in the town of Dover-Foxcroft, Maine.

Procedures: Data were obtained, at the beginning of the study, by the administration of a semantic differential instrument designed to measure student's attitudes, on four scales, toward numerous ecological concepts and a questionnaire determining previous outdoor experiences, parental educational level and occupation. A photographic technique was used as an unobtrusive means of determining levels of active student involvement in the activities.

At the termination of the study, a post-test form of the semantic differential was administered. Additionally, a survey of attitudes toward the activities adapted from a previous study was administered. Student academic aptitude percentage grades were collected from the classroom teacher during the study.

Results: The study centered on six research questions:

1. Was there a relationship between knowledge of the ecological concepts and involvement in the outdoor activities?

Pearson correlation analysis and one-way analysis of variance revealed no significant relationship between these two variables.

2. Was there a relationship between more positive attitudes toward the ecological concepts and involvement in the outdoor activities?

One-way analysis of variance revealed significant relationships between involvement scores and several semantic differential concept scores.

3. Was there a relationship between knowledge of the ecological principles stressed and positive attitudinal changes?

One-way analysis of variance indicated a significant relationship between knowledge scores and attitude scores on various scales for several semantic differential concepts.

4. Was there a relationship between classroom academic aptitude and more positive attitudes?

Pearson correlation analysis revealed a significant relationship between classroom academic aptitude and attitudes toward the ecological concepts.

5. Was there a relationship between socioeconomic level and attitude toward the ecological concepts?

Chi-square analysis revealed no significant relationship between socioeconomic level and attitude.

6. Was there a relationship between sex and level of involvement in the outdoor activities?

Chi-square analysis revealed no significant relationship between sex and level of involvement despite the finding that males were involved in more outdoor experiences than were females.

Further data analysis utilizing paired t-tests revealed numerous significant positive changes in attitude (pre-test to post-test) on the semantic differential scale concerned with excitement for numerous concepts.

Attitude toward those concepts concerned with direct observation of living plants and animals and mapping of the study site revealed greatest positive change more so than those concepts concerned with some form of quantitative manipulation such as population census.

Conclusions: There is an apparent relationship between involvement in outdoor environmental education activities and attitude toward concepts related to these activities. There is also some relationship between knowledge of environmental concepts and attitude toward those concepts. In both cases the attitudinal change is in a positive direction. There appears to be no relationship between sex and level of involvement or socioeconomic level and level of involvement. Those concepts concerned with direct observation of living things on a study site as well as mapping the study site seemed to reflect greatest positive attitudinal change.

267. Andrews, Dorothy Maud, Ed.D. Effect of a Values-Oriented Environmental Education Unit on the Attitudes of Preservice Teachers and on Their Students. Boston University School of Education. Dissertation Abstracts, 1979, 40(6):3216-A. UMI 7923845; 222pp.

DESCRIPTORS: attitudes, elementary, knowledge, teacher training preservice, values.

The purpose of this research study is to evaluate the change in attitude of preservice elementary teachers toward environmental concepts through instruction in a values-oriented environmental education unit and, also, to evaluate the change in attitude toward environmental concepts of pupils taught by these preservice teachers during their student teaching assignments. The null hypotheses are:

1. There will be no difference in preservice elementary teachers' attitudes toward the environment between a group of teachers receiving instruction in a values-oriented environmental education unit and a group of preservice elementary teachers who have not received this instruction.

2. There will be no difference in elementary pupils' attitudes toward the environment between a group of pupils taught by teachers who have received instruction in a values-oriented environmental education unit and a group of pupils taught by teachers who have not received this instruction.

The experimental design developed to test both these hypotheses is a Lindquist Type I design. The experiment can be summarized as a pretest-posttest control group design. To measure attitudinal change for the first hypothesis, Environmental Assessment Instrument I was developed. This included a semantic differential consisting of 16 environmental concepts and a 45-item cognitive test to measure attitudinal change. For the second hypothesis, Environmental Assessment Instrument II, a Likert-type instrument consisting of 10 environmental concepts was developed.

The population for the initial study consisted of 48 undergraduate junior students enrolled in the course The Learner and His Environment at Boston University School of Education. Prior to presenting the instruction, Environmental Assessment Instrument I was administered as a pretest. The experimental group received instruction in a values-oriented environmental education unit. At the conclusion of the instruction period Environmental Assessment Instrument I was administered to both groups as a posttest.

Nine preservice teachers and 131 students participated in the follow-up study. Prior to instruction Environmental Assessment Instrument II was administered to all pupils as a pretest. After presenting a mini-environmental unit to their pupils, Environmental Assessment Instrument II was administered as a posttest.

Data from the semantic differential were analyzed by an analysis of covariance which showed there was a significant difference ( $p = .05$ ) in attitude toward 9 of the 16 concepts as a result of the values-oriented environmental education unit. An analysis of covariance on the data from the cognitive test showed a significant difference ( $p = .0001$ ) in knowledge of ecological facts and principles in the experimental group.

In the follow-up study the posttest scores on Environmental Assessment Instrument II for both the control and experimental groups were analyzed using an analysis of variance.

The following conclusions may be drawn from the results of this study:

The attitudes of preservice teachers toward environmental concepts changed significantly as a result of instruction in a values-oriented environmental education unit.

The cognitive knowledge of ecological facts and principles of preservice elementary teachers increased significantly as a result of instruction in a values-oriented environmental education unit.

Preservice elementary teachers who have received instruction in a values-oriented environmental education unit are able to elicit a positive attitude toward the environment in their pupils.

positive attitude toward the environment in their pupils.

268. Babcock, William A., Ph.D. Environmental Pollution Coverage in Newsweek from 1969 through 1975. Southern Illinois University at Carbondale. Dissertation Abstracts, 1980, 41(2):444-A. UMI 8017410; 127pp.

DESCRIPTORS: citizenship, descriptive research, issue awareness/knowledge of issues, nonformal.

This study examines the relationship between the nature and frequency of the media coverage of environmental pollution when compared with the public's concern regarding environmental pollution, the reported quality of the environment and with federal obligations and outlays for pollution control and abatement.

To study this relationship, indices were obtained on the public's concern over pollution; the reported quality of the environment as measured by air, water, and soil pollution; and on governmental obligations and expenditures for pollution control and abatement.

Four specific hypotheses were posed. These hypotheses posited that no correlations would be found between the news coverage of environmental pollution and public opinion regarding environmental pollution, reported environmental quality, and federal outlays and expenditures for pollution control and abatement. Kendall's tau was used to test the hypotheses.

To examine these hypotheses, a content analysis was conducted on every third edition of Newsweek magazine each year from 1969 to 1975. The sample of 126 Newsweek editions yielded 217 items (stories, columns, shorts, letters, etc.) which contained 143 air pollution mentions, 128 water pollution mentions, and 97 soil pollution mentions. The largest number of pollution items was found in 1970 (57 items) and the fewest items (9 items) in 1969.

Of the pollution items mentioned in Newsweek from 1969 through 1975, air pollution accounted for between 33.4 percent and 41.5 percent of coverage, water pollution between 32.4 percent and 39.7 percent, and soil pollution between 26.2 percent and 27.8 percent of the coverage.

In testing for the hypotheses it was found that: (1) Newsweek's coverage of environmental pollution was uncorrelated at the .05 level with the public's concern of pollution; (2) Newsweek's coverage of air pollution, water pollution, soil pollution, and total pollution was uncorrelated (at the .05 level) respectively with the reported air quality, water quality, soil quality, and mean environmental quality; (3) Newsweek's coverage of air, soil, and total pollution was uncorrelated respectively with federal obligations for control and abatement of air, soil, and total pollution. But, the correlation between Newsweek's coverage of water pollution and federal obligations for control and abatement of water pollution was correlated at the .05 level (tau = -.87), indicating that as Newsweek's coverage of water

pollution decreased, federal obligations for water pollution control and abatement increased; (4) Newsweek's coverage of environmental pollution was uncorrelated with federal outlays for pollution control and abatement.

Thus, the results of this study indicate that Newsweek is not a good barometer of the public's concern regarding environmental pollution, the reported quality of the environment, or of federal obligations and outlays for pollution control and abatement.

269. Baca, Ted Paul, Ph.D. A Study of the Environmental Attitudes of Four Different Age Groups. University of Oregon. Dissertation Abstracts, 1977, 37(12):7555-A. UMI 77-13,182; 122pp.

DESCRIPTORS: attitudes, citizen action, issue awareness/knowledge of issues, nonformal, resource management education.

The purpose of the study was to measure the environmental attitudes of a population stratified into four age groups in order to establish: (1) level of environmental concern based on age, and (2) how other select demographic factors influence the environmentally conscious individual.

A valid and reliable five-point Likert scaled attitude questionnaire was developed to collect the data. The 37-item questionnaire was developed around the areas of: (1) population control, (2) air pollution, (3) general pollution, (4) enforcement, (5) personal action, (6) conservation of natural resources, (7) wildlife protection, and (8) recycling.

The finished questionnaire was administered to 190 subjects during the winter quarter of 1976. The sample population was drawn by means of the stratified constant sampling technique from the community of Barstow, California. A somewhat similar number of subjects were selected from the following age groups: (1) a 14-16 year old group, (2) an 18-25 year old group, (3) a 40-59 year old group, and (4) a 60 and above group.

Attitude scores were analyzed by one-way analysis of variance when sample means were compared. Multiple regression analysis was employed to study the single and combined effects of independent variables--age, sex of respondent, ethnic background and socioeconomic status--on environmental attitude scores.

An overall mean score of 134.58 and a standard deviation of 16.02 were derived for all respondents. Such findings indicated that two-thirds of all subjects fell between the scores of 150.60 and 118.56 ( $M + SD$ ). Since a neutral score on the Likert-scaled instrument was 111.00, it was concluded that the vast majority of participants held attitudes supportive of their environment. When the variables--age, sex of respondent, ethnic background and socioeconomic status--were examined for their effect on each respondent's total attitude score, only sex of respondent produced significant variance. A multiple correlation ( $R$ ) of .24 was produced for all four variables. The coefficient of multiple determination based on  $R^2 = .059$  showed a 6 percent explained variance

in environmental attitudes. However, sex of respondent accounted for 5.5 percent of that total. By employing analysis of variance it was further established that females were significantly more supportive of their environment than males.

As a supplement to the investigation, multiple regression analysis was also applied to each of eight environmental areas in order to determine how each was affected by the independent variables examined in the general study. General pollution, personal action and natural resources were all significantly affected by the single variable, sex of respondent. Multiple correlations of .15, .21, and .23 were obtained for each respective area. Likewise, coefficients of multiple determination based on  $R^2 = .023, .045, \text{ and } .043$  accounted for 2 percent, 5 percent and 4 percent of the explained variance in each respective area.

Enforcement and recycling were affected by the combined action of age and sex of respondent with significance occurring in both cases. Multiple correlations of .23 and .16 were obtained for each successive area. Coefficients of multiple determination accounted for 5 percent and 3 percent of the explained variance in each successive area.

Population control was significantly affected by age, sex of respondent, and socioeconomic status. The three variables produced an  $R$  coefficient of .240. The  $R^2$  coefficient was .056, indicating the three variables showed a 6 percent explained variance.

Wildlife protection was significantly affected by the action of socioeconomic status. The single variable produced an  $R$  coefficient of .170. An  $R^2$  coefficient of .028 showed a 3 percent explained variance.

270. Batty, Barbara Dawn, Ph.D. The Effects of Advance Organizers on the Learning of the Students in the Study of Oceanography in Eighth Grade Earth Science Classes in an Inner City School. The University of Texas at Austin. Dissertation Abstracts, 1979, 39(11):6671-A. UMI 7910930; 259pp.

DESCRIPTORS: cognitive, experimental research, knowledge, marine education, middle school.

The purpose of the study was to investigate the effects of a treatment involving the use of advance organizers with earth science students in an inner city school. As a part of this study, advance organizers were developed for a unit in oceanography.

The investigation consisted of four weeks of instruction for 95 eighth grade students in four intact, basic classes who usually score below the 20th percentile on the McGraw-Hill Comprehensive Test of Basic Skills. There were two teachers for these four classes. Each teacher had one experimental class and one control class.

Four hypotheses were generated and tested by a Pathways' Oceanography Criterion Test using a two-by-two factorial nonequivalent control group

design. The total design was an incorporation of two designs; Campbell and Stanley's Design 9, a nonrandomized control group pretest-posttest design and the subsequent analysis of data of the pretest-posttest scores using Design 8, a Simple Factorial Design in which comparisons were made by analysis of variance. The means of the posttest scores of the Pathways' Oceanography Criterion Test of the control groups and the experimental groups were used to determine significant differences for the main effects of the treatment, the class membership, and the effects of treatment-by-teacher interaction. The significance level was established at 0.05.

The data indicated that there was no significant difference in the pretest scores of the experimental and control groups as established by a t-Test of independent means. Subsequent analysis of the posttest scores indicated that there was no significant difference detected in the experimental and control groups, nor was there any significant difference in the effects of treatment-by-teacher interaction. There was a significant difference in class membership which the experimenter felt resulted from extenuating circumstances. Due to these extenuating circumstances occurring in one teacher's class, further statistical analyses were made using a t-Test of correlated means to determine if there was a significant gain in posttest scores over pretest scores in both teachers' classes. The results indicated that learning had taken place at the 0.001 level of significance in both teachers' classes.

As a result of the statistical analysis, these conclusions were drawn from this study. Students given advance organizers did not reflect any greater facility in learning the concepts of oceanography over those not receiving the advance organizers in the control group. Students in one teacher's classes scored higher than students in the other teacher's classes. The posttest scores when compared with their pretest scores indicated that the students had significantly learned the concepts of oceanography in all teachers' classes.

In addition, after the planned experiment was over, the two teachers have continued to use sections of the advance organizer materials in their classes. It is the recommendation of those replicating this study that the pattern of the advance organizers' use should be established before the experiment is begun.

271. Becker, Lenere Marcia, Ed.D. The Effect of the Resident Outdoor Experience on Attitudinal Change Toward Environmental Issues. University of Northern Colorado. Dissertation Abstracts, 1978, 38(8):4566-A. UMI 7730797; 92pp.

DESCRIPTORS: attitudes, experimental research, issue awareness/knowledge of issues, middle school, outdoor classroom, outdoor education.

Statement of the Problem: The problem of this study was to determine if there was significant change in attitudes of sixth grade students toward environmental issues as a result of participation in the resident outdoor school experience in addition to the classroom experience in

Santa Cruz County, California as compared to a change in attitudes of sixth grade students toward environmental issues as a result of the classroom experience only.

Procedure: The subjects consisted of 360 sixth grade students selected in a stratified random sampling from the public schools of Santa Cruz County, California. This population was divided into a control group and an experimental group of 180 subjects each. While the control group received normal classroom instruction, the experimental group received normal classroom instruction and participated in the one-week resident outdoor school experience. Each group was pretested on environmental attitudes and then posttested to determine change. The instrument used was a semantic differential. Analysis of covariance was applied to the pretest and posttest. Five concept blocks were considered: environment, interdependence, conservation of natural resources, pollution, and human impact on the environment. The level of significance for the investigation was at the 0.05 level.

Findings: Adjusted posttest mean scores indicated that the experimental group exhibited a significantly greater change of attitude in a positive direction at the 0.05 level toward environmental issues than did the control group in two of the five concept areas: conservation of natural resources and impact on the environment. There was no significant difference in change of attitude observed in the concept areas of environment, interdependence, or pollution.

There was no statistically significant difference in attitudinal change of the girls in the experimental group and the girls in the control group for any of the five concept blocks.

There was significant difference in the attitudinal change of the boys in the experimental group as compared to that of the boys in the control group in two concept areas: pollution and human impact on the environment. However, there was no significant difference in attitudinal change relative to the concept areas: environment, interdependence, and conservation of natural resources.

The adjusted posttest mean scores revealed that within the experimental group there was no significant difference in attitudinal change between the boys and the girls for any of the five concept blocks.

Conclusions: This investigation of the effects of the resident outdoor program on attitudinal change toward environmental issues, as based upon statistical evidence, resulted in the following conclusions: The resident outdoor experience, as a supplement to the regular classroom instruction, is more effective in improving attitudes toward environmental concerns than the regular classroom instruction without the resident outdoor experience in the areas of conservation of natural resources and human impact on the environment. There was no significant difference shown in the concept areas of environment, interdependence, or pollution. Although not statistically significant there was observable change in these areas based on mean and median raw scores.

Recommendations: The following recommendations, based on the findings



within the limitations of this study and upon the experience gained by the investigator during this study, are as follows:

1. The resident outdoor school experience should be part of the regular school curriculum, and be considered for various grade levels.
2. Educational experiences in a variety of outdoor settings, including community settings, be provided to increase environmental awareness.
3. Since the resident outdoor experience did affect attitudinal change toward conservation and human impact on the environment, adequate funding should be provided to ensure that this experience be available to all children.
4. Further study should be made as to the permanence of attitudinal change that occurs as a result of the resident outdoor experience.
5. Further study should investigate the particular kinds of curricular patterns and instructional methods that affect attitudinal change toward environmental issues.
6. Further study should investigate developing more sensitive instruments to detect changes in attitudes relative to environmental concerns.
7. Further study should be pursued relative to outdoor experiences in metropolitan settings and their effect on attitudinal change toward environmental issues.

272. Biswas, Susanta Kumar, Ph.D. Value Orientations, Life Styles, and Preferences in Urban Environments: An Empirical Analysis. The Florida State University. Dissertation Abstracts, 1977, 38(5):3101-A. UMI 77:24,739; 351pp.

DESCRIPTORS: descriptive research, nonformal, preferences, urban, values.

This study examined the assumption, as derived from Michelson's "intersystem congruence model," that people's urban environmental preferences and the relative importance that they place on various aspects of the urban environment are systematically related to their value orientations and life styles. Six dimensions of the urban environment, each including one or more environmental attributes; two life styles, living and shopping styles; and three value orientations--family centrism, instrumentalism, and privacy--were investigated. A random sample of 329 young, married, child-rearing, middle-class, white female residents of Tallahassee was used. The study of such a restricted group allowed control for at least partially, any possible effects of race, sex, life cycle stage, and socioeconomic status.

Mail questionnaires were used to collect data on the respondents' values, life styles, and preferences within the dimensions and on the

relative importance that they place on the environmental attributes included in this study. Based on these data, the respondents were dichotomized in each value orientation and life style. Two four-way factorial designs and analysis of variance and chi-square statistical techniques were employed to examine group differences in preferences. Spearman rank correlation coefficients were computed and analyzed and tests about the difference of two proportions were used to determine group differences in the relative importance that the respondents placed on the environmental attributes.

Each of the values and life styles was found to be relevant to environmental preferences. High family-centered people desired larger common spaces in dwellings, larger lot sizes, and greater proximity to children's play areas than did low family-centered people. Those who valued convenience highly desired greater proximity to various facilities than did those who valued convenience less. High privacy-oriented people desired larger dwellings and lot sizes, fewer of their neighbors similar to them with respect to their ethnic background and life cycle stage, and to live on secluded streets more than did those with low privacy value. People with a local living style, i.e., those who usually live close to various urban services and facilities wanted greater proximity to different facilities than did those with a cosmopolitan living style. And people who were cosmopolitan in their use of stores were less inclined to desire the large concentrated type of shopping facility and more inclined to prefer shopping facilities of various types and sizes in their community than were those with local shopping habits.

These findings show that people's preferences in the urban environment are likely to differ systematically according to differences in their values and life styles. It also appears from the observed, significant interaction effects that whether or not people with dissimilar orientations to a value or a life style would have different preferences depends partially on one or more of their other values and life styles. Furthermore, the combination of a given condition on each of two or more value orientations and life styles is likely to represent a significant social characteristic with respect to environmental preferences.

The findings of this study, however, only partially support the assumption that the relative importance that people place on various aspects of the urban environment is systematically related to their values and life styles. Respondents with dissimilar values and life styles placed different importance on only certain aspects of the environment.

Nonetheless, it is apparent from the findings that values and life styles are relevant to the man-made environment. Particular qualities and patterns of the man-made environment are congruent with some values and life styles, while they are incongruent with others.

273. Bohl, Walter Benson, Ph.D. A Survey of Cognitive and Affective Components of Selected Environmentally Related Attitudes of Tenth and Twelfth Grade Students in Six Midwestern, Four Southwestern,

and Twelve Plains and Mountains States. The Ohio State University. Dissertation Abstracts, 1977, 37(8):4717-A. UMI 77-2352; 297pp.

DESCRIPTORS: affective, attitudes, cognitive, descriptive research, secondary.

This study was the second part of a three-part national environmental assessment. The purpose of this study was to measure cognitive and affective environmental information among tenth and twelfth grade students. The sample of over 15,000 students was drawn so that population distribution in each state was accurately reflected. The environmental inventory was administered by classroom teachers in over 270 schools in 22 states of the Midwestern, Southwestern, and Plains and Mountain regions of the United States.

Three separate 40-item inventories were developed involving environmental facts, concepts, principles, beliefs, and perceptions. The responses were tabulated; response frequencies were compared with those resulting from the other two parallel studies. A Chi-square analysis was made on the basis of sex, grade level, size of home and school communities, and state of residence. Correlational and factor analyses were also made on the data.

The results showed that in all cases the response frequencies of this study were within 2 percent of those from the other two counterparts of this study confirming nationwide consistency. The 0.0001 level was considered statistically significant for the Chi-square analysis, since the sampled population was so large. Sex was found to be a statistically significant factor on about one-half of the inventory items on each form. Grade level was found to be a statistically significant variable on about one-fourth of the inventory items. The size of home and school communities and the state of residence were found to be statistically significant variables on about one-fourth of the inventory items. Correlation analyses identified three subpopulations: (1) A small number of students possessing a high amount of cognitive information and positive attitudes, (2) a majority of students possessing a low amount of cognitive information and positive attitudes, and (3) a small number of students possessing a low amount of cognitive information and negative attitudes or no opinion responses. Although all three forms of the inventories were composed of basically different questions, all three inventories factored similarly. The most prominent factor identified incorrect cognitive responses with negative or no opinion affective responses.

This study indicates that the average high school student possesses a limited amount of cognitive environmental information. The attitudes possessed by high school students could be termed "learned responses" since the correlation between these attitude responses and cognitive information was very low. Therefore, these attitude responses should not be considered firm beliefs on the part of the student.

274. Botinelli, Charles Adrian, Ed.D. The Efficacy of Population/Resources/Environment Simulation Games and Traditional Teaching Strategies: Short- and Long-Term Cognitive and Affective Retention. University of Colorado at Boulder. Dissertation Abstracts, 1980, 41(4):151C-A. UMI 8021551; 213pp.

DESCRIPTORS: affective, cognitive, experimental research, games, instrument development, lecture, simulations.

This study was designed to ascertain the efficacy of three environmental simulation games in comparison with the traditional lecture-discussion teaching method. Short- and long-term retention effects were measured for the cognitive and affective domains for each simulation game group and the lecture-discussion group (control).

Approximately 720 students from 24 science and social studies classes in three Denver high schools participated in the study during the 1976-77 academic year. Intact classes were randomly assigned to four treatment groups in which the primary teaching strategy of a three-day environmental unit was as follows: (1) The Planet Management Game (PM); (2) Baldicer (B); (3) Population (P); (4) Lecture-Discussion (C).

The underlying hypothesis was that environmental simulation games are effective teaching strategies in that they teach environmental concepts and foster positive environmental attitudes at least as well as the lecture-discussion method. Further, it was believed that the use of environmental simulation games would result in greater retention of concepts and positive attitudes than the lecture-discussion method.

Three instruments were developed to test the hypotheses: (1) The Population/Resources/Environment Test (PRET): To assess immediate and long-term cognitive learning, (2) The Population/Resources/Environment Attitude Questionnaire (PREAQ): To measure immediate and long-term affective learning, (3) The Personal Inventory (PI): To yield an unobtrusive measure of socioeconomic status (SES).

Following three days of treatment, each group completed the three instruments to determine immediate cognitive and affective effects. Approximately 45 days later, the PRET and the PREAQ were readministered to assess long-term retention.

Multiple analyses of variance and covariance, using students' total scores on the Iowa Test of Basic Skills as the covariate, were performed on the PREAQ and PRET data, respectively, within 4 x 6 x 2 x 2 mixed designs.

The Student-Newman-Keuls multiple comparisons technique was used to identify differences among treatment group means after significance was detected at the .10 alpha level.

Analyses of dependent variable data indicated that students who participated in the lecture-discussion group fared significantly better on the immediate PRET and PREAQ than those participating in simulation game treatments ( $p < .10$ ). No significant cognitive retention differences were revealed among treatments ( $p < .10$ ). However, there

was a significant difference favoring the P group in the realm of affective retention ( $p < .10$ ).

It was concluded that environmental simulation games may not be as effective in teaching environmental concepts or in forming immediate positive attitudes as the traditional lecture-discussion method. However, environmental simulation games may act as a foundation from which more positive environmental attitudes can evolve and be retained for longer periods of time.

On the basis of this investigation, it is recommended that environmental simulation games be utilized occasionally in conjunction with traditional strategies to foster the growth of positive environmental attitudes and to provide enjoyable changes-of-pace in the classroom routine.

The three major implications of this study are: (a) levels of inference can be defined more precisely; (b) levels of inference responses are a function of the operational levels of the students; and (c) operational words are an effective strategy for signaling operations.

275. Buttel, Frederick Howard, Ph.D. Class Conflict, Environmental Conflict, and the Environmental Movement: The Social Bases of Mass Environmental Beliefs, 1968-1974. The University of Wisconsin-Madison. Dissertation Abstracts, 1976, 36(8):5556-A. UMI 75-23,835; 416pp.

DESCRIPTORS: attitudes, beliefs, economic background, educational background, historical research, issue awareness/knowledge of issues, social background.

This study is an analysis of the major theoretical-methodological approaches in the sociology of natural resources and environmental problems and an empirical study of mass environmental beliefs. The theoretical analysis is cast in "order-pluralist-functionalist" versus "conflict-coercion-class" terms. This analysis indicates the theoretical-methodological controversies of general sociology are alive and well in the sociology of natural resources and environmental problems, with variants of the order approach dominating the existing literature.

Selected order analyses of the environmental movement and environmental attitudes are then critically examined. Significant lacunae in the order approach are noted, along with suggestions as to how a conflict perspective may provide greater analytical leverage on the research problems of this inquiry.

The social bases of support for the environmental movement during the 1968 to 1974 period are then examined with statewide Wisconsin sample survey data. This analysis corroborates previous empirical research indicating a rapid rise-and-fall cycle of pro-environmental beliefs and a broadening of the social bases of support during the peak of movement

support (at or around Earth Day, 1970). This provides the backdrop for a theoretical-empirical inquiry into the social class and political interests embodied in various measures of "environmental concern," and a factor analysis supports this multidimensional conceptualization. Subsequent analysis is based on summated Likert scales derived from these factor analysis operations.

The study then turns to a reconsideration of the middle class pro-environmentalism generalization. These relationships are found to be less pervasive than generally assumed in the literature. There is no multivariate relation between any social class indicator and awareness of environmental problems, and education has only a small net effect on support for environmental reform when age and size of place of residence are held constant.

Political party identification proved to be unrelated to all dimensions of environmental beliefs, although there were substantial relationships of political liberalism with support for environmental reform--especially among the white-collar middle class. These relationships were predicted and interpreted from a conflict perspective on dominant class political ideologies and the nature of the American political party structure.

Subsequent analysis finds the working class pro-economic growth generalization as inappropriate as the one regarding working class anti-environmentalism. Support for economic growth is found to covary with other indices of ideological incorporation into the society, suggesting support for economic growth is part of a larger congeries of system-legitimizing ideas. Support for economic growth proved to have little net impact on working class environmental beliefs, while there was a moderately low effect of support for economic growth on middle class environmental attitudes. Mass media exposure was found to have a significant negative effect on support for economic growth among the working class. These findings are suggestive of political-economic elites' efforts to "de-mobilize" the environmental movement and its threats to economic expansion and the profitability of corporate production. The remaining empirical portion of the study consists of estimating the impacts of the environmental movement's mobilization of awareness of environmental problems on selected indicators of critical political-economic ideologies.

276. Calcote, William Jennings, Ed.D. Teacher Perceptions of Environmental Education Concepts in Programs of Biological Science Instruction in Secondary Schools. Auburn University. Dissertation Abstracts, 1977, 37(7):4260-A. UMI 77-1040; 181pp.

DESCRIPTORS: cognitive, preferences, science education, secondary, teacher training inservice, teacher training preservice.

The purpose of this study was to make an analysis of teacher perceptions of 54 selected environmental education concepts in the programs of biological science instruction in selected high schools. Sixty-four teachers of biology from 28 high schools participated in the study.

An environmental education concept opinionnaire and a teacher questionnaire were employed to gather data for the study. The concept opinionnaire was utilized to ascertain perceptions of biology teachers concerning the selected environmental education concepts, which were contained in four major groups of statements. An analysis of the concept opinionnaire data indicated that the Group 1, Biophysical Concepts, received the highest percentage of responses in the four response categories, and the Group 2, Sociocultural Concepts received the lowest percentage of responses in the response categories. The teacher questionnaire was used to collect data pertaining to the status of environmental education in the high school curricula and the preservice and inservice preparation of biology teachers for teaching environmental education concepts. An analysis of the teacher questionnaire data revealed that although only one of the participating high schools had a program in environmental education, all of the 64 biology teachers had at least one training experience in environmental education.

Multiple regression was employed to account for variation in the concept opinionnaire data. The regression analyses indicated that the interaction sources accounted for most of the variation in the concept opinionnaire data. Five interaction sources were listed as most frequently accounting for the variation in the opinionnaire data. These sources were participation in workshops and conferences and teaching experience; inservice and preservice training; participation in workshops and conferences and membership in organizations; participation in workshops and conferences and educational preparation; and membership in organizations and teaching experience.

277. Case, Charles Conrad, Ed.D. The Effects of a Model Environmental Education Program on the Environmental Knowledge and Attitudes of Sixth Grade Students in Selected Seventh-Day Adventist Schools of New England. Boston University School of Education. Dissertation Abstracts, 40(6):3081-A. UMI 7923852; 275pp.

DESCRIPTORS: attitudes, instrument development, knowledge, middle school, multidisciplinary-infusion, outdoor education.

The purpose of this study was to determine the effect of an eight-week environmental education curriculum integrated into the regular school curriculum and a resident field experience on the environmental knowledge and attitudes of sixth grade students in the selected Seventh-day Adventist schools. The 93 students with the 17 teachers were randomly selected and assigned to three groups, two experimental and one control.

Experimental group A was treated with the integrated curriculum for five weeks, one week of resident field experience, and an additional two weeks of the integrated curriculum. Experimental group B was treated with only the integrated curriculum for eight weeks. Control group C had no environmental curriculum activities.

To evaluate the effects of the environmental program on the environmental knowledge and attitudes of the students, a pre- and posttest were given the first and tenth weeks of school respectively. The Case Environmental Knowledge Test (CEKT) was constructed to measure environmental knowledge. The CEKT contains 30 multiple choice questions divided into 6 subcategories: (1) 7 science; (2) 7 environmental; (3) 4 mathematical; (4) 4 art; (5) 4 social studies; and (6) 4 health. The Millward-Ginter Outdoor Attitude Inventory (MGOAI) was used to measure environmental attitude. The MGOAI is divided into four subcategories: (1) 16 environmental; (2) 8 educational; (3) 10 pollution; and (4) 9 socialization.

An inservice program was conducted for the five teachers in experimental group A and the four teachers in experimental group B. The curriculum used consisted of 64 activities, one activity per week for each of the school subjects taught in the sixth grade. The teachers in experimental group A were also instructed about the activities in the resident field experience.

At the conclusion of the study, the students and teachers filled out a response sheet expressing their views about the strengths and weaknesses of the study.

#### Conclusions:

1. There was a significant difference between experimental groups A and B on the knowledge test in favor of experimental group B.
2. There was no significant difference between experimental group A and control group C on the knowledge test.
3. There was a significant difference between experimental group B and control group C on the environmental knowledge test in favor of experimental group B.
4. There was no significant difference between experimental groups A and B on the environmental attitude inventory.
5. There was a significant difference between experimental group A and control group C on the environmental attitude inventory in favor of control group C.
6. There was no significant difference between experimental group B and control group C on the environmental attitude inventory.

Recommendations: As a result of this study, it was recommended that:

1. An inservice training workshop should be developed to instruct teachers in methods of teaching environmental education to students on all grade levels. This workshop should include a section dealing with values and attitudes in the outdoors, and values clarification.
2. Further research should be conducted in preparing environmental education activities and integrating them into the classroom.
3. Additional study using techniques of item analysis should be used for assessing the reliability and validity of the Case Environmental Knowledge Test. Continued study should also be concerned with the development of normative data pertaining to differences associated with sex and geographic location.



4. An environmental attitude test to measure outdoor attitudes of students taught with an integrated school curriculum should be developed.
5. Further studies should be performed on environmental knowledge and attitudes of students in the Seventh-day Adventist schools using intact classrooms with the same numbers of students.

278. Childress, Ronald Barry, Ed.D. An Analysis of Environmental Education Program and Project Curricula in Selected Public Elementary and Secondary Schools of the United States. The University of Tennessee. Dissertation Abstracts, 1976, 36(8):4984-A. UMI 76-1929; 258pp.

DESCRIPTORS: descriptive research, elementary, formal, middle school, program evaluation, secondary.

The purpose of this study was to identify, describe and analyze five general categories of curricular characteristics of a selected national sample of public school elementary and secondary environmental education program and project curricula. Specific elements of the study included identification and analysis of selected components and aspects of public school program and project curricula, including grade level participation, program justification and objectives, processes utilized in content selection, curriculum organization, instructional strategies and sources of instructional materials, staff organization and utilization procedures, evaluation methodologies, and constraints to curriculum development.

Additional comparisons were made to determine if there were significant differences among: (1) the sociocultural environments of the student populations served and the justification, objectives, sources of instructional materials and the instructional strategies of public school environmental education program and project curricula; (2) the justifications, curricular organization, instructional strategies and staff utilization and organization of public school environmental education program and project curricula; (3) the sources of financial support and the justification, curricular organization, instructional strategies, and staff utilization and organization of public school environmental education program and project curricula; and (4) in the constraints to curriculum development as perceived by the study population and the sociocultural orientation, source of funding, and program type by grade level grouping in public school environmental education program and project curricula.

The study population was comprised of a national sample of 536 directors and coordinators of public school elementary, secondary and combined environmental education programs and projects. Study participants were geographically distributed throughout all 50 states and the District of Columbia.

A comprehensive review of the literature on environmental education available after 1970 revealed a massive proliferation of literature, but a definite paucity in the amount of research within the field. The major research effort aimed at assessing the status of environmental

education on a national scale was carried out by the Research Division of the National Education Association for the National Park Service, United States Department of Interior, in 1969-70. A major outcome of the study was the conclusion that there was no general type of environmental education program in existence in the public schools.

The primary methodology utilized in this study was a direct-mail questionnaire which was administered to a selected national sample of public school environmental education program and project directors and coordinators. Questionnaire results were analyzed with respect to the criterion variables of socioecultural environments of the participating students, grade levels involved, and sources of funding for the public school programs and projects included in the study sample. More than 64 percent of the 536 questionnaires administered were accounted for. Of these, 301 were returned in such condition to be deemed usable responses. Geographically, only three states (Nevada, North Dakota, and South Dakota) were not represented by valid responses in the data analysis.

The study unveiled several noteworthy findings. Grade level involvement in public school environmental education programs is greatest in grades five, six, ten, eleven and twelve, and least at the kindergarten level. "Educational," "Ecological," and "Conservationist" justifications exert major influences in the development of total program and project justifications in the majority of cases, however, total justifications generally evolve from a combination of influences exerted by many justifications.

Program and project objectives were focused more on acquiring knowledge and developing appreciations, than on helping students solve environmental problems and develop problem-solving skills. Teachers working in a given program or project were found to have the primary involvement in content selection, while student interest, the personal and social needs of the students, teacher interest, and local environmental problems and concerns were the factors exerting the most influence on the selection of curriculum content.

Multidisciplinary and interdisciplinary organizations were reported by the majority of programs and projects. Biology and Geology were found to be content and subject matter sources in the largest number of programs. Materials developed by the teaching staff constituted the major source of instructional materials in the greatest number of programs and projects, while small group projects, class discussions, and field trip/community resource visits were the most often used instructional strategies.

No one dominating staff utilization and organization pattern was identifiable in the participating programs and projects. Concerning evaluation methodologies and procedures, most programs indicated they were evaluated primarily by internal program personnel and that a wide variety of specific evaluation strategies was utilized in student evaluation. Highest ranking constraints to curriculum development were inadequate funding at all levels and lack of time to develop curricula.

Significant differences were found to exist in the justification, instructional strategies, and staff utilization and organization procedures among elementary, secondary and combined public school environmental education programs and projects. Additionally, significant differences were found to exist relative to the disciplines or subjects used as sources of content and subject matter in elementary, secondary and combined approaches.

279. Chitwood, Juanita Carson, Ed.D. The Relationship between Environmental Knowledge, Environmental Attitudes, and Locus of Control in Selected Youth Conservation Camp Enrollees. Temple University. Dissertation Abstracts, 1977, 38(4):2025-A. UMI 77-21,757; 173pp.

DESCRIPTORS: attitudes, knowledge, locus of control, nonformal, outdoor education.

The purpose of this study was to determine the relationship that exists, if any, between environmental knowledge, environmental attitudes, and locus of control in enrollees attending four Youth Conservation Camps. The following questions were to be studied: (1) Would there be a change in environmental knowledge at the end of the YCC camps? (2) Would there be a change in environmental attitudes at the end of the YCC camps? (3) Would there be a change in locus of control scores at the end of the YCC camps? (4) Were there relationships among scores on the environmental knowledge test, the locus of control test, and the test for environmental attitude?

Fifty-eight YCC enrollees were used in this study. They were pretested during the first week of an 8-week session on the following variables: locus of control, environmental knowledge, and environmental attitudes. Locus of control was measured by the Rotter Internal-External Scale; environmental knowledge by the Environmental Knowledge and Opinion Survey (EKOS) knowledge subtest; and environmental attitudes by the EKOS attitude subtest and a Q sort developed by the researcher and a colleague at Temple University.

Subjects took the posttests using all of the instruments listed above during the last week of the camp session. Although work projects at each camp varied, the YCC programs at each camp were to meet the objective of developing and understanding and appreciation in participating youths of the nation's environment and heritage.

Statistical tests performed on the data show that there was a significant change in environmental knowledge, as measured by the EKOS knowledge subtest, and in environmental attitudes, as measured by the EKOS attitude subtest. Both changes were in the positive direction and were significant at the .05 level of significance. Statistically significant differences in locus of control scores and Q sort scores were not found.

Numerous statistically significant correlations were found among scores of the dependent variables. The EKOS knowledge subtest scores were

found to be highly correlated with those of both attitude instruments and the attitude instruments were highly correlated.

Differences in scores between male and female enrollees were small. Male enrollees appear to show a greater change in environmental information and females showed a more positive attitude on the pretest.

Recommendations included: (1) A more effective recruitment program for YCC enrollees; (2) Better methods of camp evaluation for environmental knowledge and attitude; (3) More input in work projects by the YCC enrollees; (4) A follow-up program for YCC graduates so that those youngsters can use this experience to positively influence others.

280. Clinard, Lillian Austin, Ph.D. The Testing of a Home Economics Energy Conservation Curriculum Guide. The University of Tennessee. Dissertation Abstracts, 1978, 38(9):5299-A. UMI 7801989; 208pp.

DESCRIPTORS: energy education, experimental research, program development, program evaluation, secondary.

This research study provided for the testing of a high school home economics curriculum guide for energy conservation, Energy Conservation in the Home. The evaluation of the guide included both internal evaluation by the development team and field testing.

The field test was conducted with the cooperation of the Tennessee State Board of Education in high school home economics programs with 129 teachers and their intact groups of students participating. The Solomon Four-Group Design was employed as a research model for testing the effects of utilizing the curriculum guide on student opinion and knowledge. The independent t-Test, correlated t-Test, analysis of covariance, and two-way ANOVA comprised the statistical analysis. Group mean scores for knowledge and opinion of 2411 students comprising 107 groups were used as data for the statistical analyses.

Two treatments designated A and B were administered. Treatment A consisted of two levels: the utilization of the guide to teach energy conservation in secondary home economics, and the lack of the use of the guide. The presence of pre- and posttesting, and the presence of posttesting only, constituted Treatment B levels. The treatments were randomly assigned.

The four experimental groups consisted of (1) subject groups who had use of the guide and were posttested only; (2) subject groups who had use of the guide and were pre- and posttested; (3) subject groups who had no use of the guide and were posttested only; and (4) subject groups who had no use of the guide and were pre- and posttested. Immediately preceding the field test, the pretested groups were administered Opinion and Knowledge Evaluations developed by the researcher. All the groups were posttested with the Opinion and Knowledge Evaluations.

Eight sections of the guide (3, House: The Shell; 4, Environmental Control; 5, Housing Selection; 6, Food; 7, Clothing; 8, Personal Care;

9, Entertainment; and 10, Improving Energy Conservation in the Home) were tested independently. Teachers were given their choice of sections for field testing.

The statistical analysis indicated that Section 6, Food, had a significant effect at the .05 level on both knowledge and opinion; Section 7, Clothing, on opinion; and Section 8, Personal Care, on knowledge. However, the remaining sections of the guide tested afforded no significant effects on either knowledge or opinion. The effects of pretesting were significant at the .05 level only for Section 6, Food, on knowledge.

In addition, participating teachers who were given the guide were asked to complete a Guide Evaluation Form. The results of the Guide Evaluation Forms indicated that the majority of teachers participating in the study rated the guide above average in terms of usefulness and effectiveness.

The guide was refined in response to the evaluation prior to final printing. The revised guide was then distributed nationally for replication and dissemination.

281. Collins, Bobby McManus, Ed.D. Preparation of a Textbook "Elements of Forestry" for Use in Secondary Schools. Duke University. Dissertation Abstracts, 1980, 41(2):615-A. UMI 8017138; 254pp.

DESCRIPTORS: descriptive research, formal, program development, resource management education, secondary.

Part I of this dissertation describes the steps taken in preparation of a textbook entitled "Elements of Forestry." Part II is a manuscript for a book designed for a course that constitutes a form of general education but also is a general introduction for those who continue studies in forestry.

The possibility of existence of such a book was explored, with a negative finding. It was learned that in 1935 Dr. Joseph Illick produced a book reprinted in 1939 that served as a general textbook for many years but was considered to need replacement because of many advances in the technology of forestry. The author found himself in an advantageous position to prepare a replacement for there are schools of forestry nearby at Duke University and at N.C. State University, with the Forestry Sciences Laboratory of the U.S. Forest Service located midway, containing professionals willing to make suggestions and technically criticize his written statements.

Forestry is truly a profession, but its technical content today has the aspect of being a conglomerate of a wide assortment of disciplines and fields of activity. The task therefore included choosing a topical sequence suited to the mental development stage and educational preparation of a ninth-grade student, that grade appearing to be the most advantageous in which to offer such a course.

A total of 480 literature items were examined for useful content and the likely ones were read. Initially 33 possible chapter topics were identified. Many of these were rejected or merged with others. The final manuscript has 15 chapters. The chapters fall into somewhat of a chronological order and start with prehistory, and progress through stages of mankind's development to the most recent innovations in forestry. Much use is made of pictures. Minimum preparation in the sciences is assumed. However subject matter on botany, zoology, chemistry, geometry, and trigonometry (which the teacher might explain) is included. This serves as general education and should help make these fields seem less formidable and of possible interest for further study. The book also touches upon economics, world geography and commerce, and the use of metric units in forestry measurements.

In school year 1978-79 the author, a former biology teacher, taught a course for 28 ninth graders of average IQ who originally had opted for a course in agriculture. This was conducted to try out mimeographed first drafts of 12 of the ultimate 15 chapters; to experiment with field trips to view logging, silviculture, and sawmill operations; to note student reactions to films supplied by government agencies and wood-products firms; and to have students perform some of the activities described in the book. Thus, material was gathered for a possible teacher's manual. Weekly and quarterly tests were given. Every effort was made to have the manuscript be didactically arranged, its content be as linearly cumulative as possible, structured to promote concept development, stimulative to interest in the subject, and informative of cross-relationships with other disciplines and fields of practice.

The book describes forests here and abroad; major tree species; forest composition, usage and conservation; tree growth, measurement and harvesting; damage by insects, diseases, weather, catastrophes, animals and fire; recreational uses; environmental relationships; and possible use of trees as collectors of solar energy. Its preface gives credit to a number of foresters by name for information and constructive criticism, and to people in government agencies and forest product industries for pictures, interviews, and demonstrations of equipment and facilities. The final chapter reviews forestry services available to owners of farms and woodsteads.

282. Czarnecki, Jonathan Edward, Ph.D. Citizen Participation in Water Quality Planning: Survey Evidence. State University of New York at Buffalo. Dissertation Abstracts, 1980, 40(9):5179-A. UMI 8005651; 208pp.

DESCRIPTORS: citizen action, citizenship, model building, nonformal, pre-experimental, resource management education.

The purpose of this thesis is to investigate why people decide to participate in water quality planning. Until now, political scientists and policy practitioners have relied on the findings of electoral participation research in interpreting trends in citizen participation. This thesis uses relevant models of political participation to develop a

framework for empirical investigation; of special importance is the so-called Socioeconomic status model of political participation.

The data in the study are from a survey of peoples' beliefs, attitudes and behaviors concerning water quality along the Erie-Niagara region of New York state. This region has been designated by the federal government as a special planning area for areawide water quality management planning under Section 208 of the Federal Water Pollution Control Act Amendments of 1972. Methodologies used in this thesis include both descriptive and inferential statistics, as deemed appropriate by the nature of the data. Special care has been used in ascertaining the reliability and criterion validity of measures used in the analysis; this care reflects caution in exploring a heretofore untrammled area of political research.

The findings indicate that, in specific setting of water quality planning, self interest and perception of water quality problems as they impact on individuals assume great significance in explaining and predicting the willingness of people to engage in water quality planning participation. Further, socioeconomic influences are not as strong as indicated in the Socioeconomic status model of participation. This leads to the conclusion that in the case of water quality planning in Western New York, a different set of explanations for participation behavior may be required than the set conventionally used by political scientists. The thesis concludes with recommendations for future research, especially with respect to the inclusion of behavioral participation measures to better test the proposed theory.

283. Dalton, Edward A., Ed.D. Energy and Man's Environment: Its Impact on Educators in Seven Western States. Brigham Young University. Dissertation Abstracts, 1979, 40(1):80-A. UMI 7916537; 141pp.

DESCRIPTORS: energy education, formal, program evaluation, teacher training inservice.

The purpose of this study was to determine if educational impacts had occurred on educators, mainly teachers and administrators, as a consequence of their participation in an EME workshop between 1974 and 1977. An effort was also made to determine the value of EME services, the nature of EME materials, limiting factors in energy concept incorporation and changes in education caused by energy problems.

It was found that numerous impacts had occurred on teachers, administrators, and students as a result of EME efforts. EME materials were also described and found to be highly valued, widely accepted, and used. Limiting factors were identified and changes in education caused by energy problems predicted.

The study indicated that Energy and Man's Environment's efforts are justified and successful. The combination of quality materials and inservice training will result in implementation and incorporation of energy concepts into a teacher's program of instruction or an administrator's program of work,

284. Davidson, Michael Samuel, Ed.D. Identification of Objectives for Secondary School Population Education Programs in the United States. Columbia University Teachers College. Dissertation Abstracts, 1976, 36(8):3857-B. UMI 76-3248; 227pp.

DESCRIPTORS: cognitive, instrument development, population education, program development, secondary.

The purpose of the study was to identify cognitive objectives for secondary school population education programs in the United States. It included identifying an ultimate objective (the objective toward which all others are directed), intermediate objectives (directed toward the ultimate objective but subsidiary to it) and immediate objectives (content).

The procedure required several steps: developing a preliminary population education survey instrument; selecting population education experts; interviewing five experts to improve the preliminary instrument; revising the preliminary instrument; conducting a pilot study with the revised instrument; making additional refinements and sending the final instrument to 59 experts.

The final instrument requested personal information from the experts as well as their comments on an ultimate objective (The student should have the capability to make intelligent and rational decisions relating to population matters) assumed to have consensus. Respondents were also asked to indicate their agreement or disagreement with each of the following intermediate objectives:

The student should have a basic knowledge of demography.

The student should be able to examine his or her role as a population actor (fertility, migration and mortality) in own family.

The student should be able to examine his or her role as a population actor in society and world.

The student should be able to examine his or her survival and the quality of life as a function of the population characteristics and processes of others.

Also, respondents had the option to add intermediate objectives they considered Definitely Essential.

In addition, the experts rated a series of immediate objectives, grouped by intermediate objective and behavioral category, e.g., Define, Describe, Analyze, etc., on a one (Definitely Essential) to five (Definitely Not Essential) plus No Opinion scale, and could add immediate objectives considered Definitely Essential.



Personal data revealed that the typical expert was male, expert in sociology or demography, worked in a four-year college or university, spent 21 to 40 percent of time on population education in the past year, began working in the field during 1969-71, was interested primarily in the senior high school and focused his work in curriculum or materials development.

Comments on the ultimate objective indicated little disagreement. Also, there was almost unanimous agreement on the four intermediate objectives.

Two hundred and two immediate objectives were rated. 61 were rated Definitely Essential, 105 as Probably Essential, and 36 as Not Essential. Twenty-eight immediate objectives considered Definitely Essential were added by the experts.

Ratings of immediate objectives by behavioral categories indicated items in Define and Describe classification were rated similarly (1.94 and 1.97) while items in Analyze were rated less highly (2.24).

For the Definitely Essential items, a rank order of intermediate objectives, IV, III, I, and II, was significant at the .05 level. Similar high significance did not occur with the Probably Essential items or a combination of the Definitely and Probably Essential items. Furthermore, it was noted that a particular subset of items, those relating to methods of birth control, received particularly poor ratings.

The major recommendations of the study were that the objectives identified should be used to set up guidelines for the cognitive aspects of secondary school programs in the United States and that these objectives should be used in a coordinated program approach in which teachers with different specialties would deal with the different intermediate objectives. Also, a program coordinator should be used to plan the program and hold seminars to synthesize, evaluate, and draw conclusions about the intermediate objectives.

285. Deluca, Donald Richard. Ph.D. Community Response to Environmental Problems and Related Social Issues. Cornell University. Dissertation Abstracts, 1977, 37(10):6764-A. UMI 77-8420; 358pp.

DESCRIPTORS: citizenship, descriptive research, economic background, nonformal, social background.

This research sets out to identify community social, demographic, economic and political characteristics which have important effects on community level environmental problems, responses to those problems, and the size of social issues associated with them. The objective is to develop a causal model to explain variation in the environmental problems of land-use and water pollution.

To accomplish this, a basic exploratory model is formulated which provides a social structural framework for analyzing the proposed relationships. The theoretical arguments which produced the basic exploratory model are made explicit in the statement of propositions and research hypotheses. Environmental problems, communities' responses to them, and the size of social issues related to such problems are postulated to be positively related to the social structural complexity and the level of aggregate resources of communities. Specifically, it is hypothesized that highly differentiated, well linked, politically fluid communities that are larger, richer, and contain residents with higher levels of socioeconomic status will have the following: (1) increased land-use and water pollution problems, (2) increased capacities to respond to these problems, and (3) larger social issues surrounding these environmental problems.

In order to conduct the investigation, a lagged cross-sectional research design is adopted. This design allows multivariate analyses of a large number of cases so that the hypotheses derived from the model can be empirically tested.

The upstate New York portion of the Hudson River region is the setting for the research. In order to allow contrasts and comparisons between large urban areas and small towns, 132 communities were sampled consisting of 25 cities and 107 towns. Some of the towns are suburban and others are rural. Both primary and secondary data were gathered. Operationalized measures of each concept specified by the basic exploratory model are constructed from these data.

Analyses of the empirical relationships among the variables suggested by the basic exploratory model are performed by subjecting the data to a series of statistical tests. The three analysis techniques employed are all derived from the general linear model. First, product moment correlation analysis is used to determine the nature of the bivariate relationships among all of the indicators of the concepts in the model. Second, multiple regression analysis is used to assess the partial contribution that each independent variable makes toward explaining the variance of the dependent variables. Third, path analysis is used to determine the direction and strength of the "causal paths," and the direct and indirect effects of the independent variables on the dependent variables of the theoretical model.

Major results of these analyses can be summarized as follows: (1) Of the 168 bivariate relationships examined representing the subcomponent hypotheses of the nine propositions in the basic exploratory model, nearly two-thirds of the correlations are significant and in the direction predicted. (2) Using multiple regression equations, four measures of physical environmental conditions are examined and their social determinants evaluated. Although the most important variable changed a little, commercial differentiation most consistently dominates the macrosocial structural variables, and population size is the most important

aggregate community resource. (3) Community response to land-use and water pollution problems is increased by commercial differentiation and population size. Median family income greatly increases in importance when population size is taken out of the equation. (4) None of the predicted determinants of land-use and water issues are very strong; most are not significant at the .1 level. Special crosstabulations show that communities that have very high land-use problems tend to ignore them. (5) Path analysis is utilized as an interpretative technique for examining the basic exploratory model as a whole. Four path models are evaluated. The pattern of effects is similar across all four models. Except for the weak relationships to the issue variables, the model is generally supported.

286. Dispoto, Raymond G., Ed.D. Socio-Moral Valuing and Environmental Activity, Emotionality, and Knowledge. Rutgers University, The State University of New Jersey. Dissertation Abstracts, 1976, 36(7):4380-A. UMI 76-1108; 175pp.

DESCRIPTORS: behaviors, citizen action, higher education, knowledge, moral development, values.

Cognitive-developmental socio-moral reasoning or valuing has been shown to associate with actions, attitudes, and knowledge regarding social, moral, and political issues. Prior to this inquiry, no one had attempted to determine if moral valuing was related to a values-laden socio-scientific issue such as the environment.

It was postulated that the state of environmental quality is primarily a social matter of basic values rather than science and technology. This investigation was conducted to explore hypothesized relationships among moral valuing (a la Kohlberg) and environmental activity, emotionality, and knowledge.

The variables were measured in 140 undergraduates at Rutgers University with standardized objective tests and a biographical questionnaire. The major technique of data analysis was simple and partial correlation. Where two correlating variables also correlated with academic ability (College Board score), ability was statistically controlled for by partial correlation to see if the residual relationship was still significant. The results of data analyses were deemed significant if they at least satisfied the .05 level of confidence. In addition to viewing the subjects as an intact total sample, they were divided into science and humanities subgroups for separate analyses. Both principled and conventional morality scores were computed for each subject.

Moral reasoning showed varying degrees of relationships with environmental variables for the different groupings of subjects. Partial correlation revealed that scholastic aptitude was responsible for the apparent associations between moral reasoning and environmental variables as far as the intact sample was concerned. However, when the sample was grouped into science and

humanities majors, environmental/morality relationships appeared among humanities majors which were not masked by academic ability. No important environmental/morality associations were observed for science majors.

On the basis of these inconsistent, composite, cross-group findings, it was concluded that cognitive-developmental socio-moral reasoning or valuing is related to actions, emotions, and knowledge in the area of environmental science.

Somewhat more consistent results were obtained between the environmental variables across the various groupings of students, even with the influence of academic ability removed. College students, regardless of their grouping, were more emotionally involved with the environment than knowledgeable; and more knowledgeable than active. Humanities majors were as concerned about the environment as science majors, but science majors knew and did more about it. Environmental emotions, knowledge, and actions were all interrelated.

This investigation confirmed the importance of cognition in cognitive-developmental moral valuing, but its affective component requires additional research clarification. An empirical foundation was established which might encourage departments of science education to direct their research efforts toward an instructional paradigm of total human development by conducting complementary Piagetian (cognitive) and Kohlbergian (affective) studies.

287. Dresser, Harry Holland, Jr., Ed.D. An Investigation of Differences in School Organizational Climate and Other Selected Variables and the Implementation of a Marine Education Infusion Curriculum. University of Maine. Dissertation Abstract 1980, 40(19):5387-A; UMI 8009255; 124pp.

DESCRIPTORS: elementary, formal, marine education, multidisciplinary-infusion, program implementation.

This study attempted to identify any differences which might exist in a number of variables among schools which accepted, rejected, or made exploratory use of an introduced innovative marine education curriculum. The innovative curriculum material consisted of one instructional unit each for grades K-8. Each of the units had an aquatic, or marine, focus and each was an infusion unit. That is, it was intended to provide classroom teachers with exercises and activities related to marine or aquatic topics for use in teaching in their standard grade-level disciplines.

The selected variables for this study were percentage of male teachers on a school staff; percentage of teachers by age categories on a school staff; percentage of teachers with academic preparation in mathematics, science, and social studies on a school staff; school pupil-to-teacher ratio; school total number of professional

staff members; community per pupil expenditure; community socioeconomic status; and the number of highway miles from the community to the marine environment. Organizational Climate Description Questionnaire (OCDQ) (Halpin, 1969) openness scores, the eight subtest scores, and school climate type by Halpin and Croft's prototypic categories were also considered.

Principals of 64 Maine elementary schools provided some of the necessary demographic data, and administered the OCDQ to their teachers following prescribed guidelines to ensure anonymity. At the same time, marine education infusion units produced by the directors and staff of the Northern New England Marine Education Project were distributed through the principals to the teachers of the schools. At the end of a six-week study period, the principals provided data on the use made of the marine education infusion units by the teachers in their schools. From this reported use, the schools were categorized into accepting schools, rejecting schools, and schools which made exploratory use of the introduced innovative material.

The variables of teacher preparation in mathematics and teacher preparation in science were found to be significant variables at, or beyond, the .05 level of significance by a one-way analysis of variance. Schools with higher percentages of teachers with academic preparation in mathematics and science were more likely to explore or accept the innovative marine education material than were schools with lower percentages of such teachers.

T-tests showed highway miles from the marine environment and percentage of upper white collar workers in the community to be significant variables among accepting, rejecting, and exploring schools.

The data clearly showed that teachers perceived the introduced marine education material as math/science oriented and as addressing saltwater topics only. Neither of these perceptions is congruent with the design intent of the marine education infusion units.

The findings clearly show that if marine educators wish to address both aquatic and marine topics in a multidisciplinary manner, they will have to make their intentions clear to the educators they hope to serve.

288. Dunn, James Ralph, Ph.D. The Development, Testing, and Validation of a Programmed Unit on Ecology. University of Southern Mississippi. Dissertation Abstracts, 1979, 40(3):1385-A. UMI 7919691; 169pp.

DESCRIPTORS: ecology education, higher education, instrument development, marine education, program development, program evaluation.

The purpose of this project was to develop, test, and validate a self-paced instructional unit on ecological concepts, especially those related to the marine environment. The programmed unit on ecology was developed for use by nonscience majors.

A 54-question, multiple-choice examination was developed as a pretest/posttest to determine the programmed unit's effectiveness in teaching areas of ecology covered by the educational objectives. The examination was reviewed by a panel of eight ecologists for content validity, and changes were made to the examination based on recommendations of the panel.

The examination was administered to 35 students at the University of Southern Mississippi as a preliminary tryout before use as a pretest/posttest. Preliminary reliability of the examination was determined.

The pretest was administered to 62 experimental students at the University of Southern Mississippi. Students were then issued the programmed unit on ecology. Most students completed the unit within five hours. Students were not permitted to remove the programmed unit from class until after they had completed work on the unit. After all students completed work on the unit, they were administered the posttest.

Analysis of examination scores yielded the following results:

1. Level of effectiveness of the programmed unit:  $p < .001$ .
2. Mean score on pretest: 26.612.
3. Mean score on posttest: 45.661.
4. TESTAT reliability, preliminary tryout: .6652.
5. TESTAT reliability, pretest: .8394.
6. TESTAT reliability, posttest: .8501.

Results obtained from an item analysis of posttest scores are as follows:

1. Item difficulties were: high, .98; low, .11; average, .85.
2. Item discrimination indices were: high, .500; low, .126; average, .309.

Conclusion: A programmed unit on ecology with emphasis on the marine environment was developed, tested, and validated. The unit was effective in causing cognitive gain in students in areas of ecology covered by the stated objectives. Favorable comments by a validation panel pertaining to the testing instrument, high reliability, established content validity, and higher posttest scores than pretest scores in all cases among students working through the unit provided strong evidence to support the effectiveness of the unit.

289. Dyar, Nancy Alice, Ph.D. Assessing the Environmental Attitudes and Behaviors of a Seventh Grade School Population.

University of California, Berkeley. Dissertation Abstracts,  
1976, 37(1):111-A. UMI 76-15,167; 190pp.

DESCRIPTORS: attitudes, behaviors, economic background, educational background, instrument development, middle school, social background.

The purposes of this research were: (1) to develop an instrument to assess the attitudes and behaviors of seventh graders concerning aspects of the environment, environmental problems, and possible solutions; (2) to describe and attempt to explain differences, if any, in these attitudes and behaviors based on variation in place of residence, sex, scholastic ability, and socioeconomic status; (3) to evaluate the efficacy of the instrument for generating student involvement in environmental education topics; and (4) to make recommendations for future environmental education curriculum development and revision.

Nine indices were developed as the result of three pilot studies of 100 students each, statistical analysis, including factor analysis of responses, interviews with seventh graders and feedback from experts in environmental sciences and education. Index 1, Environmental Problem Salience, is concerned with the importance respondents attribute to environmental problems compared with other socio-political problems. Index 2, Wilderness Evaluation, assesses the evaluative perceptions of the concept "wilderness" using semantic differential techniques. Index 3, City Evaluation, similarly assesses evaluative perceptions of the concept "city." Index 4, Nature Experience, is a self-report measure of the frequency of experiences in nature. Index 5, Environmental Action, is a self-report measure of the frequency with which students have taken action to improve environmental quality. Index 6, Nature Clubs, assesses the membership in formal nature organizations. Index 7, Forced Choice Nature Attitudes, examines students' preferences for natural experiences and natural environments. Index 8, Forced Choice Environmental Action Attitudes, examines students' willingness to act regarding environmental problems. Index 9, Beliefs About Environmental Problems Solutions uses Likert-type items regarding environmental problems. Index 9, Beliefs About Environmental Problems Solutions, uses Likert-type items regarding environmental problems. Index 9, Beliefs About Environmental Problems Solutions, uses Likert-type items both internally consistent (Cronbach's  $\alpha$  .68-.92) and stable (seven day, test-retest .73-.94). The internal consistency of the entire instrument was .70, indicating both cohesiveness and heterogeneity of the components.

The instrument was administered to 637 seventh graders who varied by residence (rural, suburban, urban), scholastic ability (high, middle, low), socioeconomic status (middle, low), and sex. Four-way analysis of variance and Scheffe post hoc comparisons were conducted to yield the following results:

1. Residence is significantly associated with variation in scores for all environmental indices. Except for Index 3, rural students are most concerned and active, urban students least so.
2. Within the urban sample there is more variability in results related to ability, SES, and sex than in the rural and suburban samples, especially for Indices 2, 4, and 7 concerning attitudes about and actions in natural environments.
3. Though not as predominant an effect as residence, ability is related to variation in environmental awareness, with high and middle ability students being more concerned or active. There is some evidence that ability affects belief about solving environmental problems through locus of control.
4. The effect of SES on the variability in scores is slight.
5. Few consistent differences are reported between boys and girls on the environmental indices, although it appears low ability urban females most often score lowest and high ability rural males score highest on these indices.
6. Students generally evaluate wilderness favorably.
7. Index 3, City Evaluation, is a measure distinctive from the others; urban students score highest and the association of this index with the others is low.

A so-called "access" model was derived from the results. This model suggests that the greater the exposure to "relatively clean environments, the more access, both physical and social, to such environments, and the more confident the student is of his or her ability to effect change in the environment, the more environmentally concerned and active the student will be.

The instrument itself proved a successful means of stimulating student involvement in environmental issues. By examining their responses, comparing them with their classmates, and discussing the outcomes and their significance, students were able to discover discrepancies between their attitudes and their actions, as well as to learn about factors relating to the present and future quality of environments and human existence.

Recommendations for environmental education curricula based on the study include: creating experience-based programs for raising the general level of consciousness and action regarding environmental problems; giving more attention to urban and low ability students; focusing outdoor education for urban students both within and outside the urban environment; providing environmental action experiences where success is evident; increasing use of affective measures to evaluate outcomes of environmental education programs.

290. Eyers, Vivian George, Ph.D. Environmental Knowledge and Beliefs among Grade 10 Students in Australia. Oregon State



University. Dissertation Abstracts, 1976, 36(19):6626-A. UMI 76-7747; 152pp. (Also listed as ERIC ED 115 481.)

DESCRIPTORS: beliefs, instrument development, issue awareness/knowledge of issues, knowledge, secondary.

The purpose of the study was to survey aspects of environmental knowledge and beliefs among Grade 10 students in Australia, in the belief that such information would be useful for workers in the developing field of environmental education there.

A survey instrument prepared and used for a similar purpose in the USA was used in the study after adaptation to suit the Australian situation. The new instrument contained 40 items in two areas called "knowledge" and "beliefs." One of the 30 items in the knowledge section was designed to trace the major source of student information about the environment while one of the 10 belief items concerned perceived local problems. Best responses were identified for each of the 29 multiple choice knowledge items, while a selected panel of environmentalists and educators provided a common reference point for the nine remaining belief items, so that a composite attitude measure could be obtained. This reference point was that of an attitude favoring the preservation of homo sapiens.

In modifying the original instrument, the SMOG grading was used to ensure that the readability of the final instrument was at the Grade 10 level.

From a two-stage sampling method in which the first stage (secondary schools) was drawn with a probability proportional to size, 174 schools were asked to each provide 30 students who would complete the instrument. Within each of the six Australian states, all school types (Government, Catholic and Independent) were represented in the proportion of their Grade 10 populations.

The collected student responses were analyzed by standard computer programs, with comparisons being made with respect to the independent variables of state of residence, school type, region (metropolitan or not), sex and membership of a self-identified group derived from responses to the "major source of environmental knowledge" item.

For item-by-item comparisons, chi-square measures were used to investigate hypotheses that the frequency of correct knowledge responses, or of agree-with-panel belief responses was the same for each group within the independently variable sample populations. In an attempt to avoid spurious significances, and to emphasize practical differences, a confidence level of 0.001 was chosen.

Analysis of variance procedures were applied to the means of total knowledge and total attitude scores. The same confidence level was used again.

Findings: Of the 174 schools approached, 160 or 92 percent replied positively, providing the responses of 4,821 students.

A general examination of the responses revealed a number of areas of knowledge inadequacy. The composite attitude displayed was one which could be regarded as supportive of measures designed to preserve the species homo sapiens. Responses to several items suggested that such positive and general attitudes might not be stable when individual conveniences or freedoms were threatened.

On an item-by-item basis, most differences in response were associated with state of residence, with sex and with membership of one of the self-identified "source of knowledge" groups.

When total scores were considered, differences in the knowledge section were associated with sex and "source of knowledge." Males gave superior responses to those from females in this section. In the attitude section, differences were associated with school type, region and with knowledge source, but not with sex.

Responses to the "source of information" item indicate that as far as these students are concerned, schools are not yet providing them with special environmental education courses which supply the major component of their knowledge about environmental matters. On the other hand, the very positive response of the schools to the study is taken as an indicator that Australian secondary schools have a high degree of interest in gaining information which could be useful to them in future environmental education programming.

291. Foerstel, Dietrich Klaus Erhard, Ed.D. An Analysis of the Congruence among Students, Parents, Teachers and Environmentalists as Related to Their Perception of and Solutions to Environmental Problems. The University of Tennessee. Dissertation Abstracts, 1976, 37(5):2600-A. UMI 76-24,830; 319pp.

DESCRIPTORS: citizenship, descriptive research, issue awareness/knowledge of issues, issue identification skills, knowledge.

This study was designed to analyze the congruence of perceptions of and solutions to environmental problems as perceived by respondents from the Knox County and Knoxville areas in Tennessee. This study was restricted to high school seniors, their parents, some of their teachers -- and also members of the Sierra Club and National Audubon Society. The total sample was composed of 1,043, of whom 714, or 68.3 percent, responded.

A questionnaire was designed to determine the perception of respondents in regards to: (a) awareness of selected pollution problems in the community; (b) effectiveness of possible approaches to solutions to environmental problems; (c) effectiveness of possible change agents to solutions to environmental problems; (d) effectiveness of possible constraints to solutions to environmental

problems, and (e) importance of educational effects as solutions change agents and constraints to solutions to environmental problems. The questionnaire was validated for clarity and content by a panel of experts and administered to the study population. Results were analyzed in two distinct ways: (1) Between-item analyses--to determine the effectiveness of the items under consideration. (2) Inter-group analyses--to determine the congruence of response among the study groups for each item under consideration. All responses were analyzed with respect to a number of demographic variables, such as, age, sex, sociocultural background, family income, educational background and environmental attitude and concern of the respondents.

The greatest environmental problem in the study area was "water pollution," closely followed by "solid waste" and "air" pollution. "Erosion" was the least problematic in the study area. In all, only one major ranking inconsistency was noted; despite this, little congruence in ranking was found among the four study groups.

The unanimous choice as most effective "short-term solution" was "Enforcement of existing legislation," with "Public education and information through media" the clear-cut second choice. Little congruence was found among the responses of the four study groups with half of the items reaching at least the .05 level of confidence (chi square analyses).

The most effective "long-term corrective approaches" were "long-range cooperation environmental planning" and "environmental-related research and development" and again little congruence among the responses of the four groups was found. Significant differences in responses were found among 13 of 16 items.

The most effective "change agents" were "long-term planning" and "major crisis" and responses provided by the four groups indicated clearly that little congruence in ranking the 11 items was found.

The major "constraints" to solving environmental problems were "public apathy" and "lack of willingness to pay cost of clean environment" with congruence in responses in only one of 16 items.

"Public information and education through the media" and "public school programs" were rated moderately effective as "short-term" and "long-term" solutions and as "change agents" but were rated very low on the "constraint" scale.

As a result the following implications for further research are offered on the basis of the findings of this study. (1) This study provides the beginning of a data-base, bringing together man-environment relationships in a comprehensive fashion. Data of this type--broad and generalizable--must be obtained if policymakers and planners are not to be tied down by a vast plethora of data based on individual and fragmented research. Discrepancy analysis comparing "where we are" with "where we should be" could provide the

directional emphasis needed so badly within the field. (2) Further investigations should be carried out to determine how the responses of the sample populations varied. (3) Analyses of the respondents' knowledge base must be made to ascertain on what information basic decisions were being made. (4) Analyses of respondents' reasoning process need to be made to ascertain what caused them to react the way they did. (5) Priorities for action and role description need to be established for all those who were involved in the study. (6) Investigations should be carried out to determine what resources are each and every one of the sample populations willing to contribute to affect the desired changes in the environment. (7) Furthermore, investigations should be initiated to ascertain what resources each of the sample populations feel should be allocated to bring about the desired changes in the environment. (8) Despite the erratic but lengthy history of Conservation and Environmental Education the psychological basis for attitude change regarding public apathy has not been investigated but merits research attention.

292. Fortner, Rosanne White, Ed.D. Experiences Related to Oceanic Knowledge and Attitudes of Tenth Grade Students in Virginia. Virginia Polytechnic Institute and State University. Dissertation Abstracts, 1978, 39(4):2166-A. WMI 7818548; 128pp. (Also listed as ERIC ED 159 023.)

DESCRIPTORS: attitudes, descriptive research, instrument development, knowledge, marine education, secondary.

The Survey of Oceanic Attitudes and Knowledge (SOAK) was developed as a method of measuring marine knowledge and attitudes of tenth grade students and relating those attributes to the students' marine experiences. Fifteen coastal and 15 inland schools in Virginia were randomly selected as sources of subjects for the study. A cooperating teacher in each school administered the survey to a heterogeneous class of tenth graders.

Analyses of data from 787 respondents revealed a statewide knowledge level of about 50 percent with regard to the marine topics covered by 63 items across three forms of the knowledge survey. Attitudes toward a variety of marine issues were shown to be moderately positive ( $\bar{X} = 3.05$  out of a possible 4.00). In order to examine the relationship between certain demographic variables and the dependent variables of marine attitudes and knowledge, a race-by-sex-by-residence analysis of variance was performed on the knowledge and attitude scores. For knowledge, the results indicated the main effects of race, and residence, and interaction between residence and sex. Substantively, the racial effects were such that white students scored higher than nonwhites. The main effects of sex and residence on knowledge scores are qualified by an interaction such that knowledge differences by residence exist only among males, with coastal males having a higher knowledge level. Only for coastal students are there pronounced differences between the knowledge scores of males and females, with males having the higher knowledge level. The analysis of variance for attitude scores according to the same demographic variables revealed main effects of race only,

with white students expressing more positive attitudes. The relationship between marine knowledge and attitudes as measured by the SOAK was found to be .43, significant at the .01 level.

As part of the survey, students ranked marine experience categories according to their relative importance in providing information about the ocean. Both coastal and inland students identified television specials and movies with marine themes as being most influential in developing their marine awareness. Three specific experiences--watching Cousteau specials on television, reading National Geographic magazine, and being able to swim--were each shown to account for at least 10 percent of the variation in knowledge scores. Participation in ocean study courses was not shown to be related to higher knowledge or attitude scores. Descriptive data for the knowledge survey indicated that student performance was relatively consistent across items considering the ocean as a chemical medium, a biological community, a physical system, a threatened resource, a cultural influence, and a political interface. Greatest proficiency was evident in scores on items related to ocean chemistry ( $\bar{X}$  = 53.8 percent), while lowest scores were on items considering the impact of the ocean on human culture ( $\bar{X}$  = 43.5 percent). As for attitude trends, visual inspection of response means for attitude items revealed that respondents felt most strongly about potential hazards to the marine environment. Political, economic, and personal considerations were also viewed positively, but attitudes were not as strong as these issues.

On the basis of the data, recommendations can be made concerning methods of equalizing access to marine-related experiences across demographic differences and utilization of specific item information to establish a baseline for further marine education. Because of the scope of modern marine education, the indicated level of overall marine awareness, and the apparent lack of significant effects of ocean study courses, it is recommended that more marine information be infused into existing curricula to foster the development of a marine-literate citizenry.

293. Foster, Oma Ruth, Ph.D. The Search for An' Ordered Structure of Statements and Principles About the Ecology of the Chesapeake Bay Estuarine Systems for Use in the Development of Curricula or Courses of Study. University of Maryland. Dissertation Abstracts, 1979, 39(8):4846-A. UMI 7903105; 375pp.

DESCRIPTORS: ecology education, knowledge, marine education, model building, program development, science education.

A growing body of knowledge about the ecology of the Chesapeake Bay estuarine systems is being generated by research groups, interpreted to the public through the media, and incorporated in fragmentary form into public education. A study published by the writer in 1974 revealed that teachers and administrators, functioning at all levels of the public school continuum, wanted and would implement the use of curricular materials on Bay ecology as they became available. The writer decided, therefore, to develop a structure of statements and principles which could be recommended for use in developing curricula or courses of study about the ecology of the Chesapeake Bay systems.

There appeared to be no comprehensive source on Bay ecology. Content, therefore, was extracted from varied sources on the Chesapeake Bay and was integrated with content from sources on general ecology and the ecology of estuaries. A large body of factual information, generalizations, and principles was developed by reviewing research reports, personal records of coursework, textbooks, reference works, journals, and monographs. This content was subjected to condensation, revisions, and organization by topics.

A philosophy of science was developed to serve as a basis for theoretical considerations and to assist in the selection of literature to be consulted in carrying out operations on the content. Primary consideration was given to the development of a philosophy of science education based upon the basic principles of ecology, a view of science which was consistent with these principles, the holistic view of man in modern psychology, and a theory of learning consistent with the holistic view of man and of science.

The literature of science education and learning theory which appeared to be consistent with the philosophy developed in this study was identified and consulted for determining operations on the content. First, current trends and recommended procedures for developing curricula or courses of study in science were reviewed, in order to make certain that the product of the study would be appropriate for the curricular setting in which it might be used. Second, recommended procedures for developing an ordered structure of ecological statements and principles were reviewed. Finally, guidelines were developed for the selection of content, for the formalization of this content into statements and principles, and for the development of an approach to structuring the statements and principles.

Procedures were then implemented for validating the content and for ordering the statements and principles and their topics within a structure. Three questionnaires were constructed. The first was presented to scientists during personal interviews for the purpose of validating content. The second and third were mailed to scientists for the sequencing of the statements and principles and the topics.

All but seven of the 76 original statements and principles survived the validation review by scientists. An order was not evident, however, in either the statements and principles or the topics as a result of the evaluation of the data from the sequencing questionnaires. The writer, therefore, ordered the statements and principles and the topics by means of a whole-to-part principle, which was consistent with the theoretical considerations developed in the study.

A structure of the surviving statements and principles, holistically ordered, together with organizer statements to replace the topics was submitted to Dr. Eugene Odum for editing and evaluation. A revised structure of statements and principles based upon his revisions and suggestions was prepared.

294. Frigo, Camillus Paul, Ph.D. The Feasibility of Integrating Environmental Management Concepts into BSCS-Yellow Version. The University of Wisconsin-Madison. Dissertation Abstracts, 1977, 38(1):123-B. UMI 77-8784; 419pp.

DESCRIPTORS: cognitive, interdisciplinary knowledge, multidisciplinary-infusion, science education, secondary.

The purpose of this study was to determine the feasibility of integrating selected Environmental Management concepts into selected parts of Biological Science: An Inquiry Into Life, a Biological Science Curriculum Study Program referred to as BSCS-Yellow Version. The criteria under which the integrative approach was to be judged as acceptable were: (1) A significant difference in Environmental Management knowledge between "individual" BSCS-Yellow Version classes receiving integrated Environmental Management instruction and "individual" classes receiving only BSCS-Yellow Version instruction, as indicated by a statistical analysis of the Environmental Management test scores. (2) A significant difference in Environmental Management knowledge between "combined" BSCS-Yellow Version classes receiving integrated Environmental Management instruction and "combined" classes receiving only BSCS-Yellow Version instruction, as indicated by a statistical analysis of the Environmental Management test scores. (3) No significant difference in BSCS-Yellow Version knowledge between "individual" BSCS-Yellow Version classes receiving integrated Environmental Management instruction and "individual" classes receiving only BSCS-Yellow Version instruction, as indicated by a statistical analysis of the BSCS-Yellow Version test scores. (4) No significant difference in BSCS-Yellow Version knowledge between the "combined" BSCS-Yellow Version classes receiving integrated Environmental Management instruction and the "combined" classes receiving only BSCS-Yellow Version instruction, as indicated by a statistical analysis of the BSCS-Yellow Version "combined" test scores.

The instructional materials for the study included 10 student activities accompanied with a teacher's guide that contained:

- (a) the Environmental Management concept to be integrated.
- (b) the part within the BSCS-Yellow Version text to be integrated,
- (c) the BSCS-Yellow Version themes and objectives,
- (d) a rationale for the integration of each Environmental Management concept,
- (e) the Environmental Management concept development,
- (f) the Environmental Management objectives, and
- (g) a description of the instructional materials and procedures to be utilized.

The technique of instruction utilized was lecture-discussion-discussion-laboratory, which involved 15 days of instruction. The population consisted of 290 tenth grade students in Biology classes utilizing Biological Science: An Inquiry Into Life (BSCS-Yellow Version). The experiment was carried out in 12 BSCS-Yellow Version classes (6 experimental, 6 control) of 4 schools from 4 different communities.

Evaluation was based on a 100-item multiple choice test, 50 of which related to BSCS-Yellow Version content and 50 to Environmental Management content. Differences in mean scores earned on: (1) BSCS-Yellow Version knowledge items by the "individual" experimental and "individual" control classes, (2) Environmental Management knowledge items by the "individual" experimental and "individual" control classes, (3) BSCS-Yellow Version knowledge items by the experimental classes "combined" and the control classes "combined," and (4) Environmental Management knowledge items by the experimental classes "combined" and the control classes "combined" were tested for significance using the Welch-Aspin Two-Sample "t" Model.

Analysis of mean scores revealed: (1) a significant difference in Environmental Management knowledge between the "individual" experimental and "individual" control classes and between the "combined" experimental and "combined" control classes, (2) a significant difference in BSCS-Yellow Version knowledge between two of the six "individual" experimental and "individual" control classes, (3) a significant difference in BSCS-Yellow Version knowledge between the "combined" experimental and the "combined" control classes.

On the basis of the conditions and limitations of the study and the nature of the population with which the study was concerned, it was concluded that it is not feasible to integrate selected Environmental Management concepts into selected parts of Biological Science: An Inquiry Into Life (BSCS-Yellow Version) because only two criteria (Criterion 1 and Criterion 2) established for feasibility were satisfied.

295. Gross, Michael Paul, Ph.D. An Analysis of Attitudes, Knowledge, and Perceptions of Elementary School Students Following Participation in Special Environmental Education Program. The University of Iowa. Dissertation Abstracts, 1978, 39(1):29-A. UMI 7810348; 170pp.

DESCRIPTORS: attitudes, economic background, knowledge, middle school, program evaluation, social background.

The purpose of this investigation was twofold: (1) to determine if a sensory and conceptual approach with advance organizers to the study of a wilderness community, the woodlands of Iowa, was effective in fulfilling its objectives, and (2) to determine if knowledge, attitudes, and perceptions of students toward woodlands and wilderness were related to sex and socioeconomic status.

The treatment consisted of advance organizers related to concepts taught during a field trip to a woodland wilderness community. The field trip utilized a specially designed sensory and conceptual approach to the study of natural communities based on a widely-used program, Acclimatization.



Six instruments were administered to the pretest and posttest groups to measure growth of knowledge, attitudes, and perceptions. The sample was composed of fifth-grade students measured one week following treatment and sixth-grade students measured one year after treatment.

Participation in the special environmental education program resulted in significant change, at the 0.05 level of significance or greater, for the following measures: (1) Cognitive Knowledge of Woodlands, measured immediately following the treatment, was significantly greater than the pretest scores and the group measured one year following the treatment. Scores one year after treatment were significantly greater than the pretest scores. (2) Attitudes toward Use/Abuse of Nature were significantly more positive immediately and one year following treatment. (3) Attitudes toward the preservation of wilderness as measured by Wilderness Story were significantly more positive for the treatment groups when compared to standardized test results. (4) Student Perceptions of Woodlands measures indicated a significantly greater affective orientation toward woodlands both immediately and one year following the treatment. A sensory orientation to woodlands was significantly greater immediately following treatment but not after one year.

Significant differences were not found for scores on the Environmental Attitude Scale and Most/Least Important Environmental Problem. The significant differences found would appear to indicate treatment effects for knowledge, attitudes, and perceptions.

The second part of the study was concerned with the relationship of scores on the dependent variables to the independent variables of sex and socioeconomic status. No relationship could be inferred when scores for students from high, medium, and low socioeconomic status were compared. No relationship could be inferred when scores from male students were compared to scores from female students.

An additional finding, not related to the major questions, was that sixth-grade students perceive woodlands as a place to which they can escape, and a place to study and be with friends significantly more frequently than students from the fifth grade. This may suggest that maturation from an egocentric orientation to an orientation towards others and society occurred and was responsible for the observations.

296. Hammerman, Elizabeth Lynn, Ed.D. A Delphi Formulation of Environmental Education Objectives. Northern Illinois University. Dissertation Abstracts, 1979, 40(5):2447-A. UMI 7924376; 146pp.

DESCRIPTORS: hypothesis generation, interdisciplinary, model building, program development, program evaluation.

The purpose of this study was to arrive at a comprehensive set of major objectives for environmental education to serve as a structural framework for curriculum development, program refinement, and program evaluation.

The 50 state coordinators for Environmental Education reduced a list of 70 objectives found in current research and literature to 24 by rating each objective on a scale of 1 to 5. The state coordinators recommended professionals in environmental education, conservation education, and outdoor education from agencies and groups concerned with EE as potential Delphi panel members.

A Delphi survey was started with 58 panel members and went through four rounds over a 5-month period. In Round 1 panel members listed five objectives that they considered of major importance for EE. These 5 came from 24 objectives given for consideration or they were generated by respondents.

In Round 2 panel members selected the 10 objectives from the list of 55 generated from Round 1 that they considered most important for environmental education. A weighted frequency was used to rank the objectives with the 10 highest ranked objectives becoming the "high priority" objectives. A list of 44 objectives was retained for use in Round 3.

In Round 3 panel members reviewed the group ranking of the 44 objectives in relation to their own choices from Round 2, and selected the 10 most important objectives for EE. A reason was given for selecting any objective outside the high priority designation in Round 2. A list of 36 objectives was retained for use in Round 4.

In the final round, panel members considered their own and the group's previous rankings of the objectives, along with the reasons given for retaining objectives. Their final ranking was given.

The highest ranked objectives from Rounds 2, 3, and 4 were:

1. To treat environmental education in an interdisciplinary manner. To involve social, political, economic, etc., aspects in addition to science.
2. To develop a citizenry that is: (1) knowledgeable about the biophysical and sociocultural environments of which humans are a part; (2) aware of environmental problems; and (3) motivated to act responsibly to develop diverse environments that are optimum for living.
3. To develop an awareness for man's/woman's place (dependence and interdependence) with the total environment, the relationship of the individual to himself/herself (self concept development within an individual), relationship of one person to another (how the individual relates to other individuals), and one's relationship to the natural, global environment.
4. To develop a clear understanding of the human being as an inseparable part of the functioning system that has the ability to alter the interrelationships of the system.
5. To provide experience with working with environmental problems, issues and concerns and thereby gain experience in the personal

valuing process, decision making and political and governmental systems and how to effect appropriate meaningful and necessary changes in them.

6. To foster a change in attitude and values through a commitment to life styles conducive to maintaining a quality environment.
7. To help individuals and social groups gain a variety of experiences with the total environment to acquire a basic understanding of the total environment, its associated problems and humanity's critical responsibility, presence and role in it.
8. To develop an awareness of the need for individual responsibility to maintain or improve the environment.
9. To develop a holistic view (systems approach) of the environment which enables one to evaluate the impact of changes on the environment.
10. To develop an awareness of the historical, cultural, and natural environments of the communities in which students reside; to lead students to appreciate the heritage associated with their communities and to realize the environmental status of it.

297. Harvey, Gary Dale, Ph.D. Environmental Education: A Delineation of Substantive Structure. Southern Illinois University. Dissertation Abstracts, 1977. 38(2):611-A. UMI 77-16,622; 265pp. (Also listed as ERIC ED 134 451.)

DESCRIPTORS: hypothesis generation, interdisciplinary, model building, multidisciplinary-infusion, theoretical research.

There are two areas of concern in this dissertation: (1) to determine whether a generally accepted definition of environmental education was extant; and (2) to determine whether a generally accepted substantive structure of environmental education was extant. The research questions stated that a mediating definition and/or substantive structure would be constructed if they were not extant in a generally accepted form.

The researcher reviewed the history and background of environmental education in order to provide a historical context for the remainder of the study.

Definitions of environmental education were compiled and arranged by year of publication. It was determined that no single generally accepted definition was extant. Key words and phrases were identified in each cited definition and tallied. The most often used key words and phrases were synthesized into a mediating definition of environmental education.

Attempts to identify and delineate the substantive structure of environmental education identified in the professional literature were

compiled in five categories or approaches: position papers, paradigms, concept lists and curricula, course(s) approach, and supplemental and other approaches. After an extensive review, it was determined that a generally accepted substantive structure for environmental education was not extant in the literature.

Key words and phrases were identified in the approaches and tallied to indicate relative use by writers in the field. A review of the key words and phrases led the researcher to the conclusion that a generic substantive structure of environmental education could be constructed by utilizing three basic components which encompass many of the others. The components are philosophy, precept, and expected outcome.

The philosophy (or first major component) was perceived to be "Spaceship Earth" with a "lifeboat" concept frame of reference. "Spaceship Earth" utilizes man, environment, and relationship as major components while the "lifeboat" concept provides a values/ethical orientation.

The precept (man-environment relationship), or second major component, operating in a values context, is perceived to operationalize the philosophy and lead to expected outcomes. The researcher perceived, and resolved, four areas of inconsistency or incompleteness in the literature. The first such area relates to the discrepancy between the name "environmental education" and the references to "man-environment relationship." The researcher concluded that "environmental education" is a misnomer and that consistency with the literature dictated the use of "man-environment relationship education" or "MERE" instead of "environmental education" as the name for this area of study. (The researcher suggested the use of the parallel terminology "people-environment relationship education" or "PERE" in his recommendations.)

Two criteria were established to discriminate between MERE (i.e., "environmental education") and nonMERE topics. This led the researcher to the second area of inconsistency or incompleteness in the literature, i.e., MERE and nonMERE topics are intermixed in the "environmental education" literature. Many of these nonMERE topics were perceived to be prerequisite, or complementary to MERE and were termed "man-environment relationship foundations" or MERF. (In his recommendations the researcher suggested the parallel terminology "people-environment relationship foundations" or "PERF.")

A third perceived area of inconsistency was the interchangeable use of the terms multidisciplinary and interdisciplinary. These two terms were defined and MERE (i.e., "environmental education") was determined to be interdisciplinary while MERF could be disciplinary, multidisciplinary, or interdisciplinary. These two terms were defined and MERE (i.e., "environmental education") was determined to be interdisciplinary while MERF could be disciplinary, multidisciplinary, or interdisciplinary.

A fourth area of incompleteness was perceived in the area of expected outcome, or the third major component of substantive structure of "environmental education." The expected outcome most often expressed in

the literature, environmental literacy, was perceived to be inadequate to describe the totality of expected outcomes for "environmental education" as conceptualized in this study. The researcher proposed and operationalized two additional levels of expected outcome, environmental competence and environmental dedication.

The three components (philosophy, precept, and expected outcome) were combined into a paradigm (Figure 57) of the generic substantive structure of "environmental education." This was followed by a paradigm which included references to specific substantive structure components beyond the scope of the study. The second paradigm (Figure 58) represents the researcher's conceptualization of the substantive structure of "environmental education." A final paradigm (Figure 59) combines the substantive structure with its more generic bases.

Conclusions, implications and recommendations were made. The major recommendation is application of the substantive structure of "environmental education" to theory and practice.

298. Hauser, Edward J.P., Ph.D. An Analysis of Learning an Environmental Education Concept from an Audio-Tutorial Method and A Print Self-Instructional Package Based on the Educational Science of Cognitive Style. Kent State University. Dissertation Abstracts, 1976, 36(7):4381-A. UMI 75-27,812; 126pp.

DESCRIPTORS: cognitive style, ecology education, higher education, knowledge.

Statement of the Problem: The purpose of this study was to utilize Hill's cognitive style theory to determine whether any cognitive style elements are related to learning from audio-tutorial (A-T) and print self-instructional packaged (SIP) teaching strategies. The major research questions investigated were: 1) Are certain cognitive style elements unique to the high achievers with regard to content achievement when audio-tutorial is used? 2) Are certain cognitive style elements unique to the low achievers with regard to content achievement when audio-tutorial is used? 2) Are certain cognitive style elements unique to the low achievers with regard to content achievement when audio-tutorial is used? 2) Are certain cognitive style elements unique to the low achievers, with regard to content achievement and to content achievement when a self-instructional package is used?

Method: The sample consisted of 96 biology Ss enrolled for fall term, 1974 at Lakeland Community College. Students were assigned to either the A-T or SIP instructional strategies. Both strategies used the concept of ecological succession as the content, with identical sequencing, varying only in the mode of presentation.

Student achievement was determined by calculating a gain score for each subject. The cognitive style profiles were mapped using the Cognitive-Style Interest Inventory developed by Hill at Oakland Community College. Student response cards were computer analyzed the end result being a cognitive style map for each subject which listed his cognitive style elements.

Using gain scores, a high and low achievement group was constructed for both instructional strategies. If any cognitive style element was exhibited by 70 percent or more of the Ss in more than one group, the element was considered to be common. If an element was exhibited by 70 percent or more of the Ss in only one group, it was considered unique to that group. Using this procedure, common collective cognitive styles and unique collective cognitive styles were constructed for high achievers and low achievers of the A-T and SIP groups.

Conclusions: The element Q(V)--Major Qualitative Visual--composed the unique collective cognitive style of the high achievers of the A-T instructional strategy. It was concluded that Ss who derive maximum cognitive knowledge from a pure A-T strategy are likely to be those who can acquire meaning derived from seeing things other than written words or graphic symbols.

These elements composed the unique collective cognitive style of the low achievement group of the A-T strategy:

T(VL) Major Visual Linguistic  
 Q(CH) Major Qualitative Code Histrionic  
 Q(CT) Major Qualitative Code Transactional

It was concluded that students who derive the least cognitive knowledge from an A-T strategy can be described as individuals who: 1) prefer to derive maximum meaning from reading written words or mathematical symbols, 2) have the ability to deliberately stage behavior to produce desired effects, and 3) have the ability to communicate with others in a way which influences their goals.

These elements composed the unique collective cognitive style of the high achievers of the SIP strategy:

Q'(O) Minor Qualitative Olfactory  
 Q(CS) Major Qualitative Code Synnoetics  
 Q'(CT) Minor Qualitative Code Transactional  
 D Minor Difference Modality of Inference  
 L Major Appraisal Modality of Inference  
 Reasoning Process

It was concluded that students who derive maximum cognitive knowledge from a SIP strategy are those who: 1) have the ability to establish realistic goals, 2) have the ability to communicate with others in a minor way which influences their goals, and 3) prefer to use a reasoning process which includes the following: using definite rules, finding differences, and finding similarities.

The element Q(S)--Qualitative Code Savory--composed the unique collective cognitive style of the low achievers of the SIP strategy. The role of this element is doubtful.

These findings add support to Hill's cognitive style theory.

299. Hinkle, Robert Douglas, Ph.D. Environmental Interpreters in Southern Michigan: A Q-Study of Interpreter Types. Michigan State University. Dissertation Abstracts, 1977, 37(12):6042-B. UMI 77-11,656; 117pp.

DESCRIPTORS: cognitive style, descriptive research, environmental center, hypothesis generation, nonformal, outdoor classroom.

The traditional role of a nature center in southern Michigan seems to be undergoing subtle but important changes in direction. Past concepts of a nature center as a place where people might go to learn about plants and animals and how they live have been greatly altered. Demands for information relating to environmental problems of pollution, energy, and population have changed many of the traditional roles of nature centers.

The interpretive naturalist is the guiding force behind programs at a nature center. The kinds of programs which a naturalist offers reflect his interests, attitudes, and beliefs. In times past, the ranks of most naturalists were filled by persons trained in botany, biology, fisheries and wildlife, forestry, or zoology. Naturalists trained in field biology usually offered programs dealing with nature in its strictest sense. Today, traditional nature-related topics and current environmental problems may be dealt with all in the same day. The attitude orientation of the individual naturalist determines what kinds of emphases will be placed on each of the programs offered.

This study identified and described types of interpretive naturalists in southern Michigan. Utilizing an investigative method termed a Q-sort, it analyzed interpreters' responses to a series of statements relating to attitudes, beliefs, and priorities dealing with nature center operation and interpretation. Factor analysis of the responses obtained from interpreters resulted in the identification and description of four definitive types of interpreters.

Analysis of patterns in their responses showed that Type I interpreters, the Naturists, were naturalists who strongly believed in a holistic approach to understanding the outdoors. Their attitudes stressed attitude development and showed an aversion to a factual presentation of interpretive material. Type II interpreters were termed Pragmatists. Pragmatists indicated that they believed interpretation should be a balance of facts, attitudes, and philosophies. Pragmatists showed attitude orientations which indicated that they believed that facts were the root of a good interpretive program. Type III naturalists were termed Educators. They strongly preferred statements which dealt with or emphasized concepts and methods of education. Type IV interpreters were regarded as Professionalists. They displayed strong orientation toward statements dealing with services which nature centers offered and duties of naturalists to provide those services.

300. Hughes, Allan Edward, Ph.D. High School Students' Understanding and Acceptance of the Commons Concept. University of Oregon. Dissertation Abstracts, 1976, 37(6):3375-A. UMI 76-27,656; 128pp.

**DESCRIPTORS:** attitudes, ecology education, knowledge, resource management education, secondary.

This study explored 297 high school students' understanding and level of acceptance of the Commons Concept, a key environmental concept introduced and developed in Garrett Hardin's essay, The Tragedy of the Commons. The Commons Concept was investigated in a high school biology course within the context of the automobile and petroleum as factors in a Commons.

Four instruments were developed and used: (1) Students' knowledge of the automobile and petroleum resources was determined through a 33-item multiple choice instrument. (2) Students' attitudes toward control of the automobile and petroleum resources were determined through a 34-item scaled attitude inventory. (3) Students' use of motorized vehicles was determined through a 10-day mileage log the students kept. (4) Students' understanding and acceptance of the Commons Concept was determined through an instrument that focused on key sections of The Tragedy of the Commons. Data were analyzed by comparing student responses to the four inventories.

**Findings:** (1) These students have a reasonably good knowledge of the automobile and petroleum resources. Boys scored higher than girls on this knowledge test. (2) Students were equally divided in their views about whether personal or state control of the Commons was desirable. Girls were more likely to favor personal control of the Commons than were boys. (3) Students averaged about 12 miles travel in a motorized vehicle each day. (4) Students seemed to understand the Commons Concept. (5) A majority of students accepted Hardin's contention that "Freedom in a Commons brings ruin to all."

**Conclusions:** This study discovered that high school students already have a good understanding of the automobile and petroleum resources. The study also discovered that high school students can understand the Commons Concept and are quite willing to accept basic ideas in the concept. Students are, however, divided on pertinent attitudinal issues raised in the essay, and this suggests a potential for lively interaction in class sessions. Various sections of high school Environmental Education courses could be organized around the Commons Concept. For example, an energy unit might focus on the automobile and petroleum resources as an example of the Commons.

301. Hyde, Linda Chance, Ed.D. Perceptions of Teachers about Selected Environmental Issues and Problems. The University of Tennessee. Dissertation Abstracts, 1977, 37(6):4822-A. UMI 77-3648; 243pp.

**DESCRIPTORS:** descriptive research, issue-based, teacher training inservice.

This study involved the examination of teachers' perceptions in three areas: (1) the role of the school, (2) the role of the teacher, and (3)



the teachers' perceived classroom treatment of 94 selected environmental issues, problems, and concepts. Respondents' perceptions were compared on the basis of teaching area to determine if responsibilities were being assumed for environmental education across all disciplines, and to determine if perceptions about the responsibility for teaching environmental concepts, problems, and issues differed by teaching area.

Also examined were teacher data with respect to the religious affiliation and age bracket of respondents. Teachers were asked questions about: (1) their background training with respect to environmental education, (2) their willingness to participate in future activities to increase competence in dealing with environmental issues, problems, and concepts in the classroom, and (3) their sources of environmental information, if any.

The sample population involved 681 teachers in Jefferson County (Louisville), Kentucky, with 378 responding (56 percent). The researcher utilized a questionnaire with 94 environmental issues, problems, and concepts, organized into 7 categories of environmental education as defined in the Environmental Education Act of 1970. Items on the questionnaire were obtained from a comprehensive literature survey and from items submitted by experts in environmental education.

Findings: (1) The results of this study indicated that two-thirds or more of the responding teachers believed the school should teach about each of the items on the questionnaire, while only one-fourth or less believed that it was their responsibility. (2) A greater percentage of teachers in certain areas--art, humanities and music (fine arts), business, home economics, science and social studies--felt the school should teach about the 94 listed items. Teachers in the areas of home economics, science, and social studies, more frequently than teachers in other teaching areas, indicated that they felt it was their responsibility to teach about the listed items. Science and social studies teachers, more often than teachers in other areas, stated that they made a planned effort to include environmental issues, concepts, and problems in their classroom activities. (3) Response comparisons based upon age bracket of teachers showed few differences in perceptions of the respondents (with significant differences on only 3 of the 94 items listed, all concerned with the role of the respondent). (4) Comparison of teachers' perceptions with respect to religious affiliations indicated differences on approximately one-fourth of the items. The researcher was unable to explain any of the occurring differences. (5) Less than 50 percent of the responding teachers said they had participated in any kind of activity designed to help them implement environmental activities in the classroom. At the same time, a majority indicated a willingness to participate in activities designed to help them incorporate activities of an environmental nature into their classroom activities. Local newspapers and television were the most frequently utilized sources of environmental information, although less than half of the teachers indicated any use of environmental sources for classroom use.

Based upon these data, teacher responses would suggest a strong need for: (1) in-service environmental education of teachers, and (2) more

extensive, systemwide planning for an effective, comprehensive, and interdisciplinary environmental education program.

302. Iozzi, Louis Anthony, Ed.D. Moral Judgment, Verbal Ability, Logical Reasoning Ability, and Environmental Issues. Rutgers University The State University of New Jersey. Dissertation Abstracts, 37(12):7662-A. UMI 77-13,271; 197pp.

DESCRIPTORS: higher education, instrument development, middle school, moral development, secondary.

This study attempted to determine if moral reasoning level as defined by Lawrence Kohlberg was a function of verbal ability, logical reasoning ability, or the specific moral situation. It was hypothesized that (1) there is no relationship between level of moral judgment and verbal ability (2) there is no relationship between level of moral judgment and logical reasoning ability, and (3) there is no relationship between level of moral judgment and specific moral situations.

The variables were measured in 116 college students, 38 high school students, and 40 junior high school students using standardized tests. The junior high school sample was included in this study to help in validating the Environmental Issues Test--an instrument designed specifically for this study. Statistical analyses included analysis of variance, correlation, chi-square and t-tests. In addition to examining the college subjects as a total intact sample, they were also grouped into Environmental Science majors and Humanities majors. Principled, Conventional, and anti-establishment morality scores were computed for each subject.

The three hypotheses were stated in the null format and it was anticipated that upon testing, each hypothesis would be rejected. This, in fact, did occur. Principled level moral reasoning was found to be significantly related in a positive direction to both verbal ability and to logical reasoning ability. Conventional-level moral reasoning was also found to be significantly, but negatively, related to both verbal ability and to logical reasoning ability.

A significant relationship also existed between level of moral judgment and specific moral situations. The subjects that participated in this study reasoned at different moral levels on different moral issues. Those differences were related to the different backgrounds of the subjects, their knowledge of, interest in, and concern for or about the issue presented in the test dilemma. Moral reasoning levels also varied according to whether the subject was in transition from one stage or level to the next higher stage or level or not in transition.

303. Iverson, Ross Lester, Ed.D. An Analysis of the Interrelationship of Environmental Knowledge and Environmental Concern. University of Montana. Dissertation Abstracts, 1976, 36(7):4224-A. UMI 76-644; 165pp.

DESCRIPTORS: affective, attitudes, cognitive, descriptive research, issue-based, knowledge, secondary.

The purpose of this investigation was to determine the interrelationship between environmental knowledge and environmental concern.

The instruments used were the Syracuse Environmental Awareness Tests Form A and Form D: Form A, a general test of environmental knowledge covering the basic areas of pollution, science technology and growth, and population, containing fifty-six items; and Form D, a forced-choice attitude-measuring device pairing nonenvironmental social issues with environmental issues. There were 105 items in Form D. The test sample was composed of 396 students in eleventh grade. The tests were administered in January of 1975.

The statistical treatment involved a coefficient of correlation by lower, intermediate, and upper quartiles as well as for all the data combined. In one instance the score on the knowledge test (Form A) was used as a dependent variable and in the other instance the concern (Form D) score was used as the dependent variable. Also, the group means were compared in a similar manner using a "t" test of significance.

Findings: In the lower and intermediate quartiles there was no significant correlation between knowledge and concern. In the upper quartiles there were small but statistically significant correlations. Also, a significant correlation was found when all data were analyzed as a single group.

Next, group means were compared between quartiles. In all but one case there was a significant difference when comparing quartile means. The exception was that the average student in the upper quartile of knowledge was not significantly more concerned than the average intermediate student.

It would appear that while there was very little micro-relationship, there was a greater macro-relationship between environmental knowledge and environmental concern. There was no evidence to indicate a cause-effect relationship. This investigation suggested that environmental knowledge and concern are mutually supportive of one another.

Conclusions and Interpretation: 1) Educational objectives relating to environmental knowledge or to environmental concern need to be specified in day-to-day classroom activities. 2) Once a student's body of environmental knowledge becomes large enough to function and to provide a basis for further learning and attitude formation, independent study seems appropriate. 3) Instructional opportunities aimed at helping the student determine what is important to him in establishing a working set of values seems appropriate for all students. 4) To reach long-range goals of either environmental knowledge or environmental concern, instruction in both the cognitive and affective domains is essential. 5) Evaluation of short-term instructional projects which have as a basic assumption a very close relationship between knowledge and concern will be discouraging and should be avoided. Evaluation should be tailored very closely to the instruction or to the specific objectives involved.

304. Jankowski, Joseph Clements Sr., Ph.D. Attributes of Public Elementary School Teachers and Their Influence on the Teaching of Environmental Conservation in Indiana in 1970. Purdue University. Dissertation Abstracts, 1976, 36(7):4224-A. UMI 76-546; 307pp.

DESCRIPTORS: conservation education, descriptive research, elementary, model building, outdoor education.

This dissertation identifies and measures the cognitive and connotative attributes of teachers and their relationship to percent of instructional time devoted to environmental conservation in the public elementary schools in Indiana in 1970.

A conceptualized model was developed for describing the environmental conservation proficiency development process for elementary school teachers.

Influences on the schools in which teachers taught were also considered. These include location of the school in the state, size, and grade levels.

Personal attributes of teachers such as sex and age were studied as possible influences on time devoted by the teacher.

There are 922 teachers and 97 principals from 100 randomly selected schools in the study.

Principals provided information which was used to assess the effectiveness of the teachers in developing environmental conservation concepts and to assess the validity of the amount of time devoted to teaching about environmental conservation as a valid tool in assessing teacher performance.

Nineteen percent of the teachers in the study did not devote any time to environmental conservation. Mean time for all teachers in the study was 4.123 percent. Men devoted more time to the subject than women.

The location and size of school did not significantly influence amount of time devoted to environmental conservation by teachers in the schools. There was no significant difference among grade levels in the amount of time devoted to environmental conservation.

An interest in the outdoors and in fishing was characteristic of teachers devoting time to the subject. Camping activities had no effect.

Few teachers subscribed to environmentally related periodicals, but those who did tended to devote greater amounts of time to environmental conservation. Similar results were found for membership and participation in environmentally-related organizations.

Teachers devoting considerable amounts of time to environmental conservation had taken courses in chemistry, physical science, and general science. Few teachers had taken a course in natural resource conservation or environmental conservation.

Environmental conservation concepts were most often taught in general science, social studies, and art. Study of plants and water were the most popular of natural resource areas taught.

Outdoor education was provided for all grade levels, but the upper grades spent greater time at the outdoor education centers and in camping programs. Ten schools had access to an outdoor education center. Seven schools had an organized camping program.

Teachers felt priority was not given to environmental education. Administrators felt that the teachers weren't motivated to teach about this area. Principals indicated that the lack of teacher's training was the primary factor for inadequate teaching of environmental conservation.

Data provided would substantiate the fact that the amount of time devoted to environmental conservation instruction is a poor indicator of teacher success and effectiveness in the total environmental education program.

The study provides optimistic and encouraging information for the future of environmental conservation education in State of Indiana.

305. Jensen, Belva Laughlin, Ph.D. A Comparison of Two Methodologies Used with Elementary School Teachers to Develop Attitudes toward Contemporary Energy Problems. The American University. Dissertation Abstracts, 1978, 39(6):3524-A. UMI 7823656; 156pp.

DESCRIPTORS: attitudes, conservation education, energy education, interdisciplinary, teacher training inservice.

Many educational efforts have been made to disseminate "energy" information to specific groups, with varied measures of success. For this reason, in the summer of 1977, a workshop was held at the Charles County Community College LaPlata, Maryland, under the sponsorship of the U.S. Energy Research and Development Administration, the Potomac Electric Power Company the Southern Maryland Electric Cooperative, and the Charles County Community College. The objective of that 1977 workshop was to present aspects of Energy Resources and Conservation with their attendant economic, social, political, and environmental problems to elementary and secondary school teachers.

The 1977 workshop was designed for maximum learning in the energy arena. This educational program was directed at raising the consciousness level of adult audiences who may or may not be educators. Proceedings of this workshop were videotaped. A syllabus, discussion guide, and glossary were produced for use in conjunction with the video tapes. This researcher's study used these previously prepared tapes and materials in

a second workshop held in the summer of 1978 to compare two methods of instruction for elementary teacher education in the development of comprehensive attitudes toward contemporary energy issues.

This study was designed and conducted to determine those differences, if any, which occur as a result of applying two audio-tutorial methodologies for developing attitudes toward contemporary multidisciplinary energy problems in elementary school teachers. The two methodologies chosen differed as follows: one used a structured discussion setting with a trained instructor and was considered the experimental group, while the control group was unstructured and held their discussion sessions without a trained leader.

The hypothesis of this multidisciplinary study in teacher education was that participants enrolled in an experimental group provided with an instructor who reinforced concepts through discussion and critique would differ significantly in mean attitude change from those persons enrolled in a control group which had only unstructured discussion in a leaderless group.

A randomized control group pre-posttest design was used to test this hypothesis on elementary school teachers from Southern Maryland in a workshop held in the summer of 1978. The pre and posttest instrument used was developed by the National Assessment of Educational Progress and modified by the researcher.

The audio-tutorial portion of the methodologies for changing attitudes toward energy problems consisted of the 14 videotapes and a study guide which was specifically developed to accompany them.

The items on the pre and posttest instrument were designed to measure six specific energy-oriented attitudes. The change in each specific attitude of the control group was compared with the change in the same attitude of the experimental group by using t-tests where significance was determined at the .05 level. A total attitude gain score was developed for both the control group and the experimental group and the change in attitude between the two groups was compared again by using a t-test with the significant difference determined at the .05 level. In this study no significant differences were found between the control and experimental groups.

306. Johnson, David I. Ph.D. A Quantitative Comparison of Environmental Education, Conservation Education, Outdoor Education, Ecological Education, Environmentalized Education and General Education Abstracts Based on Goals. Michigan State University. Dissertation Abstracts, 1977, 38(5):1973-B. UMI 77-25,251; 124pp. (Also listed as ERIC ED 139 692.)

DESCRIPTORS: conservation education, descriptive research, ecology education, model building, outdoor education.

The relationship of environmental education to established fields such as ecological education, conservation education, outdoor education, and

new terms like environmentalized education has been confusing. This study was designed to evaluate the relationship of environmental education, ecological education, outdoor education, conservation education, environmentalized education and general education. Goals because of their long-term perspective and internal development were chosen as a basis for comparison.

Goals selected from the literature were juried to obtain 60 goals representing each of the six areas. Using a Q-sort procedure, 65 selected individuals representing the six areas rank-ordered the goal statements into a quasi-normal distribution with scores ranging from +6 to -6. The resulting scores were analyzed using multivariate analysis of variance and one-way analysis of variance followed by Scheffe's Test.

Goals describing man's relationship to and utilization of the environment were ranked high by all groups. Goals describing specific subjects such as health, population growth, and outdoor science were ranked low by most groups. Environmental educators, environmentalized educators, and conservation educators ranked many of the same goals highest. The ecological education and the general education goal categories had a reliability coefficient of .8. Ecological educators ranked their goals significantly higher than all other groups. No differences were found between environmental educators, conservation educators, and environmentalized educators.

Personal data, education, and occupation most often influenced the rankings of the environmental education and environmentalized education goal categories. The courses that participants were currently teaching influenced the rankings of four goal categories.

A model developed to illustrate the relationships among the six groups showed environmental education overlapping the five other areas with especially strong overlaps with conservation education and environmentalized education. The uniqueness of ecological education, general education and outdoor education is also illustrated.

307. Johnson, Warren Dale, Ph.D. Teachers' Perceptions and Circumstances that Influence Willingness to Teach Environmental Studies. University of Illinois at Urbana-Champaign. Dissertation Abstracts, 1980, 41(2):616-A. UMI 8017956; 199pp.

DESCRIPTORS: attitudes, descriptive research, elementary middle school, model building, teacher training inservice, teacher training preservice.

The study addressed five key questions: (1) What are teachers' perceptions of environmental studies? (2) Do teachers perceive that what they are teaching in their curriculum is environmental studies? (3) What kind of materials do teachers present when teaching environmental studies? (4) What experiences do teachers believe influenced their interest in environmental studies? (5) What factors might or might not have a bearing upon whether they teach environmental studies?

Data for the study were collected in two phases. Phase I consisted of an exploratory survey of all the elementary teachers in four schools in a small Midwestern industrial city. Phase II consisted of focused interviews with 14 teachers selected according to their responses to specific questions on the questionnaire used in Phase I. Relevant data were gleaned from the teachers' responses to provide profiles which illustrated each of the interviewed teachers' positions with regard to the five key questions.

Among the more significant findings in the study are the following: Teachers' definitions of environmental studies are similar to definitions given by environmental educators. Teachers are concerned about the environment and are predisposed to teach ES. All teachers were teaching ES in one form or another, usually within science, social studies or reading. The environmental activities most often selected by teachers, exemplified by litter pick-up and plant or animal care, seem to have the same set of attributes; they teach moral values; they are simple to do; they provide immediate and obvious feedback; and the "lessons" are relevant to the life of the student. In general, ES topics are introduced in a whimsical manner. ES sources often used by teachers are science and social studies texts, student news magazines, nature publications, and news media. Teachers feel a variety of experiences influenced their interest in ES and no specific kind of experience can be identified as more important than another. The constraints to teaching ES most often mentioned by teachers are inadequate academic preparation, lack of time, student personal problems, and limited ES materials.

Recommendations made by the researcher to alleviate these problems are: goals/objectives for a comprehensive K-12 school environmental studies program, broad guidelines for a preservice teacher education program in ES, recommendations for developing teacher in-service workshops in ES, and establishment of a state level Environment/Energy Education Clearinghouse and newsletter.

308. Kelley. John Joseph Jack, Ph.D. An Evaluation of a Delivery System for the Implementation of Instruction in Environmental Education at the K-12 Level. The University of Connecticut. Dissertation Abstracts, 1980, 40(8):4385-A. UMI 8003747; 292pp.

DESCRIPTORS: elementary, formal, instrument development, middle school, program evaluation, secondary, teacher training inservice.

The purpose of this study was to determine if a state-sponsored delivery system for the introduction of an innovative program in environmental education achieved its stated objectives, which were to: (1) gain participation by a representative cross-section of the state's teacher population, and (2) provide a program which was satisfactory for the instruction of environmental education. The variables related to teacher participation that were investigated were: grade level, teaching discipline, age, sex, preparation, and experience. Teacher opinion of the program was examined in terms of the constructs: instruction, content, implementation, and logistics.



The sample for the study was comprised of 835 elementary and secondary teachers from throughout the State of Connecticut who attended orientation workshops. A portion of the sample, 445 teachers, chose not to participate further in the program. Of the remaining 390 teachers who ordered the program's curriculum materials, 98 actually instructed a topic in environmental education. A total of 78.2 percent of the workshop participants returned the evaluation forms they had been requested to complete.

Two instruments were developed to obtain the data needed to answer the research questions: (1) the Teacher Profile for determining demographic characteristics, and (2) the Delivery System Evaluation Questionnaire (DEQ) which contains items dealing with teacher response to the workshops, the concepts and materials of the innovative program, and classroom utilization of the materials. The data from the Teacher Profile were used to discover (1) the representativeness of the sample, and (2) the relationship between the demographic variables and the teachers' degree of participation in the program. Common factor analysis of DEQ extracted four underlying concepts and teachers' scores on these constructs were utilized to compare teacher opinion of the programs. Teachers' scores on DEQ were also used to evaluate teacher opinion of the individual topical units and the time required for instruction. The data were analyzed by the chi-square test to determine if the results departed significantly from chance expectation.

The principal findings of the study are: (1) There were significant differences between the teachers who participated in the program and the state's teacher population with respect to grade level and teaching discipline. (2) Teacher participation in the program was significantly influenced by the variables of experience in environmental education, academic degrees obtained, and sex. However, no significant effect was felt by the variables of grade level, teaching discipline, age, years in teaching and in present position, and undergraduate field of study. (3) Although there was no significant difference, the opinions of elementary teachers and secondary level science teachers varied on the constructs of instruction, content, implementation, and logistics. (4) Teacher evaluation of the program did not reveal significant qualitative differences among the individual topics of environmental education. (5) Teacher estimation of the program's curriculum materials was not enhanced to a significant degree with increased instructional time in environmental education.

309. King, Robert Eugene, Ed.D. The Impact on Knowledge, Attitude, and Achievement Motivation Scores of Various Sequences of Field Trip and Classroom Instruction Using Selected Energy Education Concepts. University of Kansas. Dissertation Abstracts, 1979, 39(7):4166-A. UMI 7824839; 133pp.

DESCRIPTORS: affective, attitudes cognitive, energy education, experimental research, field trip, knowledge, middle school, secondary.

The comparative effectiveness of four presentations involving the same energy production and use objectives was studied. Thirty-two intact eighth grade classes containing 619 students were, with the exception of five control classes, randomly assigned to one of four experimental treatments: (1) field trip following classroom instruction, (2) classroom instruction following the field trip, (3) classroom instruction only, and (4) field trip instruction only. Twelve intact ninth grade classes containing 240 students were randomly, within logistical limits, assigned to one of three experimental treatments: (1) field trip following the classroom instruction, (2) classroom instruction following the field trip, and (3) classroom instruction only.

Field trip and classroom instruction was based upon the same set of cognitive and affective objectives. Field trips were conducted by well trained paraprofessional guides assigned to work with a maximum of 10 students per guide per trip. Each field trip lasted two hours, and involved a tour of an electrical power plant, a nuclear reactor, and an electrical engineering laboratory. Classroom instruction was done by the regular teachers, and occupied 10 class sessions. Teaching suggestions, student reading materials, experiments, and films were provided to each teacher. Students in the control groups studied their normal classroom curriculum during the duration of the experiment.

Four areas were evaluated: student achievement on the cognitive objectives, student attitudinal shifts on the affective objectives, student responses on the Junior Index of Motivation Scale, and student evaluation of their treatment experiences. In addition, correlations between the first three variables were examined. The data from this investigation were analyzed using *t*-tests, analysis of variance, analysis of covariance, analysis of orthogonal comparisons, and chi-square tests as appropriate. A uniform level of .05 was used in determining the statistical significance of each test.

- (1) Significant differences were found at the eighth grade level between experimental and control groups on the Energy Knowledge posttest. The experimental groups recorded uniformly higher posttest scores, even though on the pretest the control groups had recorded higher scores.
- (2) Significant posttest Energy Knowledge score differences were found at the eighth grade level between groups receiving both field trip and classroom instruction, and those receiving only field trip or classroom instruction. The former groups recorded higher posttest scores.
- (3) When eighth and ninth grade post-Energy Knowledge scores were studied using a 2 x 3 analysis of covariance procedure, significant differences were observed between both grade level means and treatment means. The ninth grade students achieved higher adjusted posttest scores than the eighth grade students. Students in the three treatment groups--field trip then classroom instruction, classroom instruction then field trip, and field trip only--recorded average means that were significantly different and ranked from high to low in the order listed.

- (4) No significant test score differences between treatment groups or between grade levels were found for any of the attitudinal tests used in this study.
- (5) For the three treatment groups receiving field trip instruction, with or without classroom instruction, correlations of post-Energy Knowledge and post-Energy Attitude ranged from .30 to .45 at the two grade levels. For those treatment groups that received only classroom instruction, the knowledge and attitude correlations were .18 at the eighth grade level, and .25 at the ninth grade level.
- (6) The Junior Index of Motivation posttest scores displayed significant, positive correlations with the Energy Attitude scores for all experimental treatment groups at the eighth grade level. The correlations ranged from .26 to .41. However, no significant correlations were observed between the JIM scores and the Energy Knowledge scores.

310. Kinsey, Thomas Gail, Ph.D. A Study of the Defensibility of Environmental Attitudes: Instrument Development and Experimental Testing of Defensibility as Related to Knowledge. University of Maryland. Dissertation Abstracts, 1979, 39(10):6046-A. UMI 7908854; 139pp.

DESCRIPTORS: attitudes, higher education, instrument development, issue-based, knowledge, values.

The purpose of this research project was to study a different approach to the problem of the relationship of environmental attitudes to knowledge of the environment. This different approach has its theoretical basis in the social sciences (Coombs and Chadwick, 1971; Raths, et al., 1966) and sought to observe a step in the process of value formation. Specifically, the author was interested in looking at how an individual utilizes his knowledge of environmental concepts as supports for his environmental attitudes.

There were two major outcomes of this project. First, a viable instrument (The Environmental Issues Attitude Defensibility Inventory), which measures in the broadest sense an environmental attitude and also the defensibility (information supports) of that attitude, was produced. Second, there is evidence that completion of an environmental studies course can increase the breadth of informational supports (defensibility) of an environmental attitude.

This experimental phase of this research took a preliminary look at the relationship of the variables value judgment (a statement of a general environmental attitude) and the defensibility level (the informational supports a person can summon to support that value judgment) as they relate to knowledge and the experience of an environmental studies course. Knowledge of environmental concepts was measured by a shortened version of The Environmental Science Test Form B (Fleetwood, 1972).

For the experimental phase of this project, the sampled population was 141 summer session (1977) students at the University of Maryland, College Park. Three environmental studies courses were chosen to be studied, and for each treatment course an appropriate control (nonenvironmental studies) course was selected. The control courses were selected by the criteria that the students in the nonenvironmental courses had similar backgrounds to the students in the environmental studies courses and that the students in the control group were potential registrants for the environmental course at some future time. The experiment was conducted as a modified Solomon Four-group design.

There were no significant differences among the courses in the initial levels of any of the variables as measured in a pretest. The results of the posttest showed that there were no significant differences in the basic attitude (as reflected by the value judgment) among the courses studied. There is evidence, however, that the breadth of informational supports (level of defensibility) of their attitudes was increased by the completion of an environmental studies course.

In an area where the research literature is complex and conflicting, this research lends evidence to the conclusion that knowledge alone cannot be relied upon to produce changes in environmental attitudes (Dispoto, 1977). However, there is evidence that completion of an environmental studies course will produce individuals who have more defensible (more strongly supported) attitudes. Apparently, when confronted with an environmental issue, persons who have completed an environmental studies course will integrate the concepts learned into supports for the value decision he makes on the issue.

311. Kinzel, Steven Frank, Ph.D. A Q-Methodological Study of Environmental Attitudes of Participants in the 1975 Michigan Youth Conservation Corps. Michigan State University. Dissertation Abstracts, 1977, 38(3):1115-B. UMI 77-18,499; 154pp.

DESCRIPTORS: attitudes, conservation education. nonformal, outdoor education, program evaluation.

The residential, state-sponsored, Youth Conservation Corps in Michigan, during the summer of 1975, was operated with two five-week sessions. Camps were located at Yankee Springs and Headquarters Lake in the Lower Peninsula and Alberta in the Upper Peninsula.

The purpose of this investigation was to: (1) identify attitudes of members of the 1975 Michigan Youth Conservation Corps toward the environment and related areas; (2) determine if there was any shift in attitudes after members had been involved in the program; and (3) find any relationship between attitude "types" and age, sex, education, family income, religious orientation, participation in clubs, summer camps, and various outdoor activities.

In order to determine attitudes toward the environment and any possible attitudinal shifts, Q-methodology was used. Interviews were conducted

with enrollees involved in the first five-week session to sample attitudes about the environment. Interviews yielded 60 statements about the environment which were used to construct the Q-sample. It was administered on a pre and post basis to camp participants and members of a church youth group. Data analysis revealed four attitudinal types. These "types" were named: Proponents of Social Control, Want Satisfiers (Hedonists), Proponents of Personal Involvement, and Disbelievers: There Is No Problem.

The Proponents of Social Control view people as being responsible for our environmental problems. They believe people are too materialistic and should know better than to do the things they do. Changing people's values, even if it means legislative action, is their solution.

The Want Satisfiers (Hedonists) do not feel limits should be imposed on them or that they need to personally change their habits in order to bring about a solution to the problem. They have a hands-on approach to Mother Nature and feel that technology which helps to satisfy their wants, will also get them out of their environmental problems.

The Proponents of Personal Involvement are not anxious to place the blame for environmental problems, but they do believe that others, as well as themselves, are ready to get involved to solve the problems at hand.

The Disbelievers: There Is No Problem do not seem to recognize the problems the other types do. Generally, they feel people who create problems should be and are concerned with taking care of the problems they create.

The consensus statements indicated that subjects agreed that we are a wasteful nation with most people being part of the problem. Subjects also saw industry as an untrustworthy culprit who must be forced to stop polluting. Finally subjects were in general agreement that we should consume less, recycle more, and have a greater respect for life and the environment. Factors such as sex, education, grade average, mechanized sports activities, and other outdoor related activities appear to be important when describing the various attitudinal types found in this study.

Of particular interest to this study was the shift in attitudes that could be seen between the pre and posttests. While Factor I (Proponents of Social Control) and Factor II (Want Satisfiers) had several people with significant factor loadings on both the pre and posttest, Factor III (Proponents of Personal Involvement) represented a type of attitude found mainly on the pretest while Factor IV (Disbelievers: There Is No Problem) represented another type of attitude found only on the posttest.

YCC has provided the opportunity Proponents of Personal Involvement have sought. After involvement in the YCC program, their attitudes toward the environment have changed.

Factor IV (Disbelievers: There Is No Problem) represents a coalescing of unidentifiable types of people into an identifiable one. After

several weeks in the YCC program, Disbelievers did form recognizable attitudes toward the environment.

From all evidences, it seems that the YCC program has accomplished some measurable objectives.

312. Kudlas, John Michael, Ph.D. The Effect of An Interdisciplinary Course in Sportsman's Biology Upon High School Students' Attitudes Toward Wildlife and the Environment. University of Utah. Dissertation Abstracts, 1979, 39(10):4794-B. UMI 7907532; 101pp.

DESCRIPTORS: attitudes, interdisciplinary, program evaluation, resource management education, science education, secondary.

The problem was to ascertain if there was any attitude change toward wildlife after students had participated in the Sportsman's Biology class at Mayo High School when compared to similar students. Also, to determine the difference in attitude toward the general environment, of students, after completing the Sportsman's Biology class, and similar students not enrolled.

The experimental subjects were 61 students who selected the Sportsman's Biology class in the fall of 1977; and the control subjects were 61 other eleventh and twelfth graders who were matched according to their sex, grade, relative socioeconomic status as indicated by their elementary school district and their scores on the Lords Thorndike Non-Verbal Cognitive Ability Test. To determine if any change in attitude toward wildlife had occurred, the nonequivalent control group quasi-experimental design was implemented using a pretest and posttest with both groups. To further ascertain if attitudes toward the general environment differed at the conclusion of the course, the static-group comparison technique was employed. To determine Attitudes Toward Wildlife (ATW) and General Environment Concern (GEC) two attitude scales were selected from Joseph Passineau's (1975) dissertation project conducted at Utah State University in Logan, Utah.

The t-test was used to determine homogeneity and it was found that the two groups differed significantly at the .05 level before the start of the semester. The control group's t-test analysis revealed no significant change, at the .05 level, in their attitude toward wildlife. The analysis of variance revealed that the experimental group's attitude toward wildlife had changed more significantly, at the .05 level, than the control group's. A t-test, at the .05 level, revealed that the Sportsman's Biology group had a greater environmental concern than the control group.

The conclusions formulated within the limitations of this study were that: 1) some factor or factors other than the combination of sex, age, socioeconomic status and cognitive ability affect attitudes toward wildlife and/or students' election to enroll in Sportsman's Biology. The pretest revealed a significant difference between the two groups; 2) the students who enrolled in Sportsman's Biology significantly changed

their attitude, in a positive direction, toward wildlife while similar students actually decreased in their mean attitude scores toward wildlife; 3) students in Sportsman's Biology had a greater concern for the environment than the control group at the conclusion of the semester. The Sportsman's Biology class appears to be an effective method in obtaining higher attitudes toward wildlife and environmental concern.

313. LaHart, David Eugene, Ph.D. The Influence of Knowledge on Young People's Perceptions About Wildlife. The Florida State University. Dissertation Abstracts, 1978, 39(6):3496-A. UMI 7822182 99pp. (This report, in slightly different form, is also listed as ERIC ED 170 167.)

DESCRIPTORS: attitudes, descriptive research, knowledge, resource management education.

Knowledge and attitudes are major components of environmental perception and are important influences on each other. Knowledge about ecological concepts, knowledge about wildlife and knowledge about endangered and threatened species were measured using over 1,300 eighth graders in Broward County, Florida. Knowledge was associated with attitudes, consumptive attitude orientations, demographic characteristics, animal-related activities and other variables.

A model for examining environmental perception was developed and used to organize various components of this study. The model proved useful as a scheme for perceptual studies.

The results indicate that knowledge plays a relatively minor role in predicting attitudes. Level of knowledge was significantly associated with 16 of 25 attitude items but the strength of the associations was low, ~~indicating that other factors may be more important determinates of attitudes.~~ Nonconsumptive users of wildlife greatly outnumber consumptive users and are more knowledgeable.

Sex, race, and parental education were the most important demographic predictors of knowledge. Urban, rural and suburban differences were significant, but this finding is complicated by a low frequency of rural residents in the population. Parental association with an animal or wildlife-related organization was not significantly related to knowledge level.

Participation in animal-related activities showed the highest association with knowledge of any of the variables examined. Level of participation was associated with 18 of 25 attitude items but the strength of the associations was low. Knowledge level was not associated with the frequency of consumptive activities like hunting and fishing. These were the only animal-related activities that were not significantly associated with knowledge.

The effects of increasing knowledge on attitudes remains unclear because of the small knowledge increases in the experimental group and the lack of a functional control.

314. Larson, Peter Ellsworth, Ph.D. Environmental Value Orientations and Methods of Teaching Environmental Values in the Elementary School. University of Oregon. Dissertation Abstracts, 1976, 37(6):3378-A. UMI 76-27,658;144pp.

DESCRIPTORS: descriptive research, middle school, values.

The primary purpose of this study was to determine the environmental value orientations of parents, teachers, and students in the Kenai-Soldotna area of the Kenai Peninsula Borough, Alaska, and to assess whether value orientations differed. Secondly, it attempted to determine what environmental value orientation parents want their children to hold and whether that desire and their children's actual environmental value orientation differ. Thirdly, it attempted to determine what environmental value orientation teachers say they teach in their classes and whether that environmental value orientation is similar to students' actual environmental value orientation. Finally, it attempted to determine if parents and teachers want environmental values to be taught in schools and, if so, what approaches they advocate.

In order to quantify environmental value orientations of parents, teachers, and students, a revised version of the Variations in Value Orientations Schedule developed by Kluckhohn and Strodtbeck (1961) was used.

Teachers' and parents' views of whether environmental values should be taught and desired approaches to teaching environmental values they recommend were determined by an instrument developed by the author entitled Teaching Environmental Values Inventory.

A random sample of 27 sixth grade students from the Kenai-Soldotna, Alaska area constituted the student sample for this study. One parent of each student, 14 male and 13 female, constituted the parent sample. The students' teachers, of which there were 12, constituted the teacher sample for this study.

The data for this study were collected by conducting an interview at which time the respondents responded to the two inventories mentioned above.

Nonparametric statistical procedures were used to determine the participants' environmental value orientations and to determine whether differences existed within the groups identified. In order to determine statistical differences between teachers' and parents' responses to the Teaching Environmental Values Inventory, the "students t-test" was used.

In general the study revealed that: 1) Students hold a Subjugation-to-Nature environmental value orientation, whereas a Mastery-over-Nature environmental value orientation was held by parents and teachers; 2) Students' environmental value orientation differed from



that environmental value orientation their parents thought they should hold, and from that orientation teachers indicated they taught; 3) Teachers and parents alike agreed with the statement: environmental values should be taught in the schools; 4) Teachers and parents agreed that environmental values should be taught in the schools through: a) setting of personal examples, b) pointing to good models in the past, c) allowing students to freely choose from alternatives after having given consideration to those alternatives, d) presenting arguments and reasons for this or that set of values and by pointing to the fallacies and pitfalls of other sets of values; 5) Teachers and parents felt a need to place greater emphasis on environmental education in the area schools.

315. Leek, Marcia Louise, Ph.D. Project Coast's Tests of Marine Environment Awareness: A Validation Study. University of Delaware. Dissertation Abstracts 1980, 41(3):923-A. UMI 8019918; 198pp.

DESCRIPTORS: cognitive, descriptive research, elementary, marine education, middle school, program development, program evaluation, secondary.

This investigation had two purposes: the validation of Project COAST's tests of marine environment awareness and the examination of the test results as a possible indication of the need for curriculum revision. Dr. Robert W. Stegner realized the need to establish a baseline indicator of marine knowledge so that curriculum could be developed to meet the needs of students in acquiring a basic stock of marine concepts upon which rational decisions concerning the future of the coast and ocean resources could be made. The Project COAST tests are a product of this concern.

The Marine Environment Awareness Tests for grades 4, 8 and 11 are each composed of 30 multiple choice questions written to measure student understanding of the concepts presented in the Conceptual Scheme for Marine and Coastal Environmental Studies developed by Geens and Stegner in 1973. These tests were administered to over 8,000 students from public and private elementary and secondary schools throughout the United States. The study was divided into two parts: the 1976-1977 sample in which schools were selected jointly by representatives from the state departments of education from New Jersey, Delaware, Maryland, and Virginia and the director of Project COAST; and the 1977-1978 sample in which teachers throughout the United States volunteered to take part in the testing program as a result of an invitation extended by the National Marine Education Association and Project COAST.

Using the data from these testing populations, hypotheses concerning test reliability, content validity, construct validity, item difficulty, and item discrimination were examined. Readability levels for each test were also estimated. Complementary studies including teacher interactions were conducted to assist in the assessment of hypotheses concerning teacher judgment of students' knowledge of marine concepts, the effects of instruction upon student test scores, and teacher attitudes toward revision of curriculum based upon their examination of test data.

KR-20 reliability coefficients ranged from .46 to .71 while the test-retest coefficients indicated reliabilities of between .58 to .68. Because the tests are relatively short measures, the Spearman-Brown prophecy formula was used to estimate reliability for tests of 60 to 90 items and yielded coefficients within the acceptable range of .80 to .95. The tests were determined to have a representative sample of questions which defined the content domain of interest and thus content validity was established. Construct validity of the tests was partially supported by the correlational studies which indicated that students' overall achievement in basic skills and educational ability accounted for 16 to 31 percent of the variance in the marine test scores.

Seven readability tests computed as part of the DELRAP program indicated that on the average the tests are at least two grade levels above the level for which they are designed. However, this is due in part to the technical, scientific vocabulary used in the tests. Limited studies indicated that marine instruction tended to significantly improve student scores on the tests and teachers did indicate a positive attitude toward incorporating a marine program into existing curricula.

Implications from the study findings indicate that the test results can and should be used by curriculum developers. Item analysis and groupings of the questions by the four major scheme concepts should show areas where emphasis is needed to improve student knowledge of the marine environment. This project is only the beginning of a movement to improve the United States citizens' knowledge of the marine ecosystem and its importance to our future existence.

316. Leftridge, Leonard Alan, Ph.D. Rural and Urban Secondary Student Perceptions of Environmental Issues: Relevance to Environmental Education Curriculum Development. Kansas State University. Dissertation Abstracts, 1978, 38(9):5377-A. UMI 7800819; 119pp.

**DESCRIPTORS:** affective, cognitive, issue awareness/knowledge of issues, issue-based, issue investigation/evaluation skills, rural, secondary, urban.

**PURPOSE:**

Do urban students perceive environmental problems differently than rural students? If they do, how should knowledge of this affect environmental education curriculum development? Variations concerning views of environmental issues can be determined by measuring subject perceptions of those topics. A review of the literature showed that comparative studies of student environmental perceptions had not been undertaken. The overall purpose of the study was to determine how disparate groups of secondary students perceive environmental issues and to discuss how the knowledge of these perceptions, relative to environmental studies, can aid in curriculum development.

**RESEARCH FORMAT:**

Sample Populations: Subjects employed for the study consisted of "central city" and rural secondary students from nine secondary schools in Kansas. Forty-five classes were selected for gathering data yielding a total of 1,078 subjects. Required junior level classes chosen were American history, literature or English in order to avoid science-related courses which might have recently addressed environmental issues.

Instrumentation: Subjects experienced an instrument composed of three parts. The first part was a questionnaire intended to obtain pertinent demographic data. These data included the history of habitation, educational background, and extent of domestic travel of each subject.

The second part of the instrument was composed of 40 two-by-two photographic slide transparencies of which 36 illustrated environmental issues common to urban and rural settings; the remaining four slides were distractors. One-half of the 36 slides depicted urban scenes, the other half rural. A semantic differential was used in conjunction with the slides in order to assess subjects' perceptions of each scene.

The third component of the instrument was a 40-question multiple choice test. Each item contained five distractors and was associated with one photographic slide. The purpose of the cognitive instrument was to serve in identifying how subject perceptions were manifested, that is, whether affective or cognitive.

Collection of Data: Test administration and data collection were performed by the researcher. Subjects were tested in intact classroom groups where the researcher provided instructions and slide program manipulation.

The subjects were informed that the purpose of the instrument was to assess their immediate perceptions without opportunity for reflection. Therefore, they had a limited amount of time for viewing each slide and marking the semantic differential. The slides were flashed on the screen and left there for six seconds. No pauses were made between slides.

**CONCLUSIONS:**

The study identified, measured, and compared environmental perceptions of urban and rural secondary students. As a result, the conclusion of this study is that regardless of the issue, geographic setting of the problem, or amount of educational background of the subjects, rural students are more perceptive of environmental issues than urban students. Other conclusions that can be drawn from the results are related to the effect travel and education have on environmental perceptions; and the extent that environmental education pervades Kansas public schools.

Whereas the amount of travel a subject has experienced did not affect perceptions, education did. Those urban students who have not had any

environmentally-oriented classes were not as perceptive of environmental issues as urban and rural students who have had environmentally-oriented classes, or rural students who have not experienced any such courses. Finally, nearly 57 percent of the subjects questioned have not had any courses dealing at least six weeks with some form of environmental issues.

Based upon the literature and results of this study, the researcher suggests the following relative to environmental education curriculum development: 1) All students should be surveyed relative to the environmental issues which are relevant to their lives before attempting to embark on any activities which are cognitive in nature; 2) A concerted effort needs to be made in the secondary schools to implement environmental awareness activities into all disciplines. Curriculum designers should seek innovative ways of incorporating environmental education from a multidisciplinary approach. Although the literature supports this position, very little multidisciplinary development has taken place.

317. Lyon, Timothy Frank, Ph.D. A Survey of the Environmental Education Knowledge and Awareness of Selected Elementary School Students in Illinois. Southern Illinois University. Dissertation Abstracts, 1976, 37(6):2742-B. UMI 76-28,759; 130pp.

DESCRIPTORS: descriptive research, knowledge, middle school.

The purpose of this study was to assess the basic level of environmental education knowledge and awareness of selected sixth-grade students in public schools of Illinois. The instrument used to obtain this baseline inventory was constructed from specific environmental education objectives written for sixth-grade students. These objectives were written by the Task Force for Environmental Education in the April, 1974 draft of the Illinois State Plan for Environmental Education. The multiple-choice instrument used to collect the data consisted of 35 knowledge questions and three opinion questions.

Data from the following samples were collected for the study: 1) 16 geographical region-population category cells, 2) four geographical regions, 3) four population categories; 4) classes which had had environmental education, 5) classes which had not had environmental education, and 6) all classes that responded to the study. A total of 1,583 sixth-grade students from 67 school districts in the state participated.

Mean scores were calculated for the samples. The mean score of the sample representing the whole state was compared to each of the means of the other samples. The "t" test was used to determine if any of the differences between means were statistically significant. The mean scores from the following samples were found to be significantly higher than the whole state mean: 1) northeast geographical region, and 2) population category 25,000-49,999. The mean score for the southwest geographical region was found to be significantly lower than the whole state mean. The remainder of the sample means were not statistically significant when compared to the whole state sample mean.

318. Magnoli, Michael Allen, Ph.D. The Development of a Conceptual Model for Construction of a Multidisciplinary K-12 Environmental Education Program. The University of Alabama. Dissertation Abstracts, 1977, 37(12):7445-A. UMI 77-12,220; 199pp.

DESCRIPTORS: formal, model building, multidisciplinary-infusion, program development.

The problem of this study was to develop a conceptual model to illustrate the major elements that deserve consideration by a local school system when developing a multidisciplinary, K-12 environmental education program. The model was to contain the flexibility necessary to permit identification at the local level of the specific processes for program development and implementation. This flexibility would provide for maximum utilization of local physical, fiscal and human resources.

A systematic search of the literature was made (i) to examine models that have been developed in environmental education program planning, and (2) to identify the various factors which appeared to have had impacts on program development at the K-12 level.

The conceptual model generated in this study reflected seven major elements in program development, as well as the major concerns associated with each element. The model was further expanded into a process during its implementation in a case study.

The outcomes that are generated from this study are as follows: 1) A conceptual model for developing a multidisciplinary, K-12 environmental education program has practical application at the local school level; 2) The application of a conceptual model could provide for consistent program planning and facilitate common instrumentation and communication between school systems; 3) The model must provide flexibility at the local level to accommodate organizational and political considerations as well as locally defined needs and resources, and 4) The model must anticipate the major problems or concerns universally applicable to environmental education program planning.

319. Markovits, Paul Stephan, Ph.D. Environmental Education and the Resident Outdoor Education Experience. Syracuse University. Dissertation Abstracts, 1978, 38(8):4712-A. UMI 7730744; 199pp.

DESCRIPTORS: attitudes, descriptive research, middle school, outdoor education.

The study groups in this investigation of attitudes toward the natural environment were sixth grade students from six elementary schools in the suburban Binghamton, New York area. The students' attitudes were assessed through use of two self-report measures: the Markovits Inventory of Environmental Attitudes (MIEA) and the DeLucia-Parker

Environmental Attitudes Test (DPT). An unobtrusive "Litter Index" provided additional data. The students from one of the experimental schools participated in a resident outdoor education experience (ROEE) in the fall of the year and in extra environmental education activities (EEA) throughout the year. A second group of students attended only the Fall ROEE, and still another school group served as the control for each of the above. Students from three other schools participated in the spring component of this study. One such group received the EEA before the ROEE, another participated only in the ROEE, and a third group served as the control for each of the Spring ROEE groups.

The data obtained from the completion of the survey instruments were analyzed so as to test nine hypotheses. The statistical level of significance for rejection of the hypotheses (null) was set at  $p < 0.001$ , which accumulated to an overall level of  $p < 0.10$  for the total number of analyses performed.

The analyses of the control group (S6) data indicated the occurrence of a positive change in attitude from the time of the pretest to the four-month and eight-month survey on the concept (A FLOWER) as measured by the DPT. A positive change for control group S3 was seen for concept 6 (Air Pollution), as tested from the time of the pretest to the eighth month testing. A negative change was obtained for concept 7 (A Lake), measured for the same-time span. No differences were measured with the MIEA for these time periods nor for the time span between the pretest and the end of the fall camping experience.

A statistically significant change was however observed with respect to concept 3 (Two Mushrooms) as measured at the end of the Fall ROEE. No similar results were seen for the Spring ROEE. However, one of the Spring ROEs did yield a statistically positive ( $p < 0.001$ ) change in regard to the "General Environment" scale of the MIEA.

The "Litter Index" data yielded no statistically significant results in regard to overall associations for all testings. The ROEE + EAA and ROEE did not show statistically significant changes as measured by the percentage of litter observed before and after the ROEE.

In testing the above hypotheses for possible differences due to the sex of the student or to the achievement level of the student, there were found no statistically significant differences. There were however differences between males and females ( $p < 0.001$ ) in regard to the "Socialization" category of the MIEA. Differences were statistically significant for the "General Environment" and "Pollution" categories ( $p < 0.001$ ) comparing the Stanine scores of students.

320. McCarthy, C.S.J., Sister Ann Margaret, Ed.D. An Evaluation of Primary Level Environmental Education Modules upon the Attitudes of Seven-Year-Olds. University of Georgia. Dissertation Abstracts, 1976, 36(8):5190-A. UMI 76-2244; 121pp.

DESCRIPTORS: attitudes, elementary, experimental research, program evaluation.

This study attempted to determine if teaching activity-oriented environmental education modules to seven-year-olds would result in more positive attitudes ( $p < .05$ ) toward environment in the areas of man-land, man-water, and man-air relationships. Subjects were 207 seven-year-olds in a predominantly white middle class school district randomly assigned to treatment and control groups. During a 13-week instructional period, the experimental group received activity-oriented, interdisciplinary instruction on environmental topics. The control group received the usual district social studies instruction. Both groups were posttested for environmental attitudes. A 66-statement modified Likert scale, constructed by the researcher, was used to assess attitudes on the levels of feelings, predispositions, and actions. Data were analyzed by a factorial treatment by sex analysis of covariance design. Vocabulary and comprehension scores on the Gates-MacGinitie Reading Test were used as the covariates. No statistically significant difference ( $p < .05$ ) was found between sexes on any subtest or on any criterion variable across or within treatment. Aptitude as expressed by reading scores was not found to be a reliable predictor of criterion measures ( $p < .05$ ). The posttest means of the treatment group were statistically significant ( $p < .001$ ) on every subtest and criterion variable. Although all differences were statistically significant ( $p < .001$ ), the greatest difference was found on the level of actions, and the least difference on the level of feelings. It was concluded that (1) treatment alone was responsible for the more positive environmental attitudes of the experimental group; (2) neither sex class nor reading ability were confounding variables with seven-year-olds in this study.

321. Mehne, Paul Randolph, Ph.D: Affective Change Educued in Urban Secondary Students as a Consequence of Viewing Television Environmental Public Service Announcements. State University of New York College of Environmental Science and Forestry. Dissertation Abstracts, 1976, 36(9):4365-B. UMI 76-2578; 411pp.

DESCRIPTORS: affective, program evaluation, secondary, urba: .

This study investigated the ability of television environmental public service announcements to educe change in urban secondary students' affective evaluations of environmental concepts.

The sample consisted of 400 subjects enrolled in the seventh, eighth, eleventh and twelfth grades of Syracuse City School District, Syracuse, New York. A nonequivalent control group design randomly assigned social studies classes of these subjects to experimental and control samples.

Both control and experimental subjects were asked to judge 12 environmental concepts against 10 bipolar adjective pairs in a pretest instrument employing the semantic differential technique. Experimental subjects next viewed a color television stimulus event comprised of commercial broadcast programming and three environmental public service announcements produced specifically for the investigation. Presentation of the stimulus event simulated actual broadcast television through the use of a 23-inch color television and a color video recorder concealed in a mobile display cabinet. Both control and experimental subjects

were subsequently asked to judge the same 12 environmental concepts in a posttest semantic differential instrument.

Preliminary factor analysis of semantic differential raw data was conducted to determine the dimensionality of subjects' responses. Educated change in subjects' affective evaluations of the 12 environmental concepts was then determined using a variation of Osgood's D Statistic. Comparisons among group responses were made by a factorial analysis of variance.

The results of the study indicated that 30-second "straight informational," alternative-choice format environmental public service announcements are an effective medium for educating positive change in subjects' affective evaluations of environmental concepts. Results also indicated that urban seventh and eighth grade subjects exhibited significantly more positive change in affective evaluations of environmental concepts than urban eleventh and twelfth grade subjects. If careful consideration is given to the factor structure and concept vocabulary of the semantic differential technique, the study has shown that an instrument based upon this technique will provide a sufficiently sensitive measure of changes in environmental affective evaluations.

Results are reported from a concomitant survey of United States commercial broadcast television stations which was conducted to determine regionally-oriented production and message design criteria for environmental public service announcements.

322. Melton, Arthur Larry, Ed.D. A Survey of Environmental Knowledge, Sources of Environmental Information, Solutions to Environmental Problems, and Environmental Concerns of Junior High Students in Philadelphia Public Schools. Temple University. Dissertation Abstracts, 1976, 37(4):2096-A. UMI 76-22,057; 155pp.

DESCRIPTORS: knowledge, instrument development, middle school, model building, program development, secondary.

The purpose of this endeavor was to obtain baseline information about students' environmental knowledge, sources of their environmental information, and their perceptions regarding solutions to environmental dilemmas. Also included in the study were three short questions to indicate the intensity of the students' concerns for environmental problems. The study was designed in order to answer the following questions: 1) How well do seventh and ninth grade students in the Philadelphia Public Schools score on questions about the environment? 2) What are the students' sources of information to questions about the environment? 3) What solutions do the students perceive as being helpful in solving environmental dilemmas? 4) What degree of concern do the students express about three environmental conditions presented to them?

The survey instrument was developed by the author, and a pilot test was conducted in May, 1974. The major study took place in April and May, 1975. The survey instrument was administered to 598 students in 12



Philadelphia junior high schools. One seventh grade and one ninth grade class was sampled in each school for a total of 24 classes. The schools were divided into two categories; Title I eligible, and Title I noneligible. This was referred to as the socioeconomic status (SES): high SES = Title I noneligible, and low SES = Title I eligible.

The data were analyzed with the aid of frequency counts and percentages, analysis of variance, chi square tests, and multi-way contingency tables calculated by the CDC-6400 computer at Temple University, utilizing the Statistical Package for the Social Sciences computer programs. The major conclusions from the study are presented below:

Conclusions to Question 1: The total test mean for the knowledge portion of the survey was 12.7 correct out of 24 questions. The low SES students scored lowest on this portion of the survey (11.8 correct) while the high SES students scored highest (13.5 correct).

These results were better than would have occurred for random guessing and almost as good as the results that were attained by giving the same questions to high school students in other schools across the United States in previous studies.

The most important implication concerning No. 1 is that low SES students must receive special attention in planning and implementing environmental curricula.

Conclusions to Question 2: Data from the present study indicate that the pupils did not attain the major part of their environmental information in the schools. The media outscored all possible sources of information, having been selected 32 percent of the time as the major source of environmental information.

Two significant response patterns were noted. First, the low SES seventh graders selected the media as a major source of information more than any other group of students. Second, high SES students in ninth grade selected home as the major source of information.

These findings do not imply harsh criticism of the schools. They do imply a need to take advantage of the fact that the media work as a vehicle for teaching environmental information and should be utilized more.

Conclusions to Question 3: In responding to 10 environmental dilemmas presented to them, the students indicated they had some understanding of the complexity of solving environmental dilemmas. They selected multiple resources as solutions to the dilemmas over one-fourth of the time.

Furthermore, the ninth graders expressed their beliefs that solutions to environmental problems were of the political and economic nature. However, the seventh grade students thought that environmental problems facing us would best be solved by personal changes in behavior and scientific and technological advancements.

These findings imply that environmental curricula truly be interdisciplinary and that they include political and economic facets of ecology as a legitimate part of the studies.

Conclusions to Question 4: The results of the total sample indicated the students did not express much personal concern for environmental problems. The mean score for the entire sample on the Likert-type scale was 1.76, which means the pupils were "a little concerned."

The intensity of concern varied by grade level and SES groupings. Specifically, the ninth graders were less concerned than seventh grade students, and the high SES students were less concerned about environmental issues than the low SES students.

The implications to these findings are to teach environmental activities that relate directly to the everyday lives and need of the students. They are more interested in issues that relate directly to their homes.

323. Mitchell, Clayton Allan, Ph.D. The Relationship Between Principled Reasoning and Ecological Attitudes, Knowledge, and Behavior. University of Arkansas. Dissertation Abstracts, 1980, 41(5):1980-B. UMI 8026038; 227pp.

DESCRIPTORS: attitudes, behaviors, beliefs, issue awareness/knowledge of issues, issue-based, knowledge, nonformal.

The literature on the Defining Issues Test was reviewed, as was the literature on environmental attitudes, knowledge, and behaviors. The present study examined the relationships between principled reasoning, environmental concern, attitudes and beliefs regarding ecological issues, knowledge about environmental pollution, and ecological behavior in members of civic clubs and environmental groups. The differences between civic and environmental groups on these variables were also evaluated. Eight hypotheses were made regarding the group differences on these variables and the relationships between these variables within the two groups.

A variety of scores from the measures used to assess these variables were calculated and their relationships were evaluated using Pearson product-moment correlations. Group differences on these scores were evaluated with t-tests. Factor and item analyses were also done to more specifically describe between and within-group response variations. The results from these analyses were also used in refining several of the measures.

The influences of age, sex, level of education, number of children, religious preference, and occupation were also examined. Members from two civic groups and four environmental groups volunteered to participate. Questionnaires were personally delivered to civic club members but were only handed out to environmental members at their meetings. Participants filled out their questionnaires within four weeks and returned them by mail.

The hypotheses regarding group differences on four of the measures were confirmed indicating that environmentalists demonstrated significantly higher levels of principled reasoning ( $t = 2.33, p < .05$ ), environmental concern ( $t = 3.59, p < .001$ ), ecological knowledge ( $t = 2.18, p < .05$ ), and proecological behavior ( $t = 5.6, p < .001$ ) than did civic club members. The influence of age range differences between the two groups on these findings was discussed as well as the effect of the sample bias introduced by the substantial amount of time required to complete the questionnaires. The influence of the other demographic variables was not significant.

The hypothesized positive correlation of principled reasoning with expressed environmental concern and proecological behavior was not confirmed. Similarly, the hypothesized positive relationship between levels of principled reasoning and environmental knowledge was not confirmed. The hypothesis that environmental concern about the environment would not significantly correlate with proecological behavior was not confirmed. The two variables were significantly correlated in the civic group ( $r = .39, p < .05$ ) and the environmental group ( $r = .37, p < .05$ ). As predicted, expressed ecological concern and ecological knowledge were not significantly related. Encouragingly, however, the hypothesis that environmental knowledge and proecological behavior would not be related was only confirmed in the civic group. Level of knowledge and proecological behavior were significantly related in the positive direction for the environmental group ( $r = .32, p < .05$ ). Taken as a whole, the correlations between the four measures of principled reasoning, ecological attitudes, knowledge, and proecological behavior did not evidence a congruent pattern in which these qualities were all positively interrelated.

Factor and item analyses were used to reduce the number of items in the Environmental Concern Scale and the sections of the Pollution Questionnaire and refine the wording in some of them. The revised version of each measure was highly correlated with the original set of items and the revised measure related to the other variables and measures in the same way that the original set of items did.

The strengths and weaknesses of these instruments were discussed and directions of future research with them were described. The development of other assessment devices for use in assessing the ecological functioning of individuals and organizations was also suggested.

324. Nichols, Carl Richard, Jr., Ed.D. Public Perception of Needs, Attitudes toward, and Knowledge of Ecological and Environmental Concerns. University of Pittsburgh. Dissertation Abstracts, 1980, 40(8):4512-A. UMI 8004823; 38pp.

DESCRIPTORS: attitudes, ecology education, knowledge, nonformal, science education, teacher training inservice.

Social forces affecting science education today are broad and vague but exert their pressure on district issues such as accountability, curriculum, professional behavior, and the extent to which teacher

values should be expressed in the classroom. It is oftentimes necessary to work with specific groups of individuals to assess what the public perceives as needs as well as their attitudes towards certain areas of the curriculum.

This survey research utilizes a Needs Assessment Questionnaire and a Revised Scale for the Measurement of Ecological Attitudes and Knowledge administered to a random sample of adults (N = 88) to determine: (1) What the general public "feels" about the current behavior of students in the school district relative to environmental issues and what that behavior should be; and (2) If a discrepancy exists between what adults perceive as student needs for involvement in environmental issues and what these adults, themselves, actually put into practice.

Demographic information was obtained on each respondent as to age, sex, income, place of residence, and level of education. Multivariate analysis of variance on the scores of the Revised Scale indicated that (a) females, more than males, demonstrated a higher degree of concern regarding environmental issues, (b) adults in the upper income brackets demonstrated a greater knowledge of the environment and (c) adults at the college + levels of education displayed a higher level of support for environmental issues than adults with less than a college education. However, adults with less than a high school level of education attended more meetings to better the environment and contacted more agencies to find out what can be done about pollution.

In addition, respondents displayed a relatively high degree of verbal commitment and feeling for environmental and ecological issues but had a low degree of actual commitment and knowledge.

The results of this study have implications for curriculum development and in-service teacher education. The method called "Needs Assessment" provides a practical approach to finding the degree of satisfaction or discrepancy between what people say exists "now" and what "should" exist.

325. Owley, Gordon Thomas, Ph.D. / The Development of the Child's Concept of Ecology. Marquette University. Dissertation Abstracts, 1977, 38(2):709-A. UMI 77-16,764; 105pp.

DESCRIPTORS: cognitive, ecology education, model building, population education, rural, urban.

In recent years, the quality of our environment and its ability to continue to provide food and energy for a growing population have become topics of nearly worldwide concern. In the United States, this concern has generated a number of educational efforts in ecology extending even to the elementary school. However, these curricula appear to have been formulated with little knowledge of how the concept of ecology develops in children.

This study sought to answer two questions: 1) What are the effects of the following variables on the development of the child's concept of

ecology: a) developmental changes across the intuitive, concrete, and formal operations stages of cognitive development as outlined by Piaget; b) sex of the child; c) place of residence (urban vs. rural)? 2) What are the major parameters of the child's concept of ecology?

Based on a pilot study, a semi-structured interview was constructed around seven parameters: Ecology, Biosphere, Pollution, Population, Niche, Species Interaction, and Adaption. A 5-point Likert-type rating scale was constructed to measure each of the seven parameters. Two judges each rated tape-recorded interviews of 132 children on each of the seven scales. In order to answer question one, a separate 2 x 2 x 3 analysis of variance was performed on the mean ratings for each subject on each scale. The results showed cognitive stage as a significant main effect in the development of the concept of ecology. On all seven scales the subjects' responses became less egocentric and concrete and more general and abstract as they moved from intuitive to formal stages.

Place of residence resulted in a significant effect on the Niche, Species Interaction, and Adaption scales. Urban children were rated higher than rural children on the Niche and Species Interaction scales, while the opposite results were obtained on the Adaption scale. The main effect of sex was significant on the Population scale with males having the higher mean rating.

The sex by stage interaction was significant on the Ecology, Biosphere, Pollution, Population, and Species Interaction scales. On all but the Ecology scale, males at the concrete stage were rated significantly higher than females at that stage. No significant differences were found between males and females within either the intuitive or formal stages on any scale.

The residence by stage interaction was significant on the Adaption scale. While there were no significant differences between the means for urban and rural subjects at the formal and intuitive levels, rural subjects at the concrete stage did better than urban subjects at that stage. This finding, along with the pattern of sex x stage interactions, suggests differential rates of development at the concrete stage.

Second-order interactions were significant on the Adaption and Pollution scales. These interactions are difficult to interpret but also suggest differential development at the concrete stage.

In order to answer the second question, the mean ratings were factor analyzed. Three types of analysis, Principal Component, Alpha, and Image factor analysis, were utilized in order to compare the factor structures. All three methods yielded a single factor loading highly on all seven scales. The results indicate ecology is a relatively unitary concept.

Implications for education and further research are discussed.

326. Page, Cedric Daniel, Ph.D. Social Class and Ethnic Differences in Aesthetic Response to the Visual Urban Environment. Rutgers University - The State University of New Jersey. Dissertation Abstracts, 1977, 38(5):3105-A. UMI 77-25,007; 248pp.

DESCRIPTORS: affective, ethnic group, social background, theoretical research, urban.

The assessment of an individual's well-being in the built environment requires an investigation of affective responses to the visual setting in the city. An individual's sense of well-being is as much a function of what is seen as it is of what is heard or conceptualized. In most built environments the sense of well-being can be either good or bad with respect to some overall level of emotional and physical comfort. The visual urban environment has behavioral implications that are reflected in orientation and movement. What is seen tends to evoke an image which is evaluated on the basis of its motivational value for the individual to select or reject a given course of action.

The affective response to the visual environment is hypothesized to have a structure consisting of two dimensions. An objective of this study is to identify these dimensions and to examine the influence of social class and culturally influenced values on aesthetic preference and response. The central hypothesis is that as perception varies from group to group, their visual experiences will be mediated by social class and ethnic culture characteristics such that the differences will produce different affective or aesthetic responses to the same visual environments.

The data used in this study of aesthetic response to the visual urban environment were obtained from a cross-section of respondents via the semantic differential-type questionnaire. The semantic scales were used to record the subject responses to city environments presented as color slides. The response data were tabulated and analyzed according to the social class and ethnic cultural affiliation of the respondents. Multidimensional scaling techniques were used to identify the dimensional structure of aesthetic response. The multidimensional scaling algorithm, INDSCAL (Individual Differences Scaling), when run with the study data revealed the following: (1) that evaluation and arousal are the most important dimensions in an individual's structuring of aesthetic response. (2) that social classes within ethnic groups do not show an aesthetic response similar to the ethnic group but instead a response more like the social class group to which they belong, and (3) that environments and their visual impact can be assessed quantitatively with respect to the direction of that impact and the intensity of the impact.

The study concludes by noting several relationships between the objectives and principles of the urban designer, and the needs and expectations of the users and observers of the built environment. Designers need to be more aware that their projects do affect the emotional and physical well-being of people, and that more careful assessments of user needs must be carried out before a design project

becomes reality and a physical fact. The findings of this study suggest that the aesthetic need in most people can be satisfied by environments that are positively evaluated and that are arousing to the observer. Design strategies that incorporate ethnic and social class values are likely to have the greatest effect on minimizing environmental stress and maximizing comfort and well-being in the built environment.

327. Partain, James Douglas, Ed.D. An Assessment of Energy Cognizance, Attitude Toward Energy Conservation, and Perceived Energy Conservation Behavior of Selected Public School Educators. Texas A&M University. Dissertation Abstracts, 1980, 40(12):6176-A. UMI 8012015; 118pp.

DESCRIPTORS: attitudes, behaviors, conservation education, energy education, program evaluation, teacher training inservice.

The objective of this study was to determine the effects of an energy education in-service program by assessing the energy cognizance, attitude toward energy conservation, and the perceived energy conservation behavior of selected Texas public school educators before and after an in-service training program.

The participants of this study were 313 classroom teachers of the Bryan (Texas) Independent School District, which is composed of 10 elementary (K-5) schools and 4 secondary (6-12) schools. Teachers of 13 schools participated in the in-service meetings of this quasi-experimental, pretest-posttest study.

An evaluation instrument was adapted from existing instruments and an in-service presentation was developed from those available through the Texas Education Agency Regional Service Centers and from the Energy Conservation Resources for Education (ENCORE) materials.

The hypotheses were tested both by campus and by level to determine if significant (.05 level) differences existed prior to the treatment, following the treatment and across the treatment. The possibility of significant interactions or trends was also tested.

Testing the hypotheses by campus revealed significant differences in both pre and posttests on attitude and in the posttests on cognizance; there was a significant interaction between campuses and the occasion of cognizance testing.

Testing the hypotheses by level revealed significant gains both in cognizance and attitude between pretests and posttests. Also, a significant cognizance interaction was noted (the elementary level having a lower pretest mean and a higher posttest mean than the secondary group). The treatment was judged effective in improving levels of cognizance and attitude, but was noneffective in changing levels of perceived energy conservation behavior.

Although the treatment was conducted during six weeks of the spring of 1979 (while some fuel shortages occurred in the area), there was no discernible trend in the relationship of mean scores to position in the presentation/testing sequence.

328. Passineau, Joseph Francis, Jr., Ph.D. The Development of the Environmental Awareness Inventory (EAI)--An Assessment Instrument for the Evaluation of Environmental Education. Utah State University. Dissertation Abstracts, 1976, 36(9):5654-A. UMI 76-6241; 387pp.

DESCRIPTORS: affective, attitudes, instrument development, issue awareness/knowledge of issues, middle school, program evaluation.

The shortage of assessment instruments was documented as an obstacle preventing optimal use of the evaluation process in environmental education. Instruments were needed for evaluating the effectiveness and summative worth of programs, for facilitating formative improvement, and for aiding teachers in the development of activities relevant to the individualized interests, attitudes, motivations, abilities, and needs of students.

The objective of the study was the development and validation of an assessment instrument, the Environmental Awareness Inventory (EAI), for use by teachers and other evaluators in assessing the "affective environmental awareness" of upper elementary and junior high school students.

Independent scales were constructed for: (a) general environmental concern; (b) interest in specific environmental issues; (c) attitudes towards 14 different issues of environmental quality: population problems, pollution, land-use planning, the energy problem, the development and consumption of energy resources, consumer behavior life styles, transportation systems, recycling and solid wastes, pesticides, wildlife, wilderness, noise pollution, agricultural resource problems, and international agricultural resources; (d) degree of faith in the ability of science and technology to find solutions to environmental problems; (e) degree of optimism-pessimism concerning one's ability and the ability of others to promote environmental quality; (f) degree of environmental activism (motivation to participate in environmental problem-solving activities); (g) disciplinary orientation concerning environmental problems and their solutions (aesthetic, political, educational, economic, and technological); and (h) degree of recognition of the complexity of environmental problems.

A "catalog of independent scales" format was adopted to (1) allow evaluators to select and administer only those scales which measure the particular attributes deemed relevant, (2) encourage the perspective that environmental education is a complex set of related elements, and (3) facilitate the criterion-referenced testing approach.

A concern for content validity and internal consistency reliability influenced the selection of the procedures. A development plan, delineating the proposed need, objectives, uses, development procedures, content areas, format and items of the EAI, was evaluated by 54 environmental education specialists, teachers and administrators, and evaluation and assessment specialists.



To elicit the responses of students, a variety of item types were written including attitude statements, activity preference lists, short story problem statements, forced-choice questions, and cartoons.

Nineteen preliminary scales, each measuring a different attribute, were constructed and administered to approximately 800 upper-elementary and junior high school students in Cache County, Utah. An internal consistency reliability coefficient was calculated for each scale and the scales were item-analyzed by correlating each item with the total scale score. Based on the results of the preliminary scale analysis, 21 EAI Revised Scales were developed. The content validity of the scales and items was evaluated by a panel of 21 environmental education specialists, and the "interscorer consistency" of the items was evaluated using a panel of five scorers. Items not meeting acceptable standards were deleted. The Revised Scales were administered to over 2,000 students located primarily in five Midwest states. The coefficient alpha reliability, mean, standard deviation, and standard error of measurement were calculated for each scale and subscale for various grade level combinations. The obtained reliabilities ranged from .87 to .28. Four of the 21 scales had reliabilities above .80, 12 had reliabilities above .70, and 18 had reliabilities above .50. Because the degrees of validity and reliability vary from one scale to another, some EAI scales are useful for assessing individuals, others for assessing groups, and others for research.

Appraisal of the EAI by environmental education specialists and teachers was positive. A handbook was written concerning such topics as the goals, rationale, and potential uses of the EAI, instructions for administering and scoring the EAI, and the interpretation and use of EAI scores.

329. Peck, Richard Allan, Ph.D. A Study Comparing Outdoor, Indoor, and Outdoor-Indoor Settings for Teaching Specific Environmental Education Objectives. The University of North Carolina at Chapel Hill. Dissertation Abstracts, 1976, 36(7):4233-A. UMI 75-29,061; 138pp.

DESCRIPTORS: affective, attitudes, cognitive, experimental research, knowledge, outdoor classroom, science education, secondary.

Environmental education is a commonly used but ill-defined term. The many ideas and concepts that the term can embrace must be identified and the perimeters defined with each research project. Due, in part, to the variance of definitions, studies comparing programs in environmental education are rare.

The following study was part of an E.S.E.A. Title III grant to the Burke County, North Carolina, Public School System. The objectives of the study were to teach identified cognitive and affective objectives in three settings: inside classrooms, outside and away from school facilities, and a combination of indoor and outdoor settings. Students

in the three experimental approaches were high school biology students in the 1973-74 school year. Program effectiveness was determined by two tests, each administered as pretests and posttests.

Student scores on the cognitive test reflected a greatly improved posttest mean score for the outdoor group. Both the combination and indoor groups improved their mean posttest scores but not as dramatically as did the outdoor group. Affective mean posttest scores improved in both the outdoor and indoor groups indicating a shift to a more positive attitude toward the environment. A slightly negative shift was reflected in the mean posttest score of the combination group.

Test scores indicated that the outdoors could be used as an effective educational tool. Some advantages of taking students outside did not register on the two tests but resulted in student, parent, and teacher comments supporting such activities.

330. Pettus, Eloise Spencer, Ph.D. A Study of the Treatment of Ecology, Air Pollution, and Water Pollution in Selected Recommended Books for Elementary Grades Published in the United States, 1960-1975. The Florida State University. Dissertation Abstracts, 1978, 38(9):5106-A. UMI 7801505; 235pp.

DESCRIPTORS: ecology education, elementary, historical research, interdisciplinary.

A study of 96 children's science books on ecology, air pollution, and water pollution was made to determine how many of 10 designated disciplines are contained in each; how many of 11 stipulated criteria were met by each; how many reviews of these books were contained in five selection aids for children's books, and whether they were recommended, recommended with reservations, or not recommended, in each; and what the trend was related to the interdisciplinary nature of the books published in four 4-year periods from 1960-75. The research was accomplished by content analysis, by comparison of reviews, and by trend analysis.

It was determined that over 70 percent of the books studied contained five or more disciplines, so may be considered interdisciplinary. Ninety-two or 95.8 percent, of the books met six or more of the specified criteria. Only one of the five selection aids utilized in this study contained reviews of over 50 percent of the books studied. All but six of the books were recommended or recommended with reservations in each selection aid in which reviews of them appeared. The percentage of books containing five or more disciplines ranged from 100 percent of those published during the 1960-64 period, down to 86 percent during the 1964-67 period, down to 70 percent during the 1968-71 period, and up to 75 percent during the 1972-75 period, indicating, despite this fluctuation, a definite trend toward writing and publication of interdisciplinary children's books on ecology and pollution during the period studied.

331. Peyton, Robert Ben, Ph.D. An Assessment of Teachers' Abilities to Identify, Teach, and Implement Environmental Action Skills. Southern Illinois University at Carbondale. Dissertation Abstracts, 1978, 38(10):6071-A. UMI 7804297; 164pp.

DESCRIPTORS: environmental action skills, hypothesis generation, model building, teacher training inservice, teacher training preservice.

This study investigates the environmental action competencies held by a population of pre- and inservice teachers enrolled at three institutions of higher learning. The study is also concerned with the participants' own perception of their abilities to prepare and teach environmental action units in the classroom, their own perception of their abilities to take action in five designated categories of environmental action, and their history and future plans of environmental action taking.

Procedure of the study involved the development of a survey instrument which was administered to 225 participants enrolled in science methods courses at three universities. Participants were predominately female preservice elementary education majors. Design of the instrument was based on a paradigm of environmental action which operationally defined five categories of environmental action and identified 13 criteria for selecting appropriate environmental actions.

The assessed groups show limited ability to provide examples of environmental actions in each of the five categories which had been defined for them previous to the task defined, or to identify criteria for the selection of appropriate environmental actions. Measured competency findings were consistent with participants' own perception of their abilities to teach and/or prepare environmental action units or modules.

The involvement of the participants in environmental actions was found to be peripheral. Fewer than half reported taking individual or group actions. The actions reported were of a general nature represented mostly by simple persuasive or ecomangement categories of action. Over half of the participants (61 percent) reported intentions to take future environmental action, but less than one-fourth of these could identify the issue or specific action. Issues and actions named were again of a generalized and simple nature. Eighty percent of the participants who did not intend to take future action reported that a lack of environmental action skills contributed to their reluctance to take action. Only 20 percent of the participants reported belonging to an active environmental organization or reading an environmentally-related periodical regularly.

A basic assumption in the research is that the ability (and willingness) of students to carry out environmental actions is an important component of the major goal of environmental education (defined as environmental literacy). Generally, findings indicated that most of the population sampled have little competency in the action skills assessed by the instrument, perceive they have little competency in these skills, have had limited experience in environmental action taking, and have incomplete plans or none at all for future involvement as environmental activists. The researcher suggests that without some form of future

intervention (e.g., training, curriculum materials, nonformal environmental action experiences) there is little reason to expect the assessed sample, or similar samples, to effectively prepare environmentally literate students in their classrooms. Recommendations are made concerning further research, teacher training and curriculum development, and environmental organizations as they interact with educational systems.

332. Picker, Lester Alan, Ed.D. The Design and Field Testing of An Integrated Winter Ecology Program. University of Maine. Dissertation Abstracts, 1978, 39(6):3496-A. UMI 7822789; 400pp.

DESCRIPTORS: ecology education, experimental research, program development, program evaluation, program implementation, science education, secondary.

This study attempted to develop, field test and evaluate units of instruction for use during the winter season to teach ecology in the traditional tenth grade biology program in Maine.

Following an extensive review of the literature, the conceptual scheme from Biological Science: An Ecological Approach, Third Edition (Rand McNally and Company, 1973), was selected as the conceptual framework around which the 10 units of instruction were developed. The units dealt with the winter ecology topics of snow insulation and density, snowflakes and crystals, animal and plant adaptations to cold weather, parasitism, animal (bird) behavior, bacterial decomposition, pollution detection, trees, use of a biological key, biomass and productivity, soil activity, and winter survival techniques. Within these units were several laboratory and field techniques and many ecology subtopics.

Each unit was reviewed by a panel of 10 experts. Six experimental teachers in five separate Maine high schools were trained in the use of the trial program winter ecology units. These experimental teachers accounted for the 200 students in the experimental group. A control group of 80 students under the direction of two experimental teachers and one other teacher received no ecology instruction. Each group was given a 67-item test of attitude towards the environment, The Environmental Attitude Inventory (EAI), modified (Fleetwood, 1973), and a 24-phrase semantic differential (SD) test to measure involvement with the winter environment, the Phrases About Nature Test, both pre- and posttest. Additionally, the experimental group was given a 25-item test of ecological knowledge, The Ecological Knowledge Inventory (EKI), pre- and posttest. Teachers were required to keep an anecdotal record and a rating sheet for each unit.

The winter ecology program lasted from January 1, 1978 through March 15, 1978. Analysis of the data were accomplished through the use of computer programs and the facilities of the Statistical Package for the Social Sciences (Nie, et al., 1975) and the Computer Center of the University of Maine at Orono.

Posttest reliability studies of the EAI and EKI instruments were .930

Posttest reliability studies of the EAI and EKI instruments were .930 and .830, respectively, by the split-halves method.

A t-test analysis of the EKI showed significant cognitive gains for the entire experimental group ( $p < .0001$ ) and for three of the teacher experimental subgroups.

An analysis of covariance, performed on the EAI, showed significant positive gains in attitude towards the environment for the entire experimental group ( $p < .001$ ) and for two of the teacher experimental subgroups.

A chi-square analysis was performed between the pre- and posttest scores on each of the three scales, for each of the 24 phrases on the PAN. Results of this analysis showed significant involvement with the winter environment for the entire experimental group and for two teacher experimental subgroups.

Ratings from the expert review panel and experimental teachers showed the winter ecology units to be teachable, inexpensive, nonsexist, and high in student involvement.

333. Ramler, Laverne Gregory, Ed.D. An Analysis of Conservation Content in Selected Elementary and Secondary School Textbooks. University of Minnesota. Dissertation Abstracts, 1976, 37(6):3321-A. UMI 76-27,776; 166pp.

DESCRIPTORS: conservation education, descriptive research, formal, program evaluation, resource management education, science education, social science education.

A representative sample of 137 social studies and science textbooks was examined for the amount and nature of their conservation-environmental education content. This sample included a minimum of five science and five social studies student textbooks at each of grades 1 through 12. The publisher's most recent edition of the classroom basal copy was selected and all textbooks had publication dates of 1970 or later with the majority having publication dates of 1973 through 1976.

The criteria for this examination of content was based upon a comprehensive review of conservation literature and existing conservation curricula. This review resulted in the establishment of four major content categories which consisted of natural resource content, human resource content, conceptual themes-generalizations content, and pollution-problems content. Appropriate specific subcategories were identified for each of these major areas and placed on a criteria analysis guide sheet.

The table of contents and index of each book was examined for such key conservation words or "locators" as conservation, environment, pollution, population, resources and "other." All such chapter and page key word referrals were examined and were found to contain 2,769.5 pages of conservation content. This amount of content was equal to 4.6 percent of the 60,108 total pages contained in the 137 textbooks

selected for the study and included a total of 10,076 paragraphs and 3,112 conservation pictures. Sixty-two percent or 1,723.75 pages of this conservation content was found in science textbooks with the balance of 38 percent and 1,045.75 pages located in social studies textbooks. The picture and paragraph totals were somewhat similar to this ratio with 67 percent of the pictures and 57 percent of total paragraphs located in science textbooks.

The greatest amount of conservation content was found to be of the conceptual themes-generalizations category with 45 percent of the total pages of content, followed by the pollution-problems category with 27 percent. The natural resources category was next with 20 percent and human resources had the least or only 7 percent of the total pages of content. Science textbooks contained more conceptual themes content (85 percent) and more pollution-problems content (53 percent) but social studies texts had more natural resources content (65 percent) and human resources category content (76 percent).

Elementary textbooks were found to contain 280 more pages of conservation content than secondary and also had 978 more pictures of conservation content. Secondary texts contained more pages of the natural resources, human resources, and pollution-problems category content areas but elementary had such a large majority in the conceptual themes-generalizations category that it maintained a 55 to 45 percent majority of total content.

The textbooks from grades 7, 6 and 10 contained the most conservation content while 34 textbooks had no conservation content whatsoever.

Generally textbooks with the more recent publication dates contained more conservation content.

A major conclusion of the study is that despite the exception of several individual textbooks and publishers elementary series, the great majority of social studies and science textbooks are lacking in conservation-environmental education content. School officials may contribute to their conservation-environmental program by careful selection of textbooks but they will need to provide additional supplemental materials and intensive in-service education if a quality program is to be achieved.

334. Richmond, James Malcolm, Ph.D. A Survey of the Environmental Knowledge and Attitudes of Fifth Year Students in England. The Ohio State University. Dissertation Abstracts, 1977, 37(8):5016-A. UMI 77-2484; 324pp. (Also listed as ERIC ED 130 864.)

DESCRIPTORS: affective, attitudes, cognitive, descriptive research, knowledge, secondary.

The primary purposes of this study were to establish baseline data relating to the environmental knowledge and beliefs of fifth-year secondary students in England and to examine relationships that might be of interest to teachers and curriculum developers in environmental education.

The instrument developed for the survey consisted of three questionnaires (Forms A, B and C) with each questionnaire containing a total of 45 cognitive and affective items. All items were thoroughly tested in a pilot study conducted in nine English secondary schools.

A sample of 500 secondary schools was randomly selected to proportionately represent the major types of school in every region of the country. Packaged materials were mailed to the selected schools with instructions to administer the instrument to 30 students in the fifth year. A total of 383 schools (76.6 percent of the sample) returned completed answer sheets, providing information from over 11,000 students. The answer sheets were machine scored, with student responses being automatically punched onto computer cards. The data were then transferred to magnetic tape and analyzed by standard computer programs.

The students appeared to have a poor command of factual environmental knowledge. However, they demonstrated a greater understanding of environmental concepts and generally expressed positive attitudes toward the environment. It was noted that their attitudes tended to be positive when the object of concern did not impinge directly on their lives, but were relatively negative when some personal commitment or sacrifice was required.

In examining the relationships between variables, significant differences in environmental knowledge were found with respect to sex, school type, sex composition of the school, school size and region. Significant differences in environmental attitude were found with respect to school type and sex composition of the school, but attitudinal differences could not be attributed to sex, school size or region. More specifically, it was found that males performed significantly better than females on factual knowledge items (although significant differences in male and female attitudes were not detected); and students in secondary modern and co-educational ("mixed") schools produced significantly poorer knowledge and attitude scores than their peers in other schools. Regression analyses indicated that, of the variables under consideration, only "sex" and "secondary modern" (and to a lesser extent "mixed") accounted for an appreciable amount of the variance. Most of the observed variance was probably due to personal factors such as intelligence and home-background.

In order to reveal relationships that might exist between factual knowledge, conceptual knowledge and attitudes, correlation coefficients were computed between the total scores on the factual, conceptual and belief sections of each form. The strongest relationship was found between conceptual knowledge and attitude ( $r = 0.48$ ), with a slightly weaker correlation between factual and conceptual knowledge and attitude ( $r = 0.38$ ). These results, together with inter-item correlations, support the contention that the development of sound concepts might be a productive means of leading to the establishment of positive attitudes.

When asked to identify the primary source of their environmental knowledge, over 60 percent selected activities that did not relate to

their formal schooling, notably "reading, the radio, and TV." Students were also asked to identify the local and national environmental problems that they considered to be most serious. Although a sizeable number of respondents did not perceive any of the listed problems to be of concern in their home communities, almost all students were prepared to identify problems for the country as a whole. For the nation, societal problems such as over-crowding and crime were considered more serious than problems relating to the physical environment (e.g., water and air pollution).

335. San Julian, Gary James, Ph.D. Ecology--A Correspondence Approach. Colorado State University Dissertation Abstracts, 1979, 39(8):3671-B. UMI 7901884, 386pp.

DESCRIPTORS: attitudes, continuing education, descriptive research, ecology education, issue-based, nonformal, program development, program evaluation, resource management education.

The study had three major objectives: (1) to design an ecology correspondence course, (2) to determine the public's use and opinions of the course, and (3) to determine whether or not participation in the course would alter or reinforce opinions about environmental issues. To accomplish this, a three-phase program was developed.

First, a correspondence ecology course, Ecology and Environmental Issues, was developed. Second, students that enrolled in the course were asked to provide biographical data prior to starting and additional information was requested in a follow-up survey after they completed the course. These data were tabulated to determine the public's use of the course.

Third, a pretest environmental attitude questionnaire was administered to 37 students enrolled in the course, and a posttest environmental attitude questionnaire was given to 8 of the 14 students that completed the course. A similar battery of tests was given to a control group of students composed of freshmen and sophomores registered in CO 202, Intermediate Writing, who were not enrolled in NR 130. This was to determine attitude differences at the outset between the two groups and if any attitude changes in the control group were due to events in the time interval between the tests.

As of April 1, 1978, 58 students had enrolled in the course; 27 were still enrolled; 14 had completed the program and 17 had dropped by the end of the study. Ranging in age from 17 to 51 and in occupations from a high school principal to a railroad section man, students represented a broad cross-section of the public.

The instrument used to evaluate opinion changes was composed of Likert-type questions and semantic differential questions. On 36 responses, students reaffirmed their initial beliefs while on 23 responses they either significantly increased the strength of their opinions or reversed previous opinions in at least 1 of 10 comparisons.



A paired t-test was used to compare pre- and posttest results for students taking both tests. Students' t-tests were used to compare means between the experimental and control groups. Pearson Correlation Coefficients were used to compare student responses from both groups with age and education levels. A significance level of 0.05 was used for all comparisons.

The most dramatic changes in the experimental group's opinions occurred on questions related to nuclear energy, population control and man's use of the environment. After completion of the course, students indicated that they favored greater protection of our natural resources from unregulated use.

336. Schlageter, J. Noel, Ed.D. Student Cognition, Attitudes, and Action-Orientation and Teacher Attitudes toward Environmental Education Concepts at the Seventh Grade Level. The University of Rochester. Dissertation Abstracts, 1980, 41(2):522-A. UMI 8017117; 180pp.

DESCRIPTORS: affective, attitudes, cognitive, descriptive research, environmental action skills, middle school, resource management education.

This study investigated student attitudes toward, knowledge of, and action-orientation toward the environment. It also investigated teacher attitudes toward environmental management concepts.

During December 1976 and January 1977, 676 seventh grade students and 104 seventh grade teachers in nine randomly selected schools three rural, three suburban, and three urban, located in upstate New York participated in a survey. A research associate was employed to conduct the survey.

The students completed the revised version of the Environmental Knowledge and Opinion Survey developed by Professor Paul B. Hounshell, University of North Carolina at Chapel Hill, and Dr. Larry Liggett, Director of the Environmental Education Center, Oteola, North Carolina, and the Student Checklist of Environmental Action-orientation. Student demographic data were also collected.

The teachers completed the Teacher Attitude Survey on Environmental Management Concepts. The 44 concepts used in this instrument were developed by Dr. Robert E. Roth, formerly at The University of Wisconsin, and now at Ohio State University, and used with his permission. This instrument also surveyed teacher estimates of student comprehension of the concepts. The teachers also completed the Teacher Background Data sheet providing data regarding sex, age, teaching experience, subject taught, training in environmental education, involvement in the environmental movement, and preferred method of teaching environmental education.

Significant contingency coefficients (0.05 level) were identified for student attitude scores with respect to family size, residential location, and sex; and for student knowledge scores with respect to

family size, residential location, SES, and sex. No significant contingency coefficients were identified for either student attitude or knowledge scores with respect to age, or for action-orientation scores with respect to any of the five student subpopulation characteristics. Spearman rank order correlation coefficients for student scores were 0.5342 for attitude versus knowledge, 0.2116 for attitude versus action-orientation, and 0.1927 for knowledge versus action-orientation.

Only one significant (0.05 level) contingency coefficient for the teacher data, teacher attitude with respect to preferred method of teaching environmental education, was identified. Concept ranking by the teachers and by university faculty (Roth's data) have a Spearman rank order correlation coefficient of 0.7398. A Spearman rank order correlation between concept rank by teachers and the percentage of teachers who estimated that 60 percent or more students would comprehend a concept produced a coefficient of 0.8271. Teacher participation in workshops and/or in-service programs in environmental education was reported at a very low level.

The author concluded that male students appear to have a more positive attitude toward the environment than do female students, but that females outnumber males among students possessing high environmental knowledge. Students from small families as compared to students from large families, and rural students as compared to suburban and urban students have more knowledge about and a more positive attitude toward the environment. Low SES students appear to be less knowledgeable about the environment than are middle and high SES students.

The author also concluded that the teachers in this study concur with the university faculty surveyed in Roth's study that the environmental management concepts are important; that teachers possessing a positive attitude toward the environmental management concepts favored an interdisciplinary approach to environmental education; and that there appeared to be, on the teachers' part, an association between concept rank and student concept comprehension.

The author suggests that more information is needed regarding student environmental action-orientation; that the 44 environmental management concepts be considered for inclusion in environmental education curricula and that interesting valuable workshops and in-service programs in environmental education be organized and teachers be encouraged to participate in them.

337. Schwaab, Karl Eugene, Ph D. A Survey of the Effectiveness of Environmental Education Teaching Methods as Rated by Public School Teachers and Professors of Education in Illinois. Southern Illinois University. Dissertation Abstracts, 1976, 36(12):7752-A. UMI 76-13,286; 210pp.

DESCRIPTORS: descriptive research, program development, program evaluation, teacher training inservice, teacher training preservice.

The purpose of this study was to provide educators with information which could be used in evaluating current methods courses and modifying or developing methods courses to provide environmental education preservice training of all teachers. Specifically the objectives of the study were:

1. As a general finding, teachers in the public schools gave the highest effectiveness ratings to those methods which involve students as active participants rather than passive participants.
2. Despite the acknowledged higher effectiveness rating of certain methods, teachers tended to use less effective methods.
3. Newer methods, e.g., simulation games and prerecorded field trip instructions, which are discussed frequently in the literature are not yet widely used.
4. Field trips, i.e., direct experiences with the environment, were extensively used by environmental educators.
5. Although respondents gave moderately good ratings to the effectiveness of using resource persons from a variety of agencies, the percent of respondents using such persons was not high.
6. Environmental education in the public schools is most often provided as part of other courses in the elementary grades and is most often provided as a separate course in high schools.
7. Respondents indicated the need for preservice training of all teachers, which would include an environmental education methods course, experience in preparing an environmental education resource unit, experience in conducting a field trip and studying an environmental problem, skill in using simulation games and experience in conducting educational activities at a resident center.
8. Colleges are not fulfilling a need recognized by in-service teachers as only one-fourth of the higher education units responding required preservice teachers to study environmental activities at a resident center.

The two most important recommendations of the study were:

1. This study, as did several previous studies, illustrated the lack of preservice environmental education methods training being provided by institutions of higher education which have teacher education programs. Therefore, it was recommended that departments of education look at their program offerings to see if they are adequately training their students to meet the requirements of environmental education often legislated by the state.
2. Until such time that adequate preservice training is available, it is recommended that inservice programs continue to be offered.

338. Strojny, Sally Ann, Ed.D. An Analysis of Selected Environmental Education Curriculum Programs and the Development of A Composite Curriculum Plan. University of Colorado at Boulder. Dissertation Abstracts, 1979, 40(5):2457-A. UMI 7923291; 359pp.

DESCRIPTORS: descriptive research, formal, interdisciplinary, program development, program evaluation, values,

The problem addressed by this research study, concerns an investigation of the current scope and trends of exemplary and innovative environmental education curricula throughout the country. In order to accomplish this goal, the research study was designed to provide (1) compilation of a list of program characteristics, most often cited by environmental education experts as essential elements of a superior environmental education program, into a set of program criteria; (2) identification of exemplary and innovative environmental education curriculum programs through the application of the selection criteria; (3) description and analysis of the selected environmental education curriculum programs in order to determine the current scope and trends of exemplary environmental education curricula; and (4) organization of a composite environmental education curriculum content plan.

Intensive research was conducted to elucidate important themes and instructional strategies related to environmental education curricula: (1) the historical background of environmental education; (2) the concept of environmental education; (3) the interdisciplinary approach in environmental education; (4) values exploration in environmental education; (5) problem-solving processes in environmental education; (6) ecology and environmental responsibility as unifying themes of environmental education; (7) experiential learning in environmental education; and (8) investigating controversial issues in environmental education.

A complete search of environmental education literature was undertaken in order to generate a compilation of educational determinants most often cited by experts as essential characteristics of a superior environmental education curriculum program. These, in turn, yielded an initially selected group of approximately 200 programs that indicated some congruence with the selection criteria.

The findings of this research study can be summarized as follows: (1) of the hundreds of environmental education curriculum programs in existence, approximately 200 of the programs indicated some congruence with the selection criteria, and 20 of these programs met all the criteria (interdisciplinary approach, values exploration, problem-solving processes, ecology and environmental responsibility as underlying themes, experiential learning, structure, completeness, continuity, articulation, and generalizability); (2) selected programs originated in 16 different states, and consisted of various combinations of educational levels; (3) selected programs offered a wide range of environmental education curriculum themes that examined diverse ecological processes and environmental issues; and (4) selected programs are characterized by organizational patterns ranging from haphazard structures to comprehensive spiraling strand designs.

Conclusions drawn from the research indicated that the state of the art of environmental education requires some improvement, that a discrepancy exists between recommended and existing program characteristics, that exemplary environmental education curriculum programs do exist to guide program development, and that recent trends indicate positive growth in this field.

Included in the recommendations offered by this research study are the need for quality curriculum design, program revision, and content improvement, as well as the development of a composite environmental education curriculum content plan.

339. Thiele, Eberhard Hans, Ph.D. Assessing An Affective/Aesthetic Approach to Self-Instructional Activities in Ecology for Non-Science Majors. University of California, Berkeley. Dissertation Abstracts, 1977, 38(2):717-A. UMI 77-15,879; 369pp.

DESCRIPTORS: affective, attitudes, cognitive, descriptive research, ecology education, higher education.

The necessity of making instruction enjoyable and relevant has obvious importance for nonscience majors fulfilling a science requirement. Scientific literacy, a commonly espoused educational goal for these students, involves long-term cognitive and attitudinal objectives which cannot be realized unless instruction is a highly motivating experience.

While self-paced self-instructional activities are particularly well-suited to accommodate the heterogeneity in interests and backgrounds typical of nonscience majors, they lack the emotional components inherent in the human interactions of group-centered instruction. They thus tend to be less appealing from an attitudinal standpoint.

A study was conducted to determine whether written self-instructional activities in ecology could be made more enjoyable and educationally valuable (as operationally defined) for nonscience majors by employing emotionally and aesthetically appealing instructional components.

An approach, applicable to a variety of self-instructional activities and scientific subject matter, was formulated. It consists of the following key procedures: (1) Affective materials--Audiovisual and other materials serve as stimuli and an integration method for scientific and affective responses. (In the current study, artistic photographs, poetry, quotations of naturalists and some music were employed; however, many other types of materials are suggested.) (2) Affective instructions--Instructions or questions serve to motivate affective responses. (A diversity of questioning techniques were developed for use in self-instructional programs.) (3) Affective-cognitive integration--The choice of affective materials and appropriate statements assure a conceptual integration of cognitive and affective components. (A method for analyzing scientific concepts to identify closely-related emotionally appealing aspects was described.)

These procedures were incorporated in two types of self-instructional activities: a simple self-instructional program and an essay.

Evaluation instruments, employing a Likert-type rating scale, were specifically designed for the study. Rated variables were the intensity

and nature of the students' emotional experiences, as well as the perceived enjoyability and educational value of each activity, and student views on a number of specified aspects of the approach, such as the requirements to express feelings in writing.

Pre- and posttests were given to evaluate the cognitive effectiveness of the experimental self-instructional program.

The self-instructional program was tested during the 1974-1975 academic year at San Jose State University with 150 nonscience majors. The first semester involved a random control group experiment, the second a noncontrolled formative evaluation.

The essay was tested during the fall quarter of 1975 with 55 students enrolled in an environmental studies course at the University of California at Berkeley. Experimental and control groups consisted of intact class sections of the course.

In all experiments, instructional procedures other than the experimental affective components were controlled to the extent possible. Known uncontrolled differences were taken into consideration when interpreting results.

Major results were: 1) The experimental procedures led to significantly higher ratings ( $p < .05$ ) of emotional involvement and the enjoyability and perceived educational value of instruction. Experimental-control group differences were large enough to be educationally significant; 2) An analysis of attitudinal responses by sex disclosed that in the case of the self-instructional program, females responded significantly more strongly than males; 3) The self-instructional program resulted in cognitive gains which were equal for experimental and control groups. There was no indication that the relatively low cognitive achievement (average gains per class ranged from 12 to 30 percent) was due to the experimental procedures; 4) A comparison of the better and poorer students suggested that achievement did not play a role in determining attitudinal responses to the experimental procedures; 5) The formative evaluation of the experimental approach disclosed a number of specific methods useful in the further improvement of the attitudinal and cognitive effectiveness of the approach.

The research demonstrates a method for introducing emotional and aesthetic experiences into self-instructional activities and suggests that such experiences are an effective means of making such activities appear more enjoyable and valuable to nonscience majors.

340. Van Liere, Kent Douglas, Ph.D. Public Concern for Environmental Quality: An Analysis of Its Dimensions and Correlates. Washington State University. Dissertation Abstracts, 1979, 40(1):493-A. UMI 7915155; 160pp.

DESCRIPTORS: affective, attitudes, beliefs, descriptive research, educational background, issue-based, social background.

The purpose of this study was to examine a number of issues related to public concern about environmental quality. The three major areas of inquiry concerned: (1) the interrelationships among a number of different "substantive dimensions" and "theoretical conceptualizations" of environmental concern, (2) the hypothesized bivariate relationships between environmental concern and a number of social and demographic variables, and the empirical evidence bearing on these relationships, and (3) the relative and cumulative effects of a number of social and demographic variables on environmental concern in a multivariate analysis. Each of these issues was examined by reviewing the relevant existing studies, and by analyzing data from a survey of Washington state residents.

The Washington state survey consisted of responses to a mail survey questionnaire administered to a statewide sample of Washington residents in the spring of 1976 (N = 806). On the basis of the resultant data, eight differing multi-term measures of environmental concern were constructed, including both measures of differing "substantive dimensions" (e.g., pollution, natural resources, and population) and differing "theoretical conceptualizations" (e.g., Likert-type attitude items, spending priorities, and overt behaviors).

Regarding the different dimensions and conceptualizations of environmental concern, the review of literature showed that there exist very few studies which have examined the intercorrelations among such differing measures of environmental concern, and the relationships of these differing measures to demographic characteristics. The results of the Washington study suggested that measures pertaining to population attitudes and environmental behaviors were relatively uncorrelated with other measures of environmental concern (e.g., attitudes toward pollution and nature resources), and their correlations with a number of demographic variables also differed from the other measures. At the same time, however, there was a good deal of consistency among a number of measures concerned with pollution and natural resources, both in terms of their correlations with one another and with the demographic variables.

The second issue which was examined concerned the hypothesized bivariate relationships between environmental concern and a number of social and demographic characteristics. In examining these relationships, the "explanations" for the hypothesized relationships were enumerated, and the empirical evidence bearing on each of the relationships was evaluated. The review of empirical literature and the results of the Washington survey suggested that age, education, and political ideology are the most consistent correlates of environmental concern. There was only limited support for relationships between income, occupational prestige, residence, sex, race, and political party and environmental concern, as the reported measures of association were either small or inconsistent (or both).

The final issue which was examined concerned the relative and cumulative effects of the social and demographic variables on environmental concern. Evaluating these effects was accomplished by developing a multivariate model predicting environmental concern. In evaluating the

model, it was found that education and political ideology consistently had the expected significant direct effects on environmental concern. In contrast, age and sex were found to have significant direct effects on only certain measures of environmental concern, and residence was found to have little direct effect on environmental concern.

As was true of other studies, analysis of the Washington data also showed that it is possible to explain only about 10 percent of the variation in environmental concern using models which focus primarily on demographic characteristics. Thus, the necessity of constructing more sophisticated models in order to provide better explanations of environmental concern is discussed.

341. Werling, Donn Paul, Ph.D. A School/Community Model for the Stewardship of School Site and Neighborhood Outdoor Laboratories and an Evaluation of Their Use By Selected 4th and 5th Grade Pupils for Environmental Education. The University of Michigan. Dissertation Abstracts, 1979, 40(5):2432-A. UMI 7925245; 179pp.

DESCRIPTORS: cognitive, elementary, knowledge model building, nonformal, outdoor classroom, science education.

The purpose of this study was to develop a school/community stewardship model, to implement the model and to evaluate selected fourth and fifth grade pupils' use of school site and neighborhood outdoor laboratories for environmental education. The research design compared SCIS (Science Curriculum Improvement Series) taught indoors both with and without environmental lectures to a modified SCIS outdoor environmental education approach to site stewardship. The experiment was conducted in order to determine whether there was a significant difference among the three instructional modes in the change of pupil knowledge of selected ecological and environmental concepts, understandings and facts. The relationship between knowledge and feelings and pupil behavior toward the environment was also investigated.

Emphasis was placed on developing a model whereby parks-based (nonformal) environmental educators can act as organizing forces to move from an initial phase of having school, youth and adult groups visiting the environmental education center annually to a second phase in which local school, youth and adult groups put environmental education into practice on a weekly basis by improving the stewardship (site development maintenance and use) of school site and neighborhood outdoor laboratories. The end goal of the model was not only to increase instructional use and improve the ecology of outdoor laboratories, but to bring existing public and private formal and nonformal educational efforts into a synergistic reinforcing combination.

Six fourth or fourth/fifth grade classes at three schools with existing school site or neighborhood outdoor laboratories were nonrandomly selected for the evaluation of the model and assigned to either control group A (indoor science only), experimental group B (indoor science with an environmental education lecture) or experimental group C (outdoor science with a spinoff environmental education approach). A Solomon 4



Square Lasaac design was used to partially compensate for the nonrandom selection. The conceptual framework for the eight-week series for all three groups was based upon SCIS: Environment or Communities. Indoor classes followed the regular SCIS regime. Outdoor classes extensively used OBIS (Outdoor Biology Instructional Strategies). Docents (volunteer teachers who assisted outdoor classes) were recruited and trained along with type C teachers through an 8-hour after school inservice program.

Pupil knowledge of SCIS concepts and environmental knowledge was pre- and posttested using the local school district's test and a State of Illinois developed test of environmental knowledge. Pupil behavior was tested using unobtrusive measures for littering behavior and a sign-up for a stewardship day.

The strength of the research design and use of analysis of covariance coupled with step-wise regression analysis of pupil scores on chronological age and third grade reading and math scores enabled hypothesis testing to proceed. It was found that pupils learned SCIS life science concepts as well outdoors as indoors. Of greatest interest was the fact that the outdoor groups gained significantly (0.03) more environmental knowledge than either of the control groups as measured by the State of Illinois test. No significant relationship was found between knowledge of the environment as measured by the test instruments and littering and stewardship day response behavior. Additional research and refinement of the unobtrusive measures used was recommended.

It was concluded that the school/community stewardship model was practical and effective as applied to the study location. It was recommended that environmental education centers and schools adopt the model, improve upon it, and/or develop alternatives to the present emphasis on annual field trips.

The economic benefits of good school site development were documented most thoroughly by Grube (1973) at the University of Michigan. This study documented the cognitive growth of pupils who used their outdoor laboratories for environmental education. Further research was recommended to explore the effect upon behavior.

342. Wijesinghe, Gita Sushila, Ph.D. The Treatment of Population Concepts in Social Studies and Biology Secondary School Textbooks in Florida: A Content Analysis and Survey of Teachers. The Florida State University. Dissertation Abstracts, 1980, 40(9):4881-A. UMI 8007525; 178pp.

DESCRIPTORS: descriptive research, knowledge, population education, science education, secondary, social science education.

The purposes of this study were to identify the quantity and quality of population content in secondary school textbooks in Florida and to ascertain the extent to which such content was utilized by teachers in their classes.

The textbooks analyzed represent the subject areas of American/U.S. history, biology general social studies, geography, and world history in grades 7-12. The selection of textbooks was made by a panel of experts from these subject areas, on the basis of which books were considered most widely used and most likely to contain population content.

A checklist of categories was developed for the content analysis of textbooks based on a selected set of standards. The set of standards comprised of (a) inclusion of materials, (b) comprehensiveness, (c) realism, (d) unity, (e) accuracy, (f) balance, (g) orientation towards inquiry learning, and (h) relevance to student.

The results of the content analysis revealed that though population content was included to some extent in all the textbooks analyzed, it generally was not presented in a systematic manner designed to promote an understanding of population dynamics. Basic demographic data for the world or particular regions of the world were sparse in most textbooks. Key demographic concepts were rarely used or explained. Textbooks almost uniformly gave low coverage or no coverage to certain population concepts, e.g., rural populations age-sex structure, population and public policy, existent and suggested solutions to population problems, ecological systems and population theories. Population content was found under a variety of topics and was usually given in descriptive, factual form. Generalizations, principles and hypotheses relating to population dynamics were seldom evident. The relevance of population dynamics to the life of the student was rarely made explicit; nor were students encouraged to take an active role in identifying and seeking solutions to population-related problems.

The results of the questionnaire survey of teachers indicated that a majority of them did not utilize all of the population section(s) in their textbooks. The most frequently identified reason for partial usage of the materials was lack of time. Other reasons identified were that better materials from other sources were used and that the materials in the textbooks were too outdated. Over one-third of the teachers stated their textbooks contained no section on population content.

Key recommendations of this study to textbook publishers and teachers are: (1) Infuse population concepts into an increased number of topics in the subject areas identified, (2) Achieve a better balance of population topics, representing the topics identified in this study as receiving low coverage, (3) Present population dynamics in a systematic manner including principles, generalizations, hypotheses and taking an analytic approach. (4) Include key demographic concepts and basic demographic data, (5) Encourage students to see the relevance of population dynamics to their lives, (6) Utilize population materials from reliable sources.

In addition, population educators need to increase training of teachers in population education and investigate means of encouraging teachers to include more population content in their classes.

343. Wileman, Joseph Lawrence, Ed.D. The Extent and Nature of Affective and Cognitive Changes in Teachers and Students as the Result of Participation in An Environmental Education Program. Virginia Polytechnic Institute and State University. Dissertation Abstracts, 1976, 36(8):5008-A. UMI 76-3874; 111pp.

DESCRIPTORS: affective, cognitive, program evaluation, teacher training inservice.

The effect of participation in an environmental education program on the cognitive and affective growth of teachers and students was investigated. Fourth, fifth, sixth and eighth grade teachers from selected schools in Prince William County, Virginia, were enrolled in an environmental education project funded by the National Science Foundation. These teachers, teachers who taught in the same school but not enrolled in the project, and teachers from schools (control) not involved in the project composed the three teacher groups for the study. The students of these three groups of teachers were the student groups of interest in the study.

The three groups of teachers were administered environmental attitude and environmental knowledge measures. Analysis of the data indicated that hypothesized differences between the groups were inconclusive.

The students, while not treated directly, were administered an Environmental Semantic Differential as an attitude measure and a knowledge test. Analysis of covariance indicated that there was a significant group by grade by sex interaction, with fifth and fourth grade treatment females scoring significantly higher on the attitude measure than the other groups.

The results of the analysis of these student attitude data provide evidence of both the effectiveness of the environmental education program and the use of the semantic differential as a measurement of students' attitudes toward the environment.

344. Wilke, Richard John, Ph.D. An Analysis of Three Strategies Designed to Influence Teacher Use of, Knowledge of, and Attitudes Toward Educational Resource Use in Environmental Education. Southern Illinois University at Carbondale. Dissertation Abstracts, 1980, 41(2):636-A. UMI 8017434; 305pp.

DESCRIPTORS: attitudes, descriptive research, knowledge. program evaluation, teacher training inservice.

The purpose of this study was to investigate the effects of three treatments on teacher use of, knowledge of, and attitudes toward resource use in environmental education. Specifically, the treatments investigated were: (A) Participation in a 60-hour training session in ecology and environmental education with concurrent involvement in the development of an environmental education resource manual and later acquisition of the manual; (B) Acquisition of the developed

environmental education resource manual along with a two-hour training session in the use of manual; (C) Acquisition of the developed environmental education resource manual only.

The research population was composed of 104 central Wisconsin teachers. These teachers were randomly assigned to the three treatments. Through the use of a modified posttest only control group design the researcher sought to determine whether the three treatments differed significantly in their ability to influence the following dependent variables: (1) the frequency of resource use by teachers, (2) the number of resources teachers can identify for use in teaching specific environmental concepts, and (3) teacher attitudes toward using resources for environmental education purposes.

A three-part questionnaire was developed for this study. Each part, was designed to obtain data for one of the three research questions. The researcher established face and content validity for the questionnaire, pilot tested it, and calculated the KR-20 reliability for its third part (KR-20 reliability of .99 with pilot group and .96 with research population).

Data were collected nine months after the treatments were administered. Two methods of data collection were used. Seventy-five percent of each treatment group's participants received and returned the questionnaires via the mail. The other 25 percent within each treatment group were randomly selected to receive and complete the questionnaire in the presence of the researcher. Within each group, the results obtained via the two methods of data collection were compared. No statistically significant differences were found between the two methods of data collection. Thus, the data collected for each treatment group via these two methods were collapsed for subsequent analyses.

Completed questionnaires were returned by over 98 percent of the research population. Data were analyzed through the use of One Way Analysis of Variance ( $\alpha = .01$ ) and the Scheffé test for a post hoc analysis for multiple comparisons among means ( $\alpha = .05$ ). The ANOVA yielded significant differences between the three treatments. The results of the multiple comparisons are stated below for each of the dependent variables investigated.

Use Variable: Teachers experiencing either treatment A or B had significantly higher mean frequencies of school site, community, regional, and total resource use for instructional purposes than teachers experiencing treatment C. No significant differences were observed between the means of Groups A and B.

Knowledge Variable: Teachers experiencing treatment A had a significantly higher mean frequency of resources they identified for use in teaching specific environmental concepts than teachers experiencing treatment B or C. No significant difference was observed between the means of Groups B and C.

Attitudinal Variable: Teachers experiencing treatment A had a significantly more positive attitudinal position toward using

educational resources for environmental education purposes than either teachers experiencing treatment B or C. Further, teachers experiencing treatment B had a significantly more positive attitudinal position toward using resources for environmental education than teachers who had experienced treatment C.

It can be concluded from the results of this study that certain specific treatments can influence teacher use of, knowledge of, and attitudes toward resource use for environmental education purposes.

345. Williams, Robert Aura, Ph.D. The Effects of the National Environmental Education Development (NEED) Program on Self Concept and Change of Environmental Attitudes of Selected Elementary School Students. Georgia State University-School of Education. Dissertation Abstracts, 1976, 36(7):4567-A. UMI 75-29,909; 125pp. (Also listed as ERIC ED 156 537.)

DESCRIPTORS: attitudes, elementary, environmental center, instrument development, nonformal, program evaluation.

Statement of the Problem: The study evaluated the environmental education program conducted at the Tremont Environmental Education Center, Tremont, Tennessee, to determine its effectiveness in changing and influencing environmental attitudes and self concepts of elementary school children. As a part of the study, instruments to assess environmental attitudes and attitude change in elementary children were developed and tested.

Methods and Procedures: The subjects were fourth, fifth, and sixth grade students from the metropolitan Atlanta, Georgia and Knoxville, Tennessee areas. The experimental group attended the Tremont Environmental Education Center NEED program while the control group had a similar camping program sponsored by the YMCA and YWCA which was without a specific environmental focus. Both groups were evaluated by three instruments: 1) The Environmental Preference Test (EPT), an instrument developed by the author and a panel of experts, was piloted using fifth and sixth grade students from two Atlanta, Georgia public schools; 2) The Missouri Childrens Picture Series (MCPS) was used to develop self concept variables; 3) The Verification Frequency Simulation (VFS) was used to assess littering habits.

Evaluation for both the experimental and control groups was conducted at the beginning of the week-long session and again at the end. A Solomon four-group research design was utilized as a basis for group selection. A one-way Analysis of Variance was used to test the 10 dependent variables while a t-test was used to analyze gain scores. A biserial correlation was used to determine the association of the tested variables to the seven descriptive variables and a Pearson Product-Moment correlation was computed to ascertain associations between tested variables. Fischer's z-transformation was used to determine relationships between pretest and posttest correlations.

Results: Six hypotheses were generated and the data related to each were presented and analyzed with statistical results indicating that:

1) the NEED program presently conducted at the Tremont Environmental center may significantly change environmental attitudes, littering habits and certain self-concept variables; 2) the EPT does measure some environmental attitudes and attitude changes of fourth, fifth, and sixth grade students; 3) the Tremont Environmental Education program appears to be more successful in changing environmental attitudes than the control YMCA and YWCA camps, as determined by the instruments used in this study; 4) littering habits can be measured using the VFS and can be changed by the Tremont Environmental Education (NEED) program.

The correlational statistics indicated that the EPT scores were correlated with six descriptive variables and not correlated to the VFS or littering habit variable. A change in correlation value as determined by a Fischer's  $z$ -transformation was found in the Ethnic Origin variables. A large number of significant correlations were found to exist between the MCPS scales and the descriptive variables, with changes in correlation between pretest and posttest found between all variables and the Ethnic Origin variable. Changes in correlation values between pretest and posttest occurred in the M-F scale with Socioeconomic Status variable. Aggressivity scale with the Grade Level variable and the VFS with the sex variable. Correlations between tested variables indicated that a relationship may exist between the scores on the EPT and the MCPS scales for Conformity and Sleep Disturbance and that this relationship remains constant through the Tremont experience.

Conclusions: The results of this study make it possible to conclude that the Tremont Environmental Education (NEED) program is effective in changing environmental attitudes and certain self-concepts of fourth, fifth, and sixth grade students. As a result of the evaluation of the Tremont program these findings emerged: 1) The environmental Preference Test (EPT) is effective in assessing environmental attitudes of this group of children. 2) The Verification Frequency Simulation (VFS) has significant possibilities for analyzing littering habits of larger populations. 3) No consistent predictor variables for littering habits appeared as a result of this study. 4) A relationship may exist between environmental attitudes as assessed by the EPT and the age or ethnic origin of the children.

346. Wint, Dennis Michael, Ph.D. Characteristics of Elementary Teachers Implementing an Environmental Curriculum. Case Western Reserve University. Dissertation Abstracts, 1978, 38(8):4563-A. UMI 7731018; 93pp.

DESCRIPTORS: attitudes, descriptive research, elementary, knowledge, program development, program evaluation, program implementation.

While schools have always had a role in social reform, a major redirection beginning about 1957 resulted in schools and the educational process again serving as a major agent for social change. Innovative programs designed to improve the quality of education became the order of the day. Authors investigating the impact of the millions of dollars spent on educational change generally conclude that changes have failed

to permeate the classroom doors of the majority of schools in the country.

The purpose of the study was to investigate the use of an innovative environmental curriculum by elementary teachers during and after the year of implementation, and to correlate specific characteristics of teachers and school districts with teachers classified in one of three Use groupings (Non-Use, Moderate Use, or High Use). Four discriminant variables were identified for the study: Biographical Information of the Teacher; Teacher Participation in the implementation program; Teacher Attitudes and Knowledge of the Environment; and School Characteristics. Fourteen characteristics were subsumed under these four variables. Data were analyzed using the stepwise discriminant analysis and the analysis of variance.

Between 1971 and 1974, the Center for the Development of Environmental Curriculum was funded by Ohio ESEA Title III to develop an interdisciplinary environmental education curriculum for grades K-12 for use in Ohio schools. Between 1974 and 1976, the curriculum was implemented into 26 school districts through a diffusion and implementation plan sponsored by the Division of Planning and Evaluation of the Ohio Department of Education. Approximately 800 elementary and secondary teachers participated in the program entitled the Environmental Curriculum Adaptation Grant.

Of the 499 elementary teachers representing the 21 school districts included in the study, 309 returned the data collection questionnaire. Deducting the 71 teachers who did not receive the questionnaire, the adjusted return rate was 72.2 percent.

For the responding teachers, 57.4 percent met the criteria of acceptable use of the curriculum during the Adaptation Year, the year in which the program was implemented, and 8.4 percent met the criteria during the Study Year, the 1976-1977 school year. Analyzing the three levels of use with the 14 characteristics, the stepwise discriminant analysis identified three characteristics significantly related to Use groupings. The significant characteristics and the levels of significance were: Adaptation Grant Attitudes (0.001); Age (0.007); and Environmental Education Attitudes (0.039). The results of the analysis of variance indicated three Use levels were present.

The results of this study are valuable to environmental educators and change agents in the planning and implementation of innovative programs in environmental education.

347. Witter, Daniel Jay, Ph.D. Bird-Watchers', Hunters', and Wildlife Professionals' Beliefs about the Importance and Management of Wildlife. The University of Arizona. Dissertation Abstracts, 1979, 39(7):3073-B. UMI 7901719; 204pp.

DESCRIPTORS: beliefs, citizen action, conservation education, descriptive research, nonformal, resource management education.

Since the early 1930s, calls have been made for a uniting of hunters and nonhunters in support of wildlife conservation in the public sector. Today, however, such an alliance remains largely unfounded, with government wildlife agencies continuing to depend heavily on sportsmen for financial support.

One type of hunter/nonhunter coalition which has been discussed over the years is that combining hunters with bird-watchers (or birders). If policymakers and government agencies conclude that such a union is indeed desirable, they will need information as to the compatibility of the beliefs held by birders, hunters, and wildlife professionals with respect to the importance and management of wildlife.

To help obtain this information, a self-administered, mail-back questionnaire was sent to each individual within random samples of bird-watchers (N = 180), hunters (N = 111), and wildlife professionals (N = 168). The results indicated that, though the beliefs held by the three groups differ in some ways with respect to the importance and management of wildlife, these differences seem not to pose insurmountable barriers to a union of the groups in support of wildlife. General agreement exists among them as to the ways in which wildlife are valuable, the importance of habitat preservation, the role of sport hunting in wildlife management and desirability of tapping the financial resources of the general public to finance increased nongame management. However, though they hold much in common, the financial resources of bird-watchers flow to private conservation organizations, while hunters and wildlife professionals lend financial support to public conservation efforts.

A union of the groups might well be fashioned on the now-existent framework of state agency programs, with wildlife professionals acting as facilitators and mediators. Importantly, however, the appeal of state management efforts must be broadened if the agencies expect to capture the attention of nonconsumptive wildlife enthusiasts. New programs of a nongame orientation around which bird-watchers can subsequently be rallied might be financed through short-term or long-term use of general tax revenues. For those agencies that would shy from increased dependence on such legislative appropriations, the possibility exists that this dependence could eventually be lessened by replacing general tax revenues with earmarked funds generated through special programs such as selling of permits for recreational use of public lands, selling of wildlife stamps and decals, sales tax levies, selling of nature publications, and surcharge programs.

Encouragingly, birders, hunters, and wildlife professionals appear to be on parallel paths to the same end, wildlife conservation. However, until nonconsumptive wildlife enthusiasts perceive that public wildlife agencies are full-time representatives of their interests, or until funding mechanisms are developed which make their participation in public programs mandatory, their resources will flow to wildlife conservation programs in the private sector, and remain largely untapped by government wildlife agencies.



348. Wurzelbacher, Thelma Marie, Ph.D. Population Education: Case Studies on the Implementation Process in Secondary Schools. The University of Michigan. Dissertation Abstracts, 1976, 37(3):1483-B. UMI 76-19,281; 195pp.

DESCRIPTORS: case studies descriptive research, interdisciplinary, population education, program implementation, secondary.

This study investigated the implementation of population education in selected secondary schools. It was an exploration of the circumstances and events that occur when individuals recognize the need for population education and attempt to place population topics within standard curriculum and schedules. The research centered on the individual teacher, the actual mechanics by which population education was put into traditional classes, and the various factors which influenced the implementation process.

The case study approach was used to document implementation in multiple subject areas and diverse school environments. The four data sources were the precourse survey, written and telephone logs, a school visit, and a final interview. Collection of data was preceded by population education courses taught at the graduate level. From these courses five teachers were selected as case participants.

During the time implementation was traced, three factors or dimensions were developed to categorize influences on the process of implementation. These were the resource, administrative, departmental and interdepartmental dimensions. These dimensions along with background elements or situational contrasts specific to each setting are described as they pertain to the implementation process for each case.

It was found that neither the situational contrasts nor any of the dimensions were as important to the implementation process as the classroom teacher. The individual teacher was the most significant influence on the kind and quality of the implementation that occurred. Furthermore, implementation depended in large measure on the ease in which population topics, materials, and activities fit into existing course content. Ease of fit was found to be essential to the implementation process.

Based on these findings, the infusion strategy is advocated as the method by which implementation is most likely to occur. Using this approach, population topics are inserted into existing course content and teaching schedules. The individual classroom is stressed as the unit of implementation.

Finally, recommendations dealing with teacher training, the need for materials, a personal strategy for implementation, implementation guidance, and implementation research are offered.

349. Yockers, Dennis Harold, Ph.D. Selected Michigan Public School Teachers' Perceptions About Factors Influencing Utilization of

Outdoor Sites and Resources for Outdoor/Environmental Education.  
Michigan State University. Dissertation Abstracts, 1980,  
40(12):6124-A. UMI 8013821; 152pp.

DESCRIPTORS: descriptive, research, outdoor classroom, outdoor education.

Purpose: The purpose of this study was to identify the factors which teachers perceived as influencing the utilization of outdoor sites and resources for outdoor/environmental education. Specifically, the objectives of the study were: (1) to develop a list of factors which may influence teachers in the utilization of outdoor sites and resources, and (2) to evaluate the factors by having teachers from two Michigan public school districts rate each factor as to the extent it discouraged or encouraged utilization of outdoor sites and resources.

Procedures: Data were collected with the use of a survey questionnaire. Validation of the instrument was provided by a jury of outdoor and environmental educators. The questionnaire provided two types of data: (1) demographic description of teacher respondents, and (2) teachers' ratings regarding the influences of 55 factors on utilization of outdoor sites and resources. Respondents were provided with a five-point Likert-type scale for rating the 55 factors which were identified. Frequency tables were generated for the two types of data for each of the two districts. The analysis of data involved the interpretation and evaluation of the frequency tables. The results of the study were obtained from the responses of 55 teachers from the Bellevue Community Schools and of 288 teachers from the Bloomfield Hills Schools.

Results of Study: In summary, the assessment that was performed in this study indicated that the majority of teachers from both school districts were not engaging their students in outdoor/environmental education activities which utilized outdoor sites and resources. High percentages of the teachers from both districts also indicated that they had not been involved in undergraduate and graduate coursework and teacher training which focused on the content and methods of outdoor/environmental education.

The Bellevue teachers and Bloomfield Hills teachers identified factors which encouraged or discouraged their utilization of outdoor sites and resources. Many of the factors that were identified by this study appeared to be interrelated. The combination and interaction of a number of these factors may have influenced the degree to which the teachers were involved in the utilization of outdoor sites and resources for outdoor/environmental education.

The following factors were among those perceived by the teachers from both school districts as discouraging their utilization of outdoor sites and resources: (1) time needed to plan for and to engage in outdoor/environmental education activities; (2) amount of school district financial support for the costs of outdoor/environmental education activities; (3) size of their classes. The following factors were among those perceived by the teachers from both school districts as encouraging their utilization of outdoor sites and resources: (1)

adequacy of their school's, school district's, and community's outdoor sites and resources for outdoor/environmental education; (2) educational value of outdoor/environmental education activities for students; and (3) personal interests and feelings in spending time outdoors and in outdoor/environmental education. The following factors were among those perceived by the teachers from both school districts as not being factors which influenced their utilization of outdoor sites and resources: (1) Michigan Department of Education; (2) professional organizations; and (3) institutions of higher education.

Those factors that discouraged the teachers can be viewed as deterrents to the utilization of outdoor sites and resources. Identification and removal of these deterrents could lead to a situation where teachers would be encouraged to utilize outdoor sites and resources.

The findings of the study indicate that without some future form of positive intervention from the local school district and other educational institutions and agencies, there is little reason to expect the assessed samples of teachers will utilize outdoor sites and resources for outdoor/environmental education.

350. Zosel, Mary Elsbeth, Ph.D. Measurement and Study of the Understanding of the Concept of Ecology in Fifth and Sixth Grade Students. Marquette University. Dissertation Abstracts, 1978, 39(1):208-A. UMI 7810300; 173pp.

DESCRIPTORS: cognitive, ecology education, hypothesis generation, instrument development, middle school.

As the deterioration of our environment becomes a major point of public concern, the importance of having an understanding of the delicate balance between forces in nature becomes ever more evident. It becomes the task of our educational systems to produce the enlightened populace necessary to deal with the ensuing problems. The educational efforts made in the past few years have not been an overwhelming success. The curricula and programs appear to have been developed with little research on the child's understanding of the concept of ecology.

The general problem for this study was to explore the child's concept of ecology. This was accomplished by addressing two problems: (1) An objective, reliable and content-valid test was developed based upon the universe of content identified in the literature as relevant to a child's understanding of ecology and appropriate for fifth and sixth grade students. The data obtained from the test administration were analyzed to further glean information regarding the child's concept of ecology; (2) The test items were factor analyzed so as to determine the nature and interrelationships of the factors encompassed within the child's concept of ecology.

A content-valid test was prepared by defining the universe of ecology with the assistance of a committee of experts, preparing and administering the refined test to a total of 459 fifth and sixth grade students from six schools in two school districts.

The 50-item multiple choice refined test constructed in adherence to American Psychological Association Standards had a reliability of .86 using Hoyt's Internal Reliability method. Forty-seven of the 50 items had correlation coefficients above the acceptable level.

An analysis of variance performed on the test scores by grade and school district showed the grade to be significant while the school district was not significant. A second analysis of variance computed on the test scores by grade and school found the grade, school and school-by-grade interaction to be significant.

In order to explore the second problem, the item responses were factor analyzed. The Principal Component Factor Analysis was used to investigate the factor structure. Eighteen factors were extracted. A portion of these were interpreted to have ecological meaning. These results indicate that the concept of ecology as it is understood by fifth and sixth grade students involves many different factors.

351. Zwick, Thomas Theodore, Ed.D. An Investigation into the Affective Behavior of Students in the Environmental Education Program in School District #2, Billings, Montana. University of Northern Colorado. Dissertation Abstracts, 1978, 39(1):212-A. UMI 7810555; 90pp.

DESCRIPTORS: affective, attitudes, behaviors, experimental research, middle school, outdoor classroom, outdoor education.

Purpose: This study was conducted to determine changes in students' affective behavior toward environmental education and environmental values resulting from their participation in the "AH-NEI" outdoor study area. Affective behavior was assessed by using the Billings Environmental Attitude Assessment Instrument (BEAAI). Students' self-assessed values as indicated on the BEAAI were correlated with their observed affective behavior toward these attitudes as recorded by teachers on the Checklist for Observed Affective Behavior (COAB). A Spearman Rho Coefficient of Correlation of these results was calculated to be .94.

The Likert statements of the BEAAI were constructed from randomly selected, affective objectives of the "AH-NEI" Curriculum Guide and based upon the Affective Domain Levels (Krathwohl, 1965). The sample was comprised of 160 fifth grade students enrolled in School District #2, Billings, Montana. Eighty students were randomly selected from Title I (low socioeconomic), and 80 were randomly selected from Non-Title I (high socioeconomic) schools. Experimental and control groups were composed of one school from each socioeconomic level. The designation of experimental or control was determined by a flip of a coin.

The changes in behavior between the experimental and control group were determined by a computer-run student t-test and an analysis of variance on the mean gain attitude scores. Significant levels for the student t-test and the f-ratio were set at .05.

Research Findings: Data collected and analyzed in this study revealed the following: 1) Significant Findings exist between: a) The mean gain attitude scores of students participating in the "AH-NEI" field experience and those not participating in the field experience. The group participating in the field experience showed a more positive change; b) The mean gain attitude scores of students of high and low socioeconomic schools participating in the "AH-NEI" field experience. The students from low socioeconomic schools showed a more positive change; c) The mean gain attitude scores between males from high and low socioeconomic schools participating in the "AH-NEI" field experience. The low socioeconomic showed a more positive change; d) The mean gain attitude scores between males of high socioeconomic and females of low socioeconomic schools, participating in the "AH-NEI" field experience. The females of low socioeconomic schools showed a more positive change. 2) Non-Significant Findings exist between: a) Mean gain attitude scores of males and females of mixed socioeconomic backgrounds participating in the "AH-NEI" field experience b) Mean gain attitude scores of females of high and low socioeconomic schools participating in the "AH-NEI" field experience; c) Mean gain attitude scores of males from low and females from high socioeconomic schools participating in the "AH-NEI" field experience; d) Mean gain attitude scores of males and females from low socioeconomic schools participating in the "AH-NEI" field experience; e) Mean gain attitude scores of males and females from high socioeconomic schools participating in the "AH-NEI" field experience.

Conclusions: The following conclusions are based upon the analysis of the research data found in this study: 1) Students' attitudes toward environmental values became more positive as a result of their participation in the "AH-NEI" field experience; 2) The "AH-NEI" field experience produced a greater attitude change in students from low socioeconomic backgrounds than it did in males of high socioeconomic backgrounds; 3) The "AH-NEI" field experience produced a greater attitude change in the females of low socioeconomic backgrounds than it did in males of high socioeconomic backgrounds.

SUMMARIES—FUGITIVE LITERATURE

352. Abbott, Eric A. Effects of A Year-long Newspaper Energy Series on Reader Knowledge and Action. Paper presented at the annual meeting of the Association for Education in Journalism (61st, Seattle, WA, August 13-16, 1978). 27pp. ED 163 468.

DESCRIPTORS: attitudes, behaviors, citizen action, energy education, nonformal, knowledge.

The effects of a year-long newspaper series about energy on peoples' knowledge and actions were assessed in a Wisconsin study. The series consisted of 20 full-page newspaper articles which appeared at intervals of from three to five weeks. Results, based on responses to a 16-item knowledge test mailed to newspaper subscribers and nonsubscribers before and after the series appeared, showed that newspaper subscribers increased their scores significantly from 1976 when the series began to 1977, that nonsubscribers did not increase their scores significantly, and that those who remembered reading at least one article from the series increased their scores by more than those who did not remember reading an article. Examination of specific test items showed that persons who both received the pretest questionnaire and saw the series of articles generally received the highest scores on the posttest, suggesting that questionnaire sensitization was a factor in the study. Scores both before and after the series were found to increase as educational level increased, and younger readers learned more from the series than older readers. No specific changes in respondents' energy-related actions could be linked directly to the reading of the series articles.

353. Allen, Stewart D. Land Managers' Perceptions of Risk Recreation in the Northern Rockies. Paper presented at the annual meeting of the American Alliance for Health, Physical Education, Recreation and Dance (New Orleans, LA, March 18, 1979). 13pp. ED 182 261.

DESCRIPTORS: attitudes, descriptive research, nonformal, outdoor education, preferences, resource management education.

This survey was conducted to determine the frequency of participation in high-risk recreation activities in the Northern Rocky Mountains and to identify how wildland managers perceive the presence of these sports and the problems associated with them. Managers rated perceived risk, management difficulty and appropriateness given management objectives and applied the use levels for each of 23 activities covering a wide range of sports. The result of the survey are presented in tabular form, and the manager's perceptions are discussed and analyzed.

354. Bennett, Roger V.; and others. P.E.A.C.E. (Project in Environmental Action/Community Education). Paper presented at the annual meeting of the American Educational Research Association (Toronto, Canada, March 31, 1978). 37pp. ED 152 949.

DESCRIPTORS: affective, cognitive, elementary, model building, program development, program evaluation, program implementation, secondary, urban.

This research project on environmental education was designed to implement and evaluate a community action curriculum development model concerned with the preservation and enhancement of environmental quality and ecological balance within an urban area. It sought, furthermore, to involve students, teachers, parents, community representatives, school administrators, public school curriculum specialists, and university personnel in all stages of the project. Each of the objectives of the project, and its realization, is discussed in detail. The four objectives are: (1) implementation and evaluation of a developmental curriculum model used to generate effective urban environmental curricula; (2) implementation, revision, and evaluation of the environmental leadership and inservice teacher education modules; (3) implementation, revision, and dissemination of the research findings and recommendations and the revised curricula and instructional program.

355. Bennett, Roger V. Interrelationships Among Curriculum and Instruction Variables and Learning Outcomes in Project P.E.A.C.E. Paper presented at the annual meeting of the American Educational Research Association (San Francisco, CA, April 1979). 31pp. ED 170 227.

DESCRIPTORS: affective, cognitive, elementary, model building, program development, program evaluation, program implementation, secondary, urban.

The paper focuses on development and implementation of the curriculum phase of an urban environmental studies program entitled Project Environmental Action Community Education (P.E.A.C.E.). The curriculum model developed for P.E.A.C.E. was based on the premises that it should be created by relevant consumer groups as well as educators, comprehensive in scope, and transferable to other segments of society. Project members generated eight instructional modules, a teacher inservice module and a leadership module. Examples of modules included urban environmental development and planning, social services and the urban environment, economics and politics of resource management, and leisure activities in the urban environment. The modules were field tested by 24 teachers in 10 urban schools in Memphis (Tennessee). Modules were evaluated by students using various measurement instruments including the module activity questionnaire, the individual module tests, the environmental aptitude scale, the problem-solving process inventory, and the environmental action options scale. Findings indicated that students enjoyed working with P.E.A.C.E. instructional modules and received higher test scores on seven of the eight modules after participating in the project. Findings also indicated that teachers who participated in P.E.A.C.E. inservice training became more knowledgeable about the module topics, objectives and instructional approaches of the project.

356. Blum, Abraham. Water Pollution in Environmental Education Curricula: A Comparative Study. Kiel Univ. (West Germany),



Institut fuer die Paedagogik der Naturwissenschaften, 1978. 134pp.  
ED 190 340.

DESCRIPTORS: cognitive, descriptive research, formal, program development, program evaluation.

This report compares similarities and differences in water pollution as it is presented in selected curriculum materials. The materials selected for analysis included materials from five projects in the United States, England, Israel, and West Germany. Each set of instructional materials is analyzed including the framework of the units, selection of the content, composition of teacher's guides, composition of student texts, student activities and methods, and use of media. The report concludes with recommendations based on data obtained in the study.

357. Bryant, Covey K., and Harold R. Hungerford. An Analysis of Strategies for Teaching Environmental Concepts and Values Clarification in Kindergarten. 1977. 8pp. ED 137 117.

DESCRIPTORS: citizenship education, elementary, experimental research, formal, issue-based, program evaluation.

This study was initiated to evaluate a kindergarten unit on the environment and associated pollution problems. The research design was a modified rotation design, permitting each group to act both as a control and experimental group. Two groups (each involving 17 students) were used in the study. The data indicated that many kindergarten children can form concepts concerning issues and citizenship responsibility. The writers speculate that the instructional procedures used in this unit hold promise for use with other similar groups.

358. Buethe, Chris. The Status of Indiana Teachers' Environmental Knowledge and Attitudes. Indiana State University, Terre Haute, School of Education, 1975. 36pp. ED 121 571.

DESCRIPTORS: affective, cognitive, descriptive research, teacher training inservice.

This study analyzed Indiana teachers' knowledge and attitudes about environmental problems and their solutions. A total of 67 elementary and secondary teachers from urban and rural schools were surveyed. The measurement techniques included a list of 70 environmental terms, 25 multiple-choice statements on concepts, and semantic judgments of 12 environmental expressions. With the exception of science teachers, the study revealed that Indiana teachers possess inadequate environmental knowledge and awareness. This study suggests that statewide teacher training in environmental concepts and issues should be implemented to ensure effective dissemination of environmental concepts and attitudes to students.

359. Buterbaugh, Wanda Kay. A Study of Factors Important to Environmental (Conservation-Outdoor) Education Instruction. M.E. thesis, Slippery Rock State College, 1970. 82pp. ED 129 538.

DESCRIPTORS: affective, cognitive, conservation education, descriptive research, interdisciplinary, model building, outdoor education, teacher training inservice, teacher training preservice.

In conjunction with a literature review, 100 recognized leaders in environmental education and related fields were surveyed via a mail questionnaire for purposes of determining the knowledge and skill concepts deemed necessary for outdoor/environmental education teachers at both the elementary and secondary levels. The survey elicited a 67 percent response to five questions re: environmental education; program emphasis; course requirements; teacher inservice training; knowledge and skill competency levels; and the general state of teacher preparation programs. Results indicated that undergraduate programs for outdoor educators should include: one or two environmental education courses; an adequate understanding of the biological sciences (biology, botany, history and philosophy) and environmental and conservation education concepts, history, and philosophy; an integrated or interdisciplinary approach to courses in biology, history, geography, political science, and natural resources; greater emphasis upon elementary teacher preparation curricula. At the graduate level, results indicated teachers needed: A minimum of 30 hours of approved courses; 6 hours of professional education courses; a B average; a 6-year limit on the Master's degree; a thesis or research project; specialization in outdoor education and conservation, environmental education studies/problems, or social studies; and field work in various courses.

360. Chapline, Elaine. An Evaluation of Environmental Education/Communication Skill Program., Summer 1979. Final Report. Community School District 27, Queens, NY, September 1979. 17pp. ED 186 550.

DESCRIPTORS: cognitive, descriptive research, formal, language arts, middle school, program evaluation.

The Environmental Education/Communication Skills program was designed to improve junior high school students' reading and writing skills. The key idea of the program was to motivate reading and writing improvement through environmental topic learning. Content focus areas were: orienteering, plant life, animal life, environmental problems, and future planning. A problem-solving approach and scientific method of investigation were stressed. Program evaluation focused on program operation and program effect. The program appeared to be fully implemented. The strengths of the program were seen as content base and focus for language arts activities, positive staff attitudes, staff preparation basic organization of rotating groups in topic areas, availability and quality of materials and equipment, and supervision and coordination. Students' achievement in reading comprehension was evaluated pre and post by the Literal and Inferential comprehension subtests of the Stanford Diagnostic Reading Test. Fifty-eight percent

of participating students reached or exceed the criterion in literal comprehension, 54 percent reached or exceeded the criterion in inferential comprehension. Ninety percent had acceptable scores on Writing Sample Characteristics Tests. Student and staff attitudes were evaluated using a questionnaire format. The staff felt the program was meeting its goals and should be maintained. Student responses were very positive.

361. Cheu, Janey; and others. The Socio-Scientific Reasoning Model: Instruments for Evaluation. Paper presented at the annual meeting of the National Association for Research in Science Teaching (52nd, Atlanta, GA, March 21-23, 1979). 12pp. ED 173 076.

DESCRIPTORS: attitudes, formal, instrument development, issue-based, moral development, values.

The Environmental Issues Test (EIT) is an instrument designed to assess moral and ethical reasoning within a scientific or technological context. It is comprised of five dilemma stories each of which highlights an environmental issue and the moral conflicts inherent in that issue. Following each dilemma story is a series of 12 issues statements, each keyed to a specific moral reasoning stage as defined by Kohlberg. Respondents are asked to assign a priority rating to each statement in terms of its relative degree of importance in making a particular decision. The evaluation of the EIT and the development of a similar test for younger students is described.

362. Comstock, John. An Evaluation of Twenty-Six Secondary Environmental Education Units: An Evaluation Report, Minnesota State Dept. of Education, St. Paul, Div. of Planning and Development, 1975. 321pp. ED 182 106.

DESCRIPTORS: conservation education, descriptive research, program evaluation, secondary.

This report presents the results of field testing of 26 environmental education units designed for use at the secondary level. Field testing was intended to determine the merit of the units. About 50 school districts, 170 teachers, and 900 students took part in the field test. The report includes a description of the units, design of the evaluation, results, and discussion. Appendices present data and statistics specific to various evaluative concerns.

363. Cummings, Stanley L. Jr. Environmental Education: A Market Survey. Paper presented at the annual meeting of the American Educational Research Association (San Francisco, CA, April 19-23, 1976). 21pp. ED 124 415.

DESCRIPTORS: descriptive research, formal, preferences, program development, values.

Applying techniques and statistical procedures of market research, this research paper treats the subject of environmental education. The first segment of the paper is involved with the identification of the role marketing can play in the analysis of environmental curricula and defines the potential market for environmental education. Sampling techniques were employed to divide the market into "adapter categories," categories of teachers grouped on interest and knowledge about environmental education. A second segment of the research concerns itself with correlation of teacher curriculum preference with various environmental education curriculum attributes. The research concludes that the focus on environmental education curriculum development should be on teacher preferences rather than on expert judgment if environmental education is to be marketed at the optimum level. A seven-entry bibliography concludes the paper.

364. Drawbaugh, Charles C., and Roger R. Locandro. The Effects of the New Jersey Hunter Education Program and Selected Demographic Variables of Students on Knowledge and Attitude Scores About the Sport of Hunting. Final Research Report. Fish and Wildlife Service (Dept. of Interior), Washington, DC; New Jersey State Dept. of Environmental Protection, Trenton, 1978. 69pp. ED 168 906.

DESCRIPTORS: attitudes, knowledge, nonformal, outdoor education, resource management education.

In order to assess the effect of a hunter education program on knowledge and attitudes toward hunting, students enrolled in the eight-hour New Jersey hunter education course were administered the New Jersey hunter education examination No. 4 and the attitude inventory for hunters as a pretest and posttest. The hunter education course is required of all persons being issued a first hunting license. Eleven hunter education classes from 11 New Jersey counties participated in the study. The results were structured around the categories of demography, knowledge about hunting, attitudes about hunting, and correlations between knowledge and attitude scores. The findings were related to such variables as classes, age, sex, previous hunting licenses, hunters in the home, and magazines received. There was a significant correlation between both pretest and posttest knowledge and attitude scores.

365. Dresser Harry H., and John W. Butzow. An Investigation of the Effects of Selected Variables on the Implementation of a Marine Infusion Curriculum. Paper presented at the annual meeting of the National Association for Research in Science Teaching (53rd, Boston, MA, April 11-13, 1980). 16pp. ED 186 268.

DESCRIPTORS: descriptive research, formal, marine education, multidisciplinary-infusion, program implementation, science education.

This study attempted to identify differences among schools which accepted, rejected, or made exploratory use of a proposed marine education curriculum. The selected variables for this study included:

(1) percentage of teachers by age; (2) percentage of teachers by area of academic preparation; (3) pupil-teacher ratio; (4) per pupil expenditure; and (5) distance from marine environment. Significant relationships (following ANOVA and t-tests) were detected among acceptance/rejection and teacher academic field of preparation, percentage of white-collar workers in the community, and distance from the marine environment.

366. Dunlop, David L. The Effects of An Energy-Environment Simulator Upon Selected Energy-Related Attitudes of Science Students and In-service Teachers. Paper presented at the annual meeting of the National Association for Research in Science Teaching (51st, Toronto, Canada, March 31-April 2, 1978). 32pp. ED 164 267.

DESCRIPTORS: attitudes, energy education, formal, science education, simulation.

This document is the outcome of a study designed to investigate the energy-related attitudes of several different groups of science students and science teachers both before and after working with an energy-environment simulator for approximately an hour. During the interaction with the simulator, the participants decided upon the variables they wanted to include in the study and to interact with each other, such as population growth, personal-energy use, and the distribution of natural resources. The results of the study indicated that significant changes do occur, and suggested that the energy-environmental simulator was responsible, at least in part, for attitudinal changes in several different groups of science students and inservice teachers. The document contains the names of people to contact for a presentation and/or demonstration on "energy and the environment."

367. Education Commission of the States. The Status of State Energy Education Policy. Education Commission of the States, Denver, CO, June 1979. 53pp. ED 176 969.

DESCRIPTORS: descriptive research, energy education, formal, program development, program evaluation.

A survey was conducted in May 1978 to determine the status of state policies and practices regarding energy education among state education agencies, state offices of energy, governors' offices, and state legislatures. Four different questionnaires were constructed and sent to designated officials of those agencies listed above in each state. A total of 208 questionnaires were mailed. Analysis of data received as of July 7, 1978, from 56 percent of the questionnaires plus additional information received as of September 1, 1978, is included in this final report which represents about 70 percent of the agencies surveyed. (See ED 162 890 for a more detailed version.)

368. Edwards, Sandra J. Science Education in Two-Year Colleges: Environmental Sciences. California Univ., Los Angeles. ERIC Clearinghouse for Junior College Information; Center for the Study of Community Colleges, Los Angeles, CA. 82pp. ED 180 558.

DESCRIPTORS: descriptive research, formal, higher education, interdisciplinary, program evaluation, science education.

The interdisciplinary components of science instruction at two-year colleges are examined as revealed by curriculum offerings in environmental science, integrated science, and the history of science. Part I of the report reviews the literature concerning the rationale, objectives, course content, and instructional methods of interdisciplinary science courses, as well as the components of and instructional practices in environmental sciences. Part II summarizes the findings of a study of catalogs and a survey of science instructors at 175 colleges. These studies were conducted to analyze the science courses offered in the 1977-78 academic year and to assess the instructional practices used. Major findings outlined in this section show that: (1) while interdisciplinary and environmental science courses made up 4 percent of the science courses listed, 89 percent of the colleges included one or more of these courses in their schedules of classes; (2) 70 percent of the environmental science courses listed were designed for environmental technology majors; and (3) interdisciplinary science instructors were predominantly experienced, full-time teachers using a variety of nontraditional techniques. Part III provides summary observations pointing to the small percentage of colleges offering integrated sciences in vocational curricula, the lack of goal clarification in interdisciplinary offerings, and the value of interdisciplinary sciences in developmental education.

369. Ellis, Richard A. Prior Membership in Outdoor-Oriented Youth Organizations: Its Relationship to Environmental Attitudes in Young Adults. M.S. thesis, The Ohio State University, 1976. 73pp. ED 137 058.

DESCRIPTORS: affective, attitudes, descriptive research, educational background, higher education.

This study sought to determine whether prior membership in the Girl Scouts, Boy Scouts, Campfire Girls, and 4-H related to favorable environmental attitudes, and whether prior members of these groups demonstrated significantly higher measures of these attitudes than nonmembers. The sample was comprised of 166 students from the College of Education of The Ohio State University. The instrument selected for the measurement of environmental concern was the Syracuse Environmental Awareness Test, Level III, Form D. In addition, a personal data questionnaire was utilized. Statistical analysis of the data found that no significant differences existed between the scores of prior members and prior nonmembers. No significant correlation was found to exist between duration of prior membership and attitude scores for the study population. On the basis of this study, prior membership in the specified youth organizations would appear to be of little consequence in the identification of individuals bearing environmental attitudes

more favorable than the general population.

370. Ewert, Alan. The Effects of Outdoor Adventure Activities Upon Self-Concept. Master's thesis. Eastern Washington University, 1977. 70pp. ED 178 261.

DESCRIPTORS: attitudes, higher education, outdoor education, personality type, program evaluation.

The Tennessee Self Concept Scale was used to study the effect of outdoor adventure activities on the self concept of university students. Related studies have found significant changes in self concept following survival training and Outward Bound experiences. The study population consisted of 99 students enrolled in 1 of 4 classes at Eastern Washington University. Three classes included an adventure activity, e.g., overnight survival camps, rappelling, back country hiking, as part of the course curriculum; the fourth class, the control group, was a traditional lecture course. The Tennessee Self Concept Scale was administered to all four classes in the first week of the Spring Quarter 1977 and again nine weeks later, in the last week of the quarter. Two measures were obtained from the scale: one reflecting overall level of self esteem and one reflecting capacity for self criticism. The separate variance t-test was used to measure statistically significant differences in class means for pre and posttest scores. The comparison of means suggested a positive change in self concept for the classes featuring outdoor adventure activities, but levels of change did not reach statistical significance for self esteem or self criticism scores. Additional research is needed using a larger population and other measures of self concept such as the Minnesota Multiphasic Personality Inventory.

371. Fazio, Frank, and David L. Dunlop. An Assessment of Value Preferences of College Students with Reference to Environmental Chemistry. Paper presented at the annual meeting of the National Association for Research in Science Teaching (48th, Los Angeles, CA, March 17-20, 1975). 13pp. ED 123 029.

DESCRIPTORS: formal; higher education, instrument development, preferences, science education, values.

The main objective of this study was to design an instrument to assess the value preferences of college nonscience majors with respect to certain aspects of environmental chemistry. A second objective was to obtain measures of the value preferences of various groups of nonscience majors who had completed some chemistry courses. The early construction of the instrument and the format were based on pilot studies performed by the authors. Validity and reliability measures were determined. Nine findings were noted. The overall results suggest that since nonscience majors have a strong value preference for the humanistic aspects of chemistry with regard to environmental problems, then curriculum designers, textbook writers, and course instructors should structure their course activities toward these strong value preferences.

372. Fazio, Frank, and David L. Dunlop. The Development and Use of An Energy Environment Assessment Instrument. Paper presented at the annual meeting of the National Association for Research in Science Teaching (50th, Cincinnati, OH, March 22-24, 1977). 16pp. ED 135 664.

DESCRIPTORS: energy education, higher education. instrument development, program development, program evaluation.

The purpose of this investigation was to assess the general background knowledge of the college nonscience major with respect to energy-environmental facts and concepts. It was hypothesized that in general, college students have a rather poor background in and lack an understanding of the current energy crises and the related environmental impacts of energy use. Since the hypothesis was later found to be true (accepted), the second purpose of this study was to develop a two-week six-lecture presentation on "Energy and the Environment" as part of a course in physical science for nonscience majors. A pretest and posttest design was used and the treatment group showed significant gain scores (0.01 level).

373. Fletcher, Richard K., Jr., and S. K. Ballal. Cognitive and Affective Changes of Environmental Education--A Model for Evaluation. Paper presented at the annual meeting of the National Science Teachers Association (Washington, DC, April 1978. 28pp. ED 155 055.

DESCRIPTORS: attitudes, cognitive, instrument development, issue awareness/knowledge of issues, program development, program evaluation.

This paper discusses the design and results for the evaluation of an Environmental Education Institute Program held at Tennessee Technological University from July 1976 to June 1977. The 26 participants completed pre- and post-instruments which included items of both attitudinal and knowledge composition. The goals for the evaluation of the program were: (1) to increase environmental knowledge in selected areas of the participants; (2) to create an awareness of environmental issues and possible solutions; (3) to present interesting sessions; and (4) to develop plans of action. One part of the instrument consisted of 50 cognitive multiple-choice items. Other parts were 25 Likert-type items, semantic differential items, and written comments. Data were subjected to F-ratios, t-tests and other statistical procedures. Summary data and statistics are given for test items. Both positive and negative comments from participants are included, along with a discussion of selected items.

374. Gaston, Debra Wickstrom; and others. An Empirical Investigation of a Wilderness Adventure Program for Teenagers: The Connecticut Wilderness School. Paper presented at the annual meeting of the Eastern Psychological Association (49th, Washington, DC, March 31, 1978). 12pp. ED 178 250.



DESCRIPTORS: behaviors, locus of control, nonformal, outdoor education, program evaluation.

Through an intensive 19-day outdoor experience of backpacking, hiking, rock climbing, and white water canoeing, the Connecticut Wilderness School has provided a novel therapeutic approach for problem youth referred by a wide variety of state agencies. To determine if participants in this program become more internally oriented, develop a higher level of self confidence, utilize more effective interpersonal coping strategies, and have fewer legal and social difficulties, this empirical investigation studied 135 teenagers (95 males, 40 females), aged 13 to 20, enrolled in the wilderness program and a similar comparison group of teenagers. Referring agencies rated the teenagers on dimensions of problem seriousness, self-awareness, emotional problems, and legal involvement. Demographic and personality pretest measures were collected. A random subsample of 72 students was also given a structured interview, assessing coping strategies in problematic interpersonal situations. A multi-source follow-up of these students is currently underway. With approximately one-half of the follow-up data collected, the following preliminary results have been obtained. Program participants remained more internally-oriented six months after the course and reported a significantly lower overall frequency of deviant behavior than the comparison group. The teenagers reported positive changes in meeting challenges, self confidence, getting along with parents, grades in school, and controlling temper.

375. Gore, Peter H.; and others. The Assessment of Public Issue Perception: Exploration of a Three-tiered Social-network-based Methodology in the Champlain Basin. Paper prepared for the annual meetings of the Rural Sociological Society (San Francisco, CA, August 1978). 67pp. ED 165 944.

DESCRIPTORS: citizen action, nonformal, preferences, program evaluation, rural, urban.

Design, application, and interpretation of a three-tiered sampling framework as a strategy for eliciting public participation in planning and program implementation is presented, with emphasis on implications for federal programs which mandate citizen participation (for example, Level B planning of Water Resources Planning Act, Federal Water Pollution Control Amendments). The three-tiered survey procedure was used in the Lake Champlain Basin study, which dealt with development and implementation of long-range programs for conservation and development and use of water and land resources in a mixed rural/urban area of uneven socioeconomic status. Study goals were a broader data base, a representative basin constituency, and identification of and relative importance of basin issues; the tiers were high school, key informant, and organizational surveys. The seven basic categories of environmental concern ranked by respondents were: land use, wetland issues, water pollution, socioeconomic issues, recreation, energy, planning/management. Results show that the research design gave representative groups a systematic opportunity to respond to issues and

that the public did respond and rank priority issues. It is predicted that treating informant groups as constituencies will achieve a new dimension of coordinated integrated planning, which addresses the real complexities of preparing environmental plans likely to receive public understanding and support.

376. Groth, Alexander J., and Howard G. Schutz. Voter Attitudes on the 1976 California Nuclear Initiative. Environmental Quality Series, No. 25. California University-Davis, Institute of Governmental Affairs, 1976. 71pp. ED 164 429.

DESCRIPTORS: attitudes, behaviors, citizenship, descriptive research, energy education, nonformal.

To examine whether voting behavior is a good indicator of public opinion toward controversial issues such as nuclear power, a study was undertaken to assess the meaning of the defeat of Proposition 15 in California in June, 1976. Proposition 15 called for more stringent legislative regulation of the nuclear power industry. Specifically, the study assessed how issues relating to the initiative were perceived by different segments of the electorate. The study consisted of a survey of 1,000 randomly selected Sacramento County voters and of statistical analysis of the 633 valid returned questionnaires. Questions on the four-page questionnaire dealt with sources of information about Proposition 15 and nuclear power plant energy in general, satisfaction with the political structure of the United States, and demographic and socioeconomic information. Findings indicated that confusion over the wording of Proposition 15 caused many voters (particularly opponents) to vote incorrectly in terms of their own preferences for or against nuclear power. In general, findings indicated that the initiative was opposed by older, more conservative, and more affluent voters concerned with a high standard of living and favored by younger, more liberal, less affluent and conservation-minded voters. It is concluded that studies of voting behavior with regard to a specific controversial issue can provide information about voter perceptions and attitudes to individuals concerned with political strategy and policy formation.

377. Guzewich, Marsha Scott. The Role of Volunteers at Environmental Education Centers in New York State with a Manual on Better Use of Volunteer Resources. M.S. thesis, Cornell University, 1979. 134pp. ED 178 317.

DESCRIPTORS: conservation education, descriptive research, environmental center, nonformal, outdoor education.

This thesis examines the role of the volunteer at New York State environmental education centers. The thesis observes that environmental education centers are generally not well funded and volunteer help is especially important. Results of the study, which utilized questionnaires for directors and staff, and opinionnaires for volunteers include: (1) volunteers performed teaching and trail interpretation most frequently and enjoyed these jobs most; (2) many volunteers were

not actively recruited, but sought the centers on their own; (3) most volunteers were female between the ages of 18 and 65; and (4) many staff members felt that volunteers were not thanked enough. Other results are reported.

378. Hall, Chester G., and Emmett L. Wright. Factors Influencing the Use of Suburban School Grounds for Class-Time Secondary Science Instructional Activities. Paper presented at the annual meeting of the National Association for Research in Science Teaching (53rd, Boston, MA, April 11-13, 1980). 34pp. ED 186 269.

DESCRIPTORS: descriptive research, outdoor classroom, outdoor education, science education, secondary.

This study assesses factors that influence use of suburban school grounds for class-time secondary science instructional activities. Special emphases of the study are on determining frequency of use, factors influencing use, and critical factors limiting use. Results from a survey of secondary science teachers at a public school system inservice meeting indicate that teachers favor the use of school ground science activities, but in actuality, little use of school grounds takes place. The hypothesis is offered that the disparity between teacher preference and teaching practice is a consequence of student discipline problems and large class size.

379. Hamm, Russell L., and Richard D. Spear. Environmental Education in Indiana Public Schools. Indiana State University, Terre Haute. School of Education, 1975. 54pp. ED 114 273.

DESCRIPTORS: descriptive research, elementary, formal, program evaluation, secondary.

The curriculum and research development center of Indiana State University sought to determine the number of high schools in Indiana that teach environmental education in some form. A questionnaire was mailed in February 1974 to the principals of all senior high, junior/senior high, and K-12 schools. The investigators were interested in finding out how much environmental education was offered, content areas, how it was taught, subject matter necessary for teacher preparation, priorities of environmental problems, and importance in the high school curriculum. A few of the major findings were: 6.5 percent of the 366 schools offered courses designated as environmental education; 21 percent offered courses although not so designated. Class enrollment ranged from 10 to 60 and average number of course offerings was three. Subject areas most often taught included water and air pollution, forest conservation, soil conservation, and wildlife conservation. Topic emphasis led researchers to conclude that in Indiana high schools, conservation was environmental education. Recommendations called for the implementation of a nationwide environmental education plan. Suggestions include a national conference of leaders to give direction to curriculum efforts, a test to students to determine environmental knowledge, inservice and preservice

workshops, textbook revisions, etc. An annotated bibliography is provided.

380. Hanna, John W., and Valeen Adams Silvy. Visitor Observations for Interpretive Programming. Departmental Technical Report No. 78-9. Texas A and M University, College Station, TX, 1978. 21pp. ED 180 784.

DESCRIPTORS: environmental center, nonformal, outdoor education, program evaluation.

Identified are systematic visitor observation techniques to provide data to show visitors' reactions to interpretive programming. Use of this data should enhance the ability of the interpretive naturalists to plan, conduct, and evaluate interpretive programming. The suggested techniques can be accomplished without outside help and can be conducted in the field where firsthand views of the visitor may be garnered in the outdoor environment. The report is divided into two major sections. The first covers methods of observation, and the second deals with the development and application of results.

381. Harris, Louis, and Associates, Inc. A Survey of Public and Leadership Attitudes toward Nuclear Power Development in the United States. Study No. 2515. EBASCO Services, Inc., New York, NY, 1975. 150pp. ED 156 453.

DESCRIPTORS: attitudes, citizenship, descriptive research issue awareness/knowledge of issues, nonformal.

This publication details a study done by Louis Harris and Associates in 1975 to assess attitudes toward nuclear power in the United States. The survey consisted of three parts. The first part was in-person, door-to-door interviews with 1,537 scientifically-selected households nationwide. The second part was 301 personal interviews, about one hour long, with neighbors of nuclear power plants in three areas of the country. The third part was personal interviews with 201 political, business, environmental, and regulatory agency leaders in the nation. Interview questions and data, discussions of each section of the study, and a general summary are included. Some of the topics examined are the advantages and disadvantages of nuclear energy, waste disposal, pollution problems, safety, and economics of nuclear power. Attitudes toward increasing numbers of nuclear power plants, confidence in utility company management and in environmentalists, trust in the news media, and financing nuclear development were also surveyed. It should be noted that this study predates the natural gas and coal shortages of 1976-78.

382. Harris, Louis, and Associates, Inc. Survey II of Public and Leadership Attitudes toward Nuclear Power Development in the United States. Study No. 2628. EBASCO Services, Inc., New York, NY, 1976. 176pp. ED 156 454.

DESCRIPTORS: attitudes, citizenship descriptive research, issue awareness/knowledge of issues, nonformal.

This publication details a national survey done by Louis Harris and Associates, similar to one done in 1975, to assess attitudes toward nuclear power in the United States. The survey consisted of three parts. The first part was in-person, door-to-door interviews with 1,597 randomly selected households nationwide. The second part was 309 interviews, about one hour long, with neighbors of nuclear power plants in three areas of the country. The third part was personal interviews with 214 political business, environmental, and regulatory agency leaders in the nation. Interview questions and data, discussion of each section of the study, and a general summary are included. Some of the topics examined are the rising concern over energy shortages, sufficiency of electric power supply utility prices, steps proposed to help solve the energy crisis, safety, and advantages and disadvantages of nuclear power plants. Also surveyed were attitudes in support or in opposition to nuclear power plants and confidence in utilities, government, environmentalists, and scientists on nuclear issues.

383. Henkin, Gayle; and others. An Evaluation of Curriculum Materials Based upon the Socio-Scientific Reasoning Model. Paper presented at the annual meeting of the National Association for Research in Science Teaching (52nd, Atlanta, GA. March 21-23, 1979). 16pp. ED 173 077.

DESCRIPTORS: affective, cognitive, experimental research, model building program evaluation, science education, secondary, social science education.

To address the need to develop a scientifically literate citizenry, the socio-scientific reasoning model was created to guide curriculum development. Goals of this developmental approach include increasing: (1) students' skills in dealing with problems containing multiple interacting variables; (2) students' decision-making skills incorporating a wide social perspective; and (3) critical thinking skills in the evaluation of consequences and thinking skills in the evaluation of consequences and implications of decisions. Secondary school students (grades 7-12, from both public and private sectors) enrolled in courses in chemistry, earth science, biology, health, social sciences, and physics are currently participating in the field test and evaluation of these curriculum materials. Tests designed to evaluate knowledge, critical thinking, and moral/ethical reasoning have been administered to approximately 1,000 students. The experimental design for the field test is the nonequivalent comparison group design where experimental and control groups are pretested and posttested. Mean scores of the experimental and control groups are compared using a t-test to determine if the experimental group achieved significant improvement in the cognitive and affective domains. Preliminary analysis of the data indicate that these curricular materials have the potential to affect development in both the cognitive and affective domains.

384. Hepburn, Mary A. Comparative Cognitive Evaluation of Joint and Separate Social Studies and Science Instruction in High School Environmental Education. University of Georgia, 1977. 19pp. ED 148 657.

DESCRIPTORS: cognitive, formal, interdisciplinary, science education, secondary, social science education.

An interdisciplinary environmental education program was introduced on an experimental basis into high school social studies and science courses in an effort to produce competencies in environmental problem solving. Ninth and tenth grade classes in a suburban school district in Atlanta participated in the study. The ninth graders were of average reading ability, and the tenth graders were of low reading ability. Experimental materials included four interdisciplinary student modules (textbooks, slides, audio tapes, and maps) and four teacher's guides. Ninth grade modules contained geography and biology content; tenth grade modules contained chemistry and American history content. There were four treatment groups in each grade: one studied an environmental module in science class only; one studied a module in social studies class only; one studied modules in both classes; and the control groups did not study the modules at all. Pre- and posttest results were analyzed to see if there was a significant difference of posttest performance among the four groups at each grade level. The ninth grade students scored significantly higher than tenth grade students. This may be because the ninth graders were of average reading ability, whereas the tenth grade groups were noted to have reading difficulties. More research using the modules with slow learners is needed.

385. Holmes, Barbara. Energy: Knowledge and Attitudes, a National Assessment of Energy Awareness Among Young Adults. Education Commission of the States, Denver, CO, 1978. 59pp. ED 166 017.

DESCRIPTORS: attitudes, descriptive research, energy education, issue awareness/knowledge of issues, knowledge.

This is a national assessment of energy awareness among young adults. A national probability sample of young adults, ages 26 to 35, was drawn and stratified by region and community size. Approximately 1,300 persons responded to each of the 75 attitudinal and 70 knowledge questions administered by trained energy assessment interviewers. Besides the standard demographic information, each participant was asked to respond to the energy assessment item in the appropriate booklet. The discussion centers upon national results. Group results are also presented according to race, sex, total household income, family size, education, etc. The first two chapters present the results, while the third chapter presents the analysis of these results.

386. Ignatiuk, Gerald T. Influence of the Amount of Time Spent in Field Trip Activities on Student Attitude Toward Science and the

Environment. S.S.T.A. Research Centre Report No. 49.  
Saskatchewan School Trustees Association, Regina, 1978. 26pp. ED  
180 758.

DESCRIPTORS: attitudes, field trip, formal, outdoor education, science education, secondary.

The major objective of this study was to determine whether a relationship existed between eleventh grade biology students' attitude toward science and environmental concepts and their exposure to field trip activities. All students in the sample were using the Biological Sciences Curriculum Study (BSCS) textbook, Green Version. The study was successful in establishing that such a relationship exists. Statistically significant differences in student attitude between pretest and posttest measurements after varying amounts of field work during the 15-week study period were shown.

387. Ingison, Linda J., and Jan Jeter. A National Survey of Need for Environmental Educational Materials. Wisconsin University, Madison, WI, 1976. 67pp. ED 123 087.

DESCRIPTORS: descriptive research, elementary, formal, program development, program evaluation, secondary.

The Wisconsin Research and Development Center for Cognitive Learning is proposing the development of an individualized curriculum-instructional program in environmental education. To determine broad national needs in environmental education, a survey was conducted of both schools and curriculum coordinators. The survey involved these questions: (1) What is the overall level of interest in a comprehensive environmental education program, and how does this interest relate to what materials are currently available? (2) Should a new environmental program be supplementary or comprehensive, and at which grade level? (3) Are there funds available for purchase of an environmental program, and from what source? The survey indicated current materials are widely used but do not adequately cover certain environmental topics or are not appropriate to several grade levels. The findings also indicated a need for supplementary short-term materials appropriate to several grade levels. Finally, data showed funding available in both science and social studies. Based on the results, a program satisfying the above needs is proposed.

388. Iozzi, Louis A.; and Others. The Socio-Scientific Reasoning Model: Past, Present and Future. Paper presented at the annual meeting of the National Association for Research in Science Teaching (52nd, Atlanta, GA, March 21-23, 1979). 27pp. ED 173 075.

DESCRIPTORS: cognitive, formal, model building, moral development, values.

The socio-scientific reasoning model is described. This model is the incorporation of the hypothetico-deductive mode of problem-solving with

the social and moral or ethical concerns of decision making. It has served as a guide in the development of a series of educational materials to help students advance to higher levels of thinking and reasoning capabilities. Application of the socio-scientific reasoning model centers on identifying those learning experiences important for assisting students to become more effective and capable decision makers and problem solvers in a highly scientific and technological world. The model should also prove to be useful in helping curriculum developers determine the types and complexity of activities appropriate for students at differing grade levels, with differing abilities, and with differing learning needs and requirements.

389. Johnston, Jerome; and Others. An Evaluation of the 1973 Youth Conservation Corps. Michigan University, Ann Arbor, MI, 1974. 167pp. ED 135 654.

DESCRIPTORS: attitudes, descriptive research, knowledge, nonformal, program evaluation, secondary.

This report is an independent evaluation of the YCC program using data collected by the Institute for Social Research from some 3,000 enrollees in 100 YCC camps in the United States. Data include a pre- and posttest of environmental knowledge and end-of-camp enrollee ratings of camp and staff quality and of their own self-growth in several learning areas. Additional data come from researcher visits to 17 camps and from questionnaires filled out by all of the camp-directors. An evaluation is made (1) of the program's representativeness (race and sex), (2) of self-learning (knowledge of ecology, skill in using tools, interpersonal relations), (3) of work accomplished, and (4) of enrollee's satisfaction with their experiences. Data are analyzed separately by sex, ethnic identification, and certain camp characteristics. Overall, the program was given a very favorable review from the researchers' perspective. Recommendations are included in the areas of staff training, educational programming, transfer of learning to the home environment, testing, and minority involvement. Instruments used in the valuation appear in appendices.

390. Jones, Robert M., and John E. Steinbrink. A Survey of Precollege Energy Education Curricula at the State Level. Houston University, TX, 1977. 40pp. ED 155 018.

DESCRIPTORS: descriptive research, elementary, energy education, program evaluation, science education, secondary.

This publication includes a survey and descriptions of selected state energy education curriculum materials. The basic tasks of the survey were to determine: (1) if states had systematic energy education programs for their elementary and secondary schools, and (2) if existing curriculum materials met national needs. An instrument to evaluate energy education materials was developed and used. A telephone survey was made of state science curriculum coordinators who did not reply to a



mail survey. Generalizations made from survey data include: (1) energy education materials tend to stress technical topics; (2) they often lack consistent core themes and adequate conceptual framework; and (3) they provide little that is useful in developing an alternative energy ethic. Four primary and five more specific secondary recommendations based on survey data and project involvement in energy education are given. The energy curriculum materials of 20 selected states are described and procurement information is included.

391. Katzenmeyer, Conrad; and Others. Final Evaluation Report Project ICE, C.E.S.A. No. 9, Green Bay, WI, 1975. 36pp. ED 134 446.

DESCRIPTORS: affective, cognitive, elementary, formal, program evaluation, secondary.

Reported is an evaluation of Project ICE conducted in the state of Wisconsin in 1974-75. Project ICE is a five-year environmental education project located in Green Bay, Wisconsin and funded by the state of Wisconsin under ESEA Title III. Begun in 1970, the project has developed a series of supplementary curriculum guides for all subjects and all grades, K-12, based on 12 environmental concepts. Each lesson identifies a major concept, provides behavioral objectives, suggests instructional or student activities and lists available resource materials. The program emphasizes flexibility by providing numerous alternatives for each lesson. The sample consisted of students in grades 2, 5, 8 and 11 in 14 schools. Evaluation included cognitive assessment of student achievement, teacher logs, teacher reactions, and parent reactions. Students were pretested in the fall and posttested in the spring. Data favored experimental schools in grades 2, 5 and 8. Data for grade 11 were not significant; this supported observations that the ICE program was not implemented in grade 11 experimental schools. Teachers were generally favorable to the program and many parents indicated they felt increased awareness of the environment in their children's questions, behavior, etc.

392. Kelba, Nestor N. The Development of an Instrument for Evaluating Residential Outdoor Education Centres in Canada. M.S. thesis, Calgary University, Calgary, Alberta, 1974. 158pp. ED 113 113.

DESCRIPTORS: environmental center, instrument development, outdoor education.

The study's purpose was to develop a valid instrument for evaluating residential outdoor education centres in Canada. Using published and unpublished literature, a preliminary instrument consisting of 206 criteria was constructed. Twenty-five recognized Canadian experts in residential outdoor education were randomly selected from three subsample areas (the Maritimes, Quebec-Ontario, and Western Canada); these were asked to act as jurors. To validate the preliminary instrument, the jurors were sent a copy of the instrument with instructions to rate each criterion on a 7-point scale: essential, very desirable, desirable, acceptable, questionable, unacceptable, not

feasible, and an eighth scale, not applicable. Twenty jurors (80 percent of the total number) responded. Of the 206 criteria, 3 were excluded because their average ratings were lower than the required 4.0 and 1 because of the jurors' comments. The overall average rating of the 202 criteria retained in the instrument was 6.0 or very desirable. The final instrument was given a 6-point scale which included: met completely, great degree, moderate degree, small degree, not met to any degree, and not applicable. In addition, the average rating received from jurors for each criterion was included immediately following that criterion in the body of the instrument.

393. Kooi, Warren James. An Analysis and Evaluation of the NSTA Energy Education Materials Produced by Project PEEC. M.A. thesis, West Virginia University, 1979. 107pp. ED 178 320.

DESCRIPTORS: conservation education, energy education, formal, instrument development, interdisciplinary, program evaluation.

This thesis seeks to analyze the materials produced by the Project for an Energy Enriched Curriculum (PEEC). Specifically evaluated are the completeness and degree of bias characterizing the materials as an entity. In support of this end, examined are the nature and extent to which the materials treat future energy alternatives and the extent to which the materials satisfy criteria for effective energy education as expressed in the general literature of the field. An instrument was developed by the study to evaluate the PEEC materials. The study detected some variations in reading levels from those intended and detected slight but nonsystematic biases in the energy future considerations.

394. Kushler, Martin G., and William S. Davidson. An Experimental Examination of Alternative Strategies to Promote Energy Conservation in High School Youth. Paper presented at the Annual Meeting of the American Psychological Association (87th, New York, NY, 1979). 15pp. ED 186 209.

DESCRIPTORS: attitudes, behaviors, descriptive research, energy education, program development.

This paper discusses the results of a research effort in Michigan examining alternative means of encouraging energy conservation in high school. The study itself was conducted in Michigan during the 1978-79 school year, and involved a total of 95 high schools. This report describes the methods and procedures used in that study and presents a variety of findings. First, the project demonstrates that it is feasible to carry out this type of large-scale research, including the reliable measurement of student attitudes about energy conservation. Second, the results show that both workshops and individual consultations were successful in influencing teachers to include energy conservation instruction in their classes. Finally, the findings concerning impact on student attitudes and self-reported behaviors are mixed but encouraging. These results are presented; preliminary

conclusions are drawn; and the necessity for further research is discussed.

395. Laing, Robert. An Approach to Identifying Publics of a Campaign to Ban Non-Returnable Bottles. Paper presented at the annual meeting of the Association for Education in Journalism (61st, Seattle, WA, August 13-16, 1978). 30pp. ED 159 717.

DESCRIPTORS: behaviors, citizen action, conservation education, descriptive research, nonformal.

A telephone survey conducted in Lansing, Michigan, in 1976, which segmented voters according to their orientations on a proposed state bill to ban nonreturnable beverage bottles, is described in this paper. First, background is presented on the issue of returnable versus nonreturnable bottles, the main provisions of the proposed bills are listed, and campaigns by opponents and proponents of the bill are discussed. The survey in which 305 adults were questioned about their preferences regarding beverages and containers, reasons for opposing or favoring the bottle bill, exposure to information about the bill, and voting intentions is then described. Results are reported in tabular and narrative form; differences are noted between bottle bill supporters, opponents, and those who were undecided and the way respondents' opinions relate to three factors--convenience, protection of the environment, and product cost--is shown. Among the findings were that returnable bottles (preferred by 45 percent of soft drink buyers and 22 percent of beer drinkers) were preferred because of low price and environmental reasons, and that throwaway bottles and cans were preferred because of ease of disposal and storage, convenience, and--in the case of cans--their ability to get cold.

- 396.. Marcus, Melvin G.; and Others. Environment-based Environmental Education: Inventory, Analysis, and Recommendations. Final Report of the Environment-based Education Project. Arizona State University, Tempe, AZ, 1975. 315pp. ED 173 127.

DESCRIPTORS: conservation education, descriptive research, formal, program evaluation.

This volume summarizes the activities and results of a survey of environmental education conducted for the Office of Environmental Education, U.S. Office of Education. The document presents a discussion of critical themes for environmental education; historical perspectives of environmental education; and future themes for environmental education. Attention is given to the methodology and results of a national survey of natural-environment-based education activities. Further discussion deals with interpretation of the Environmental Education Act of 1970 including the design of a survey instrument to collect data on interactions in environmental education. Concluding discussions cover the need to develop core themes in environmental education. Schematic models of various concepts and interrelationships are presented. Appendixes present copies of survey instruments, comments on survey instruments, and a bibliography.

397. Maul, June Paradise; and Others. The Coastal Zone: Man and Nature. An Application of the Socio-Scientific Reasoning Model. Paper presented at the annual meeting of the National Association for Research in Science Teaching (52nd, Atlanta, GA, March 21-23, 1979). 17pp. ED 173 078.

DESCRIPTORS: formal, model building, moral development, program development, program evaluation, science education, simulations.

The curriculum model described here has been designed by incorporating the socio-scientific reasoning model with a simulation design in an attempt to have students investigate the onshore impacts of outer continental shelf (OCS) gas and oil development. The socio-scientific reasoning model incorporates a logical/physical reasoning component as defined by the Kohlbergian paradigm and a decision-making strategy based on the work of Dewey. The curriculum utilizes role playing, simulations, trend analysis, dilemma discussions, scenario writing, hypothesis generation and testing, problem solving, variable manipulation, and model building. An evaluation for the curriculum is described. Incorporated are tests of social/moral reasoning skills, critical thinking skills, and logical and physical reasoning skills.

398. McCay, Roger E.; and Others. Measuring the Attitudes and Awareness of Environmental Education Camp Users. Forest Service Research Paper NE-426. Forest Service (DOA), Upper Darby, PA, 1978. 17pp. ED 170 143.

DESCRIPTORS: attitudes, conservation education, descriptive research, nonformal, outdoor education, program evaluation.

Questionnaires for evaluating what people expect from environmental camps and what they learned while there have been developed and applied at the Pocono Environmental Education Center, Dingman's Ferry, Pennsylvania. Nine questionnaires for various ages and types of users are presented. The results can be used by camp administrators and educators to evaluate their own programs and teaching methods. One notable result of the study was that many campers felt that their experience increased interpersonal interaction skills and positive feelings toward others.

399. Miller, James. Outdoor Education for Emotionally Handicapped Students in Central New York. Final Report September 1975. A Report on Project 75-940 for Handicapped Children Under Title VI-8 (August 1, 1974-July 31, 1975). Onandaga Nature Centers, Inc., Baldwinsville, NY, 1975. 70pp. ED 129 532.

DESCRIPTORS: affective, cognitive, descriptive research, formal, outdoor education, program evaluation, psychomotor.

Pre- and posttests were administered to three treatment (136 emotionally

handicapped, 8 physically handicapped, and 79 trainable mentally retarded students) and two nontreatment groups (11 emotionally handicapped and 70 nonhandicapped students) for purposes of assessing teacher, student, and program-centered objectives. Administered or completed by the 21 teachers involved, the instruments employed were: the student content test; the student attitude survey; the general classroom behavior teacher rating scale; the participant evaluation; and the participant narrative evaluation. The four teacher-centered objectives focused on knowing the what, where, how, and why of outdoor teaching; the three student-centered objectives focused on increased comprehension of the natural world, self, and others; and the program objectives focused on improvement of student communication skills, understanding re: local environment and environmental problems, social responses, and manipulative/motor skills. Results indicated 7 of the 13 objectives were met and 3 were partially met, while 3 of the program objectives were not directly measurable. Since 3 of the 13 objectives were not measurable, it was concluded that the project was nearly 100 percent successful.

400. Miller, Janet L.; and Others. Review and Evaluation of DOE Energy Education Curriculum Materials. Battelle Memorial Institute, Columbus, OH, 1979. 67pp. ED 179 423.

DESCRIPTORS: descriptive research, energy education, formal, program development, program evaluation.

Presented are the results of a review and evaluation of the energy curriculum materials produced by the United States Department of Energy (DOE). Major findings of the project were: (1) DOE materials are receiving only limited use because of low teacher awareness of availability; (2) when materials are used, teachers evaluate materials favorably; and (3) most evaluations of DOE materials have concentrated on teacher impressions and not the effect of the materials on students. Recommendations to improve the impact of DOE energy education programs are included.

401. Mitschke, Barry A. The Suitability of the Environmental Issues Series (EIS) for the Grade XI Biology Classroom. S.S.T.A. Research Centre Report No. 50. Saskatchewan School Trustees Association, Regina, 1978. 15pp. ED 180 759.

DESCRIPTORS: interdisciplinary, issue awareness/knowledge of issues, issue-based, program evaluation, science education, secondary, simulations.

Described is a study intended to evaluate a simulation exercise which was part of an environmental education program integrating courses and mini-courses for environmental awareness into existing curricula. Nine teachers and the associated 17 classes and 413 eleventh-grade biology students made up the study population. Techniques of treatment, control, and statistical analysis are detailed. Conclusions, implications, and recommendations for further research are provided.

402. Morris, William C.; and Others. Minorities in the Youth Conservation Corps: A Study of Cultural Groups in the 1974 YCC Program. Michigan University. Ann Arbor, MI, 1975. 176pp. ED 135 653.

DESCRIPTORS: attitudes, ethnic group, nonformal, program evaluation, secondary.

During the summer of 1974, trained observers from the University of Michigan visited a sample of camps in the Youth Conservation Corps (YCC) national program to collect data on the factors which influence Black, Chicano, and native Americans' participation and satisfaction with the YCC program. Observers spent approximately one week in each camp, interviewing all minority enrollees, a sample of white enrollees and most staff persons. Interviews and observations followed structured protocols. This report summarizes the observations and recommendations of these observers. In addition, it includes two background papers on the perspectives and needs of blacks and native Americans as they apply to the YCC program. Instrumentation appears in the appendices. In general, it was found that minorities in the YCC program have a very positive experience. Recommendations are for the purpose of further strengthening the program to ensure proper conditions will exist to meet minority needs. Recommendations fall in the area of recruitment of both enrollees and staff, optimum camp size and minimum numbers of minorities, camp program (work projects, work safety, environmental education, recreation, food, staff meetings), and staff training.

403. Murphy, Elaine, and Marjorie Dahlin. The Zero Population Growth Population Education Program: A Formal Evaluation of the 1975-1976 Project and Current Progress. Zero Population Growth, Inc., 1978. 148pp. ED 153 862.

DESCRIPTORS: formal program education, program evaluation, science education, social science education, teacher training inservice.

This publication is the final report of the federally-funded population education project of Zero Population Growth (ZPG). In this report, population education is defined and discussed, the development and performance of the project is described, evaluation measures are presented and analyzed, and the continuation of the project after the federal grants expired is mentioned. This project involved conducting population education workshops during 1975 and 1976 in five states: Delaware, Florida, Ohio, New Jersey, and Maryland. The goal was the incorporation of population studies into school systems in these states. Participants were science and social studies teachers, administrators, and professors of education. Data were collected from participants to determine to what extent they reacted to the workshops and incorporated population education into their schools. A telephone survey was conducted to validate the initial questionnaires. Data support the hypothesis that the participants would use their professional roles to institutionalize and expand population education. Data from the

questionnaires were used to improve ZPG teachers' materials. Some samples of these materials, along with the workshop agenda, the questionnaire, and the telephone survey are included in the appendices.

404. Myer, Teresa A. Changes in Attitudes Toward Environmental Education and Selected Teaching Behaviors of Teachers Participating in Environmental Education Workshops. M.S. thesis, The Ohio State University, 1979. 198pp. ED 170 170.

DESCRIPTORS: attitudes, behaviors, descriptive research, ex post facto, formal, teacher training inservice.

This study examined four teacher inservice environmental education programs to: (1) suggest a workable evaluative model for such programs; (2) assess their content with respect to stated activities and objectives; and (3) determine whether or not the experiences correlated with changes in selected teaching behaviors. The research design included observation, a descriptive survey, and ex post facto methods. An experimental group, comprised of inservice participants, and a control group, made up of two subgroups of teachers, completed pre- and post-questionnaires. Principals of all research subjects also received questionnaires. A significant discrepancy was found, using ANOVA, in what the teachers and the principals reported administrators' attitudes toward environmental education to be. Correlated t-tests showed significant increases from pre- to post-study in (1) the amount of time the experimental subjects spent teaching environmental education, and (2) the number who took environmentally-oriented field trips. Pearson product-moment correlations indicated that the more teachers had been exposed to environmental education inservice programs, the more time they spent on environmental lessons in their classrooms. Strong positive correlations were also found between attitudes and behaviors with respect to three pairs of variables. There were varying degrees of success among the four programs in completion of the activities originally intended by the inservice leaders.

405. Ogan, Christine. Changing Patterns of Mass Media Use and Effects in an Urban Squatter Settlement. Paper presented at the annual meeting of the Association for Education in Journalism (61st, Seattle, WA, August 13-16, 1978). 35pp. ED 165 170.

DESCRIPTORS: attitudes, behaviors, citizen action, economic background, issue awareness/knowledge of issues, nonformal, social background, urban.

To test the impact of mass communication on the modernization of individuals living in the countries of the Third World, a follow-up study was devised (the original occurred in 1962), whereby migrant residents in Ankara, Turkey, were interviewed regarding the effects of urbanization on their lives. While economic and living conditions had improved for the 65 original respondents interviewed, the study revealed very little change in behavior and attitudes, other than an overall decrease in the use of mass media and an increase in awareness regarding

the value of voting to effect political change. The findings did not support theories that attribute great importance to the impact of urbanization and mass media in changing traditional lifestyle patterns. (Comparative tables are included.)

406. O'Hearn, George T.; and Others. Demonstration and Evaluation of Benefits and Effectiveness of a Model for Student Projects in Environmental Problem Analysis Wisconsin University, Green Bay, 1976. 115pp. ED 176 966.

DESCRIPTORS: case studies, formal, interdisciplinary, issue awareness, knowledge of issues, program evaluation, teacher training inservice.

Research was conducted involving a three-day workshop model. The first day of the workshop involves a session on a college campus for science teachers and social studies teachers and students for the purpose of developing understanding of environmental problems. The second day is conducted at the high school; teachers and students who attended the first session act as discussion leaders for larger groups of students. The third phase consists of a return to the campus of the original group of teachers and students to review data collected on an environmental problem identified in the high school session. This report evaluates the effectiveness of the workshops in producing changes in students participating in the workshops and in the curricula of schools sending participants to the workshops.

407. O'Meara, Daniel Joseph. An Analysis of the Relationship between the National Environmental Policy Act of 1969 and Coverage of Environmental Issues in Two Newspapers from 1962-1977. M.S. thesis, The Ohio State University, 1978. 122pp. ED 160 419.

DESCRIPTORS: ex post facto, historical research, issue-based, issue identification skills, nonformal.

This thesis examines the trend in coverage of environmental problems in two newspapers from 1962-1977. Data were gathered by analyzing the content of the "Chicago Tribune" and "New York Times." Environmental stories from 24 selected issues per year were coded and analyzed using the Spearman Rank Correlation Coefficients and Chi-square tests. Number of stories per category and column inches per category were recorded for the following environmental story categories: (1) Energy Resources; (2) Water Quality; (3) Air Quality; (4) Environmental Additives; (5) Population Explosion; (6) Natural Amenities; (7) General; and (8) Miscellaneous. The study concludes: (1) an upward trend in environmental newspaper stories occurred with a peak in 1970; (2) the National Environmental Policy Act (NEPA) of 1969 had no substantial effect on environmental coverage; and (3) NEPA had no apparent effect on any separate categories of environmental news. The study also includes a brief discussion of the implications of these findings.



408. Peters, Richard O. Instructional Program Development in a Rural Experimental School System. Paper presented at the Spring conference of the New England Educational Research Organization (Sturbridge, Massachusetts, May 1978). 21pp. ED 153 775.

DESCRIPTORS: community resources, formal, outdoor education, program evaluation, program implementation, rural.

The purpose of the Experimental Schools Project in New Hampshire School Supervisory Union 58 was to effect change within an existing school system, create new instructional programs to affect student awareness and knowledge, relate school to community and the instructional process to total life-space environment, and document variables affecting change. Developed for a rural school system serving about 1,100 students in three school districts, the five-year, K-12 program integrated three major curriculum components: career/vocational education (career awareness program lessons, field trips, guest speakers, guidance, minicourses, worksite), language arts (Scott, Foresman series, skills list, "Kids' Corner"), and outdoor/environmental education (student environmental awareness lessons, field trips, guest speakers, outing clubs, lab sites). The community was involved through community-based classrooms, field trips, instructors, advisory board, and special committees. To determine program effect on career awareness and identify variables which affect career decision making, two short-term longitudinal studies were done; inservice training was evaluated by consultants and teachers. Variables identified as directly affecting curriculum development and ongoing instruction were time, staff, administrative leadership, funds, materials, facilities, evaluation, inservice training, scheduling, and enrichment experiences.

409. Porter, William Wales. The Development and Evaluation of a Therapeutic Wilderness Program for Problem Youth. M.A. thesis, University of Denver, CO, 1975. 121pp. ED 149 885.

DESCRIPTORS: affective, attitudes, behaviors, outdoor education, program development, program evaluation, social background.

An innovative therapeutic use of the wilderness environment was explored. A purely recreational outdoor camping program organized in 1971 for economically deprived youths subsequently developed into an outdoor therapeutic program designed for problem youth. The wilderness environment was employed as an effective treatment milieu for helping youths develop responsibility and trust. cursory evaluation of early programs indicated the therapeutic potential of the wilderness; however, more sophisticated evaluations were needed to substantiate the reported positive outcomes. A therapeutic approach including transactional analysis, assertive training, personal causation and modeling theories was drafted and incorporated into an effective treatment modality of the wilderness experience program to meet the goal of developing an overall emancipated youth. Evaluation of 124 participants in the 1973 program and of 54 participants in the winter 1974 by two paper-and-pencil inventories, a self-esteem measure and a behavior rating form, indicated positive results in both programs. A control

group, employed in the 1973 program design, showed no consistent improvement on these measures. Furthermore, the results suggested a transfer of the newly-acquired problem-solving skills learned in the wilderness environment to school and home environments upon termination from the program. The program's success demonstrates the value of an alternative form of therapeutic treatment.

410. Purchit, Sally R. An Assessment of Citizen Participation in Natural Resource Planning and Decision-Making. 1980. 14pp. ED 187 679.

DESCRIPTORS: citizen action, hypothesis generation, issue awareness/knowledge of issues, nonformal, resource management education.

Four major questions are addressed in this assessment of citizen involvement in planning and decision making on use of natural resources: 1) What citizen participation techniques have been utilized by state recreation planners? 2) What are the dominant goals of public participation in natural resource decision making? 3) How do state recreation planners feel about citizen participation and what problems have they encountered? and 4) At what stages in a basic planning cycle is citizen input considered most valuable?

411. Schlenker, Richard M., and L. Donald Crowell. Citizens' Perceptions of the Marine Environment and the Placement of Precollege Marine Education Instruction in the Public Schools. 1978. 24pp. ED 170 161.

DESCRIPTORS: attitudes, descriptive research, formal, marine education.

This study looks at the relationships between ages, the distance individuals live from the seashore, their perceptions of the marine environment, and their opinions in the precollege school system. Data were gathered using a questionnaire distributed on the coast of Maine between Southwest Harbor and Portland, and inland from the coast for 119 miles. The results showed that most people agree that the marine environment and knowledge of it are important. As people advance in age, there is a tendency toward the opinion that the seashore belongs to certain people and not the general public. With increasing age, there was also a trend toward the feeling that the public schools are not a good place to teach marine education. The effect of distance from the seashore on these items was generally the same as the effect of age.

412. Schlenker, Richard M., and Zahir Qureshi. The Current State of Secondary School Marine Science Education in the United States. 1978. 10pp. ED 161 746.

DESCRIPTORS: descriptive research, formal, marine education, science education, secondary.

Information was requested in late 1976 and early 1977 from the departments of education of each of the 50 states and Puerto Rico on the current status of secondary school marine science education. Thirty-five states and Puerto Rico responded. Some of the results are as follows: (1) marine science assignments accounted for 1.94 percent of the total number of secondary school science teachers; (2) there were 1,591 teachers teaching marine science courses, an increase of 1,236 over the number reported in 1973; (3) nationwide, 48 schools offered marine science instruction with 442 classes and an enrollment of 13,696 students; and (4) dramatic increases in marine science education were noted in seven states.

413. Schulze, Joseph R. An Analysis of the Impact of Outward Bound on Twelve High Schools. Outward Bound, Inc., Greenwich, CT, 1971. 156pp. ED 129 519.

DESCRIPTORS: formal, outdoor education, program evaluation, rural, secondary, urban.

Describing and analyzing the impact of Outward Bound (OB) programs on 12 high schools which reflect OB involvement varying from 1 to 5 years and include urban, suburban, and rural (public, private, boarding, and day) schools, this 1970-71 report is aimed at furthering OB philosophy and method. The report presents OB program; background; evaluation procedures; initiation rationale; funding; impact analysis; recommendations; and generalizations. Brief program descriptions are presented in the appendix for: East High in Denver; Toledo Public Schools in Ohio; Trenton High in New Jersey; Churchill High in Eugene, Oregon; Concord-Carlisle in Massachusetts; Lincoln-Sudbury in Massachusetts; Minnetonka High in Excelsior, Minnesota; St. Alban's in Washington, D.C.; Sterling School in Craftsbury Common, Vermont; Webb-Bell Buckle in Bell Buckle, Tennessee; Germantown Friends School in Philadelphia; and Adams City High in Denver. Major recommendations presented are OB should: not impose its philosophy upon its participating schools; be sensitive to institutional and administrative program readiness; leave program direction/development to school personnel as soon as possible; consider the kind/degree of OB involvement (special vs. mainstream); and continue to encourage information dissemination among participating schools. The conclusions presented re: OB impact are that OB programs: function as a catalyst; legitimize experiential education; and serve as a vehicle for curriculum reform.

414. Schwartz, Jonathan R. Nature Trails for the Visually Impaired. Syracuse University, NY, 1976. 47pp. ED 134 408.

DESCRIPTORS: nonformal, outdoor classroom, outdoor education, program development.

Many interpretive nature trails have been established for the visually impaired in recent years. The objectives of the investigation were to (A) identify what has been done in the past in the way of nature trail design for the visually impaired, (B) compare this with what

professional workers for the visually impaired consider important in the design of the facilities, and (c) to provide guidelines for the design of future trails for the visually impaired. It was determined that the "typical" nature center was over five miles from the nearest urban center, not on public transportation lines, and provided a single special trail for the visually impaired with guide ropes and braille signs. As a result of the literature search, the informal interviews with visually impaired students, and the survey of orientation and mobility instructors, the following suggestions are made for the design of future nature trails: (1) no special trails should be established, as these tend to isolate the visually impaired from the rest of the visitors; (2) all trails should be clearly differentiated from the surrounding environment so that the visually impaired can use residual sight or proper mobility techniques for travel; ropes are unnecessary and often vandalized; (3) special pavement is not needed; (4) railings should be provided at hazardous areas; and (5) interpretation should be offered through the use of portable cassette tape players, and booklets for the hard of hearing.

415. Scott, Jean, and Gerald Lloyd. An Evaluation of the Use by Teachers of British Petroleum's Multi-Media Resource Pack, A North Sea Adventure. Bath University (England), Science and Technology Education Centre, 1979. 54pp. ED 179 378.

DESCRIPTORS: descriptive research, energy education, marine education, program evaluation, program implementation, resource management education, science education.

Presented is an evaluation of a multi-media resource pack, available from British Petroleum Corporation, which details the discovery and extraction of North Sea oil. The evaluation presented includes three thrusts: (1) a determination of the areas where the packs were distributed; (2) personal interviews with teachers who had used the packs; and (3) a postal questionnaire mailed to 200 schools to collect information on use and success of the packs.

416. Sherman, Lloyd E., and Joseph C. Grannis. Secondary Education Through Health-Environmental Health Program 1976-1977, Mount Sinai School of Medicine, Final Report. Mount Sinai School of Medicine, NY, 1977. 547pp. ED 149 008.

DESCRIPTORS: descriptive research, formal, program evaluation, secondary.

Ninety New York City high school seniors spent a year in the Secondary Education Through Health (SETH) program at Mount Sinai Medical Center. The students pursued a science course with six environmental health units designed by SETH staff, and also took regular New York City Board of Education courses on the hospital premises. In addition, the students spent two mornings a week in patient care or research settings or studying the effects of pollutants on the health of individuals in East Harlem. This report focuses on the quality of the students'

experiences in SETH. In doing so it addresses the larger question of how one documents and evaluates the experiential aspect of an environmental health curriculum and of environmental education programs in general. Student performance in the health environment setting is analyzed using the general education classes as a basis for comparison. It is concluded that SETH activities promoted students' involvement in health-related situations and their development of entry level skills for medical and environmental health careers. Appended to this report is an extensive discussion on program evaluation methods, including the evaluation instrument used. Student interviews and reports on their perceptions are provided. Also attached are reprints of relevant journal articles, a community resource guide to East Harlem, student placement reports, and the actual SETH curriculum.

417. Smith, Charles A. The Effects of an On-Site and Community Outdoor Education Program on Selected Attitudes toward School of Sixth Grade Students. Master's thesis, State University College of Arts and Science, Plattsburgh, NY, 1979. 95pp. ED 182 067.

DESCRIPTORS: affective, attitudes, community resources, middle school, outdoor education.

Six grade students' attitudes toward school were studied to determine if outdoor education investigations conducted on the school site and in the community would effect a positive change, similar to the change noted with students involved in residential outdoor programs. An experimental group of 28 students participated in outdoor activities one-half day a week for 10 weeks. A control group of 29 students received no special treatment. A pretest and posttest were administered to the two groups using a 26-item Likert scale developed by the researcher and designed to identify students with a positive attitude toward school. The pretest mean scores revealed no significant difference between the groups; the posttest means showed the experimental group to have a significantly better attitude toward school (.05 level of confidence). Major implications of the research are that a program of school site and community outdoor education could achieve positive attitudinal changes comparable to those attributed to resident programs and that a classroom teacher with no previous training in outdoor education could successfully implement the program. Appendices include lesson plans for the experimental group's outdoor activities, statistical analysis of test scores, and information concerning test development and validity.

418. Smith, Victor A., and Kathleen Ruddy Lane. An Evaluation of the Energy Education Curriculum Project Materials in Indiana Elementary Schools. Paper presented at the annual meeting of the American Educational Research Association (Boston, MA, April 7-11, 1980. 59pp. ED 186 256.

DESCRIPTORS: descriptive research, elementary, energy education, formal, middle school, program evaluation, science education, social science education.

Presented is the evaluation of a K-6 collection of energy education materials developed to be used primarily with social studies and science classes. The objectives of the evaluation were twofold: (1) to formatively evaluate the lessons to provide further direction for development and revision; and (2) to summatively evaluate the use of the materials by teachers and the impact of the materials on students and teachers.

419. Stahl, Robert J., and S. Dennis Baker. The Status of Population Education in Florida Secondary Schools During 1973-1974: A Final Report. Florida University, Gainesville, 1976. 63pp. ED 120 082.

DESCRIPTORS: descriptive research, formal, interdisciplinary, population education, program evaluation, secondary, teacher training inservice.

The study presents descriptive data pertaining to the status of population education within the curricula of Florida's secondary schools. A four-page questionnaire, designed to obtain data from classroom teachers on a broad range of topics and areas pertaining to the status of population education within their respective schools, was mailed to 300 randomly selected Florida middle, junior high, and senior high schools. Responses received from 45.3 percent of the public and private school teachers indicated the following findings: (1) population education is included in schools regardless of the size of the school's enrollment; (2) classroom teachers are consciously incorporating population education content in a variety of elective and required courses; (3) there is a wide range of length of time spent by teachers on population education; (4) the majority of population education teachers are social studies teachers; (5) population education priority rankings suggest that population is primarily studied as an integral part of the examination of broader environmental problems and processes; (6) classroom teachers of population primarily teach units whose objectives are developed and written by the teachers themselves; (7) the majority of teachers indicated that they would attend a preschool or inservice population workshop if such were offered; and (8) the majority of teachers may not have received any college course preparation in the population education area. From these findings it appears that population education is included in school curricula.

420. Stromp, Bruce A. Issue Space Utilization in State Natural Resource Magazines. Paper presented at the annual meeting of the Association for Education in Journalism (21st, Seattle, Washington, August 13-16, 1978). 23pp. ED 158 297.

DESCRIPTORS: descriptive research, nonformal, resource management education.

State natural resource magazines' tremendous potential as information sources and their unique economic situation led to this study of space utilization in individual issues. Three issues from each of 40 state

magazines published in the summer of 1977 were divided into five subscription-rate and four staff-size categories. Category averages for each layout element were compared based on per issue percentages of space devoted to each element. Percentage computations were based on the total space potentially available for text. Three questions were posed: Do magazines with higher subscription rates have a lower percentage of text per issue than lower-rate magazines? Do subscription rates relate to the proportional amount of space taken by photography and artwork? and How does staff size relate to the use of photography and artwork? The results show: (1) the magazines with the highest subscription rates use less text space per issue than those with lower rates; (2) as subscription rates increase, there is a larger percentage of photography and artwork space used per issue; (3) a significant difference in the percentage of white space occurs among the subscription categories; and (4) magazines with large staffs allocate significantly more space per issue to artwork than magazines with smaller staffs.

421. Superka, Douglas P., and Norris Harms. A Comparative Evaluation of Values-Oriented and Non-Values-Oriented Environmental Education Materials. Final Report. Social Science Education Consortium, Inc., Boulder, CO, 1977. 234pp. ED 175 777.

DESCRIPTORS: cognitive, descriptive research, energy education, issue awareness/knowledge of issues, program evaluation, resource management education, science education, secondary, social science education, values.

The document reports on a study of how different environmental education curriculum units affected secondary students' knowledge of and attitudes toward energy and environmental issues. The sample consisted of 16 secondary science and social studies teachers and 32 classrooms with over 600 students in nine Colorado school districts. Eight teachers used an inquiry approach and the other eight teachers used a values-oriented approach to teach a six-week environmental education unit. All teachers used nonenvironmental education classes as control groups. Pre- and posttests and student and teacher questionnaires examined 16 variables, including general knowledge of environmental and energy issues; belief in the seriousness and importance of environmental and energy problems; feeling an ability to help solve environmental energy problems; and supporting political, legal, educational, personal, and lifestyle solutions to environmental problems. Findings indicated that both treatments produced statistically significant cognitive gains which compared to control classes, and that the values-oriented approach did encourage positive attitudes toward energy vs. environment tradeoffs and lifestyle solutions to energy problems. The conclusion is that there was no difference in students' gains in knowledge and only slight difference in attitudes toward environmental issues as a result of participating in a unit based on a values-oriented or inquiry approach.

422. Svobodny, Linda A. Increasing Self Concept through Outward Bound. Paper presented at the annual international convention, The Council for Exceptional Children (57th, Dallas, TX, April 22-27, 1979, Session B-9), 22pp. ED 171 009.

**DESCRIPTORS:** behaviors, cognitive, outdoor education, program evaluation, social background.

The study investigated the outcomes of two intervention programs for 60 male juvenile offenders (aged 13-17 years). Group I (30 SS) were placed at a correctional camp facility modeled after the Outward Bound program, which incorporates a particular treatment concept designed to increase self esteem. Group II participants (30 SS) were placed on probation within their home community. Pre- and post-treatment self concept scores were employed for both groups. Group I was given additional cognitive and social assessments. Research findings indicated that there was a significant difference in post-treatment self concept scores between Group I and Group II. The adjusted mean score for Group I was significantly higher than the adjusted mean for Group II. Group I made significant gains in self concept scores from pre-treatment to post-treatment assessment. Group II did not make significant gains. Investigation of the use of pre-treatment cognitive variables to predict post-treatment social adjustment scores for Group I revealed a significant proportion of the variance can be predicted. The single best predictor was pre-treatment arithmetic scores.

423. Thompson, Phyllis T., and John MacTavish. Energy Problems: Public Beliefs, Attitudes and Behaviors. Grand Valley State Colleges, Allendale, MI, 1976. 87pp. ED 134 416.

**DESCRIPTORS:** attitudes, behaviors, citizenship, energy education, issue awareness/knowledge of issues, nonformal, program development.

This survey reported one phase of a larger project. The goals of the project are to plan and conduct a public education program on energy-related concerns that will produce an informed public, willing to support and cooperate with the strategies necessary for the long-term resolution of our energy problems. Reported in this document are the results of a survey conducted in metropolitan Grand Rapids, Michigan in February, 1976. Six hundred addresses were selected beginning with a random start. Personal interviews were conducted and a response rate of about 86 percent was obtained. The survey included six logic areas: (1) energy problems; (2) energy supplies; (3) energy shortages; (4) expectations of price increases; (5) adaptations to perceived energy shortages and energy cost increases; and (6) credibility of information sources. Results for individual items are reported as well as general conclusions.

424. Voelker, Alan M., and Robert E. Horvat. The Development of an Instrument for Determining the Nature of Elementary School Children's Environmental Decisions. 1974. 273pp. ED 137 060.

**DESCRIPTORS:** attitudes, elementary, formal, instrument development, middle school, model building.



This report describes the formulation of a conceptual base for conducting research on elementary school children's orientation toward their environment and details procedures for developing a battery of instruments for measuring these orientations. A definition of environmental orientations is formulated. This definition is used to focus construction of instruments to generate information about elementary and middle school children's orientation towards their environment. Development (pilot and field-test) procedures are presented for three instruments. "Our World of Today/Tomorrow" uses a semantic differential to approximate children's orientation to the present and future world situation. "The Environment and Pollution" uses a Likert scale to approximate student's orientation to general pollution and environmental problems. "The Environmental Decisions Inventory" uses a Likert response format to approximate children's orientation to alternative solutions to specific environmental problems. Estimates of validity, stability, and reliability, and factor analyses are presented.

425. Ward, Mary E. A Study of the Effects a Residential Outdoor Education Experience Had on Adults Who Attended a Program in Rockford as Students in 1963 and 1966. 1976. 49pp. ED 136 998.

DESCRIPTORS: attitudes, descriptive research, historical research, outdoor education, program evaluation.

The study determined whether a residential outdoor education program in Rockford, Illinois provided a long-lasting effect on those students who as fifth graders participated in a weeklong experience in 1963 or 1966. The hypotheses developed were: outdoor educational experiences provide a long-lasting effect on those who have had the experience; past outdoor educational experiences provide for awareness of the environment and environmental problems concepts for outdoor education are of value to outdoor educational programs; and parents who participated in outdoor educational experiences as students feel the experience was worthwhile and would support an outdoor education experience for their children. Data were obtained from: a letter sent to the teacher asking about the program, and attitude questionnaires mailed to 22 participants of the 1963 class and 16 of the 1966 class. Ten of the 22 and 5 of the 16 questionnaires were returned. It was found that the residential outdoor education experience that these adults participated in as children had had a long-lasting effect on them. They remembered their experiences, and the activities they participated in. They felt that this experience was good and worthwhile to them, and it would be so to their children. The opportunity to enjoy the outdoors as children may have led to their interest in outdoor activities as adults.

426. Washington, University of Bureau of School Service and Records. Project Learning Tree: Independent Study and Evaluation. 1977. 119pp. ED 142 413.

DESCRIPTORS: cognitive, formal, program evaluation, resource management education.

This evaluation sought to determine the impact on students of the materials developed for Project Learning Tree (PLT). Three grade groupings were analyzed: (1) elementary (grades 4-6); (2) intermediate (grades 7-9); and (3) high school (grades 10-12). The basic design consisted of a treatment versus control group using a posttest designed to measure the various components of the PLT materials. Participation required covering a specific set of core lessons with the students and administering a test at the end of the lesson exposure. Approximately 4,000 students participated in the evaluation. The results indicated that PLT materials had the greatest impact on intermediate students, especially in the transmission of specific information. A number of puzzling results at the elementary grade level are reported. Included in the appendices are: the selected core lessons, breakdown of the student population by grade and state, test instruments, lists of participants by city and state, and the results on each individual item in the test.

427. Wilson, Terry L. Student Attitude Change as a Result of the Presentation of Materials Representing Various Opinions of Strip Mining. M.S. thesis, The Ohio State University, 1975. 63pp. ED 133 164.

DESCRIPTORS: attitudes, descriptive research, issue awareness/knowledge of issues, program evaluation, secondary.

Reported is a study that designed a set of materials representing a spectrum of possible opinions on an environmental issue and tested the materials with ninth-grade students. Materials were obtained regarding strip mining. Judges ranked the materials on a 5-point scale from strongly supporting to strongly opposing strip mining. Materials on which judges could agree were selected for the study. An experimental group and control group were involved in the instruction. Both groups were pretested and posttested. The experimental group received five days of instruction with materials reviewed by the judges. The posttest data indicated the control group students did not change their attitudes while the experimental group students did. In general, students with extreme positions tended to become less extreme.

428. Wint, Dennis M., and William R. Kennedy. Strategies Affecting Successful Implementation of an Environmental Curriculum into Ohio Schools. Paper presented at the annual meeting of the Ohio Academy of Science (Columbus, Ohio, April 1977). 31pp. ED 144 779.

DESCRIPTORS: attitudes, formal, model building, program development, program evaluation.

The purpose of this report was to examine the effectiveness of an innovation model used by the Ohio Department of Education in conjunction with the diffusion of the environmental curriculum adaptation project. Specifically examined were (1) major factors affecting both successes

and failures in the implementation of the environmental curriculum, and (2) teacher attitudes toward environmental education. A questionnaire was sent to 370 teachers and completed by 229 (62 percent). Three variables were identified as most important for success of the program: (1) the curriculum guides; (2) personal interest of the teacher; and (3) workshops. Major limiting factors were: (1) insufficient time in teacher's schedule; (2) priorities of other subjects; and (3) schedule conflicts for activities. Among the conclusions were: (1) the implementation model did a good job of conveying the particulars of the program, and (2) the importance of the support of the school administrator and needed school adjustments were not stressed enough.

429. Yuen, Christopher. Improving Access to Master's Theses in Environmental Education. M.S. thesis, State University of New York at Syracuse, 1979. 97pp. ED 187 528.

DESCRIPTORS: descriptive research, higher education.

Described is a project to obtain and disseminate research which resulted in the compilation of 61 abstracts of Master's theses in environmental education and communication. Environmental educators were surveyed to determine their use of various informational tools available to them and the usefulness of the compilation of abstracts. Authors of Master's theses in environmental education were questioned to find formal and informal patterns of distribution of their studies.

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|    |     |     |     |     |  |  |  |  |  |  |  |
|----|-----|-----|-----|-----|--|--|--|--|--|--|--|
| 18 | 143 | 159 | 248 | 299 |  |  |  |  |  |  |  |
|----|-----|-----|-----|-----|--|--|--|--|--|--|--|

community resource

|     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 12  | 24  | 104 | 110 | 117 | 144 | 153 | 161 | 167 | 170 | 193 | 219 |
| 252 | 253 | 408 | 417 |     |     |     |     |     |     |     |     |

conservation education

|     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1   | 2   | 11  | 22  | 68  | 92  | 101 | 105 | 106 | 149 | 150 | 166 |
| 171 | 178 | 190 | 197 | 214 | 237 | 257 | 304 | 305 | 306 | 311 | 327 |
| 333 | 347 | 359 | 362 | 377 | 393 | 395 | 396 | 398 |     |     |     |

continuing education

|    |    |     |     |     |     |     |     |     |     |     |  |
|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|
| 18 | 29 | 143 | 161 | 171 | 182 | 231 | 240 | 261 | 263 | 335 |  |
|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|

descriptive research

|     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1   | 4   | 5   | 6   | 7   | 8   | 9   | 10  | 13  | 14  | 15  | 16  |
| 17  | 18  | 19  | 20  | 21  | 22  | 23  | 24  | 25  | 26  | 29  | 30  |
| 31  | 32  | 33  | 35  | 36  | 37  | 39  | 41  | 42  | 45  | 47  | 48  |
| 49  | 50  | 51  | 52  | 53  | 54  | 56  | 57  | 59  | 60  | 63  | 65  |
| 67  | 68  | 70  | 72  | 73  | 76  | 77  | 78  | 79  | 80  | 81  | 82  |
| 83  | 85  | 87  | 88  | 89  | 90  | 91  | 93  | 94  | 95  | 99  | 100 |
| 103 | 105 | 108 | 110 | 111 | 115 | 117 | 118 | 119 | 120 | 122 | 123 |
| 129 | 136 | 137 | 139 | 140 | 142 | 144 | 146 | 147 | 152 | 153 | 154 |
| 157 | 160 | 161 | 168 | 169 | 170 | 171 | 172 | 173 | 175 | 178 | 179 |
| 181 | 182 | 183 | 184 | 185 | 186 | 187 | 189 | 191 | 192 | 193 | 194 |
| 195 | 198 | 201 | 202 | 203 | 206 | 207 | 211 | 212 | 215 | 216 | 217 |
| 218 | 219 | 220 | 221 | 223 | 224 | 225 | 226 | 227 | 229 | 230 | 231 |
| 232 | 234 | 235 | 236 | 237 | 239 | 241 | 242 | 243 | 244 | 245 | 246 |
| 247 | 248 | 249 | 250 | 251 | 255 | 258 | 259 | 260 | 261 | 262 | 263 |
| 268 | 272 | 273 | 278 | 281 | 285 | 291 | 292 | 299 | 301 | 303 | 304 |
| 306 | 307 | 313 | 314 | 315 | 317 | 319 | 333 | 334 | 335 | 336 | 337 |
| 338 | 339 | 340 | 342 | 344 | 346 | 347 | 348 | 349 | 353 | 356 | 358 |
| 359 | 360 | 362 | 363 | 365 | 367 | 368 | 369 | 376 | 377 | 378 | 379 |
| 381 | 382 | 385 | 387 | 389 | 390 | 394 | 395 | 396 | 398 | 399 | 400 |
| 404 | 411 | 412 | 415 | 416 | 418 | 419 | 420 | 421 | 425 | 427 | 429 |

ecology education

|     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 9   | 10  | 44  | 47  | 72  | 78  | 96  | 97  | 100 | 143 | 152 | 174 |
| 185 | 288 | 293 | 298 | 300 | 306 | 324 | 325 | 330 | 332 | 335 | 339 |
| 350 |     |     |     |     |     |     |     |     |     |     |     |

economic background

|     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 5   | 14  | 24  | 41  | 49  | 50  | 51  | 52  | 58  | 60  | 105 | 120 |
| 121 | 147 | 176 | 189 | 194 | 235 | 275 | 285 | 289 | 295 | 405 |     |

educational background

|     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 14  | 36  | 48  | 50  | 51  | 52  | 60  | 76  | 92  | 101 | 105 | 115 |
| 147 | 157 | 171 | 176 | 189 | 206 | 217 | 235 | 275 | 289 | 340 | 369 |

elementary

|     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 12  | 13  | 40  | 46  | 59  | 61  | 64  | 69  | 73  | 75  | 93  | 96  |
| 118 | 121 | 127 | 128 | 156 | 163 | 168 | 179 | 181 | 192 | 245 | 248 |
| 267 | 278 | 287 | 304 | 307 | 308 | 315 | 320 | 330 | 341 | 345 | 348 |
| 354 | 355 | 357 | 379 | 387 | 390 | 391 | 418 | 424 |     |     |     |

energy education

|     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1   | 13  | 69  | 74  | 86  | 92  | 102 | 119 | 129 | 150 | 155 | 166 |
| 167 | 190 | 214 | 240 | 280 | 283 | 305 | 309 | 327 | 352 | 366 | 367 |
| 372 | 376 | 385 | 390 | 393 | 394 | 400 | 415 | 418 | 421 | 423 |     |

environmental action skills

|    |    |    |     |     |     |     |     |     |     |     |  |
|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|--|
| 28 | 61 | 97 | 110 | 112 | 131 | 134 | 191 | 196 | 331 | 336 |  |
|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|--|

environmental center

|    |     |     |     |     |     |     |     |     |     |  |  |
|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|--|
| 73 | 118 | 128 | 258 | 259 | 299 | 345 | 377 | 380 | 392 |  |  |
|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|--|

ethnic group

|    |    |    |    |     |     |     |     |     |     |  |  |
|----|----|----|----|-----|-----|-----|-----|-----|-----|--|--|
| 41 | 58 | 60 | 89 | 115 | 120 | 152 | 235 | 326 | 402 |  |  |
|----|----|----|----|-----|-----|-----|-----|-----|-----|--|--|

ex post facto

|   |    |    |     |     |     |     |     |     |     |  |  |
|---|----|----|-----|-----|-----|-----|-----|-----|-----|--|--|
| 1 | 28 | 84 | 105 | 147 | 176 | 206 | 238 | 404 | 407 |  |  |
|---|----|----|-----|-----|-----|-----|-----|-----|-----|--|--|

experimental research

|     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 2   | 11  | 12  | 27  | 38  | 40  | 43  | 46  | 58  | 62  | 69  | 71  |
| 74  | 75  | 92  | 96  | 101 | 104 | 106 | 107 | 114 | 116 | 124 | 126 |
| 128 | 130 | 132 | 133 | 138 | 141 | 149 | 150 | 151 | 158 | 159 | 163 |
| 164 | 165 | 166 | 167 | 188 | 190 | 197 | 199 | 200 | 204 | 208 | 210 |
| 214 | 256 | 257 | 270 | 271 | 274 | 280 | 309 | 320 | 329 | 332 | 351 |
| 357 | 383 |     |     |     |     |     |     |     |     |     |     |

field trip

|    |    |    |     |     |     |     |     |     |     |  |  |
|----|----|----|-----|-----|-----|-----|-----|-----|-----|--|--|
| 11 | 37 | 69 | 109 | 156 | 164 | 193 | 232 | 309 | 386 |  |  |
|----|----|----|-----|-----|-----|-----|-----|-----|-----|--|--|

formal

|     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 2   | 11  | 13  | 16  | 19  | 23  | 27  | 31  | 35  | 37  | 40  | 57  |
| 59  | 65  | 67  | 68  | 73  | 86  | 87  | 88  | 95  | 100 | 103 | 123 |
| 124 | 126 | 128 | 179 | 181 | 186 | 195 | 198 | 202 | 221 | 236 | 239 |
| 240 | 245 | 278 | 281 | 283 | 287 | 308 | 318 | 333 | 338 | 356 | 357 |
| 360 | 361 | 363 | 365 | 366 | 367 | 368 | 371 | 379 | 384 | 386 | 387 |
| 388 | 391 | 393 | 396 | 397 | 399 | 400 | 403 | 404 | 406 | 408 | 411 |
| 412 | 413 | 416 | 418 | 419 | 424 | 426 | 428 |     |     |     |     |



games

23 134 170 274

higher education

|     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 17  | 23  | 33  | 34  | 41  | 54  | 74  | 82  | 87  | 94  | 95  | 101 |
| 103 | 152 | 173 | 174 | 203 | 211 | 242 | 247 | 255 | 265 | 286 | 288 |
| 298 | 302 | 310 | 339 | 368 | 369 | 370 | 371 | 372 | 429 |     |     |

historical research

102 275 330 407 425

hypothesis generation

|     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 3   | 11  | 30  | 48  | 49  | 50  | 54  | 56  | 57  | 84  | 102 | 104 |
| 121 | 129 | 138 | 164 | 196 | 205 | 222 | 231 | 235 | 244 | 296 | 297 |
| 299 | 331 | 350 | 410 |     |     |     |     |     |     |     |     |

individualized instruction

110

inquiry

49 105 134 176

instrument development

|     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 16  | 29  | 34  | 45  | 56  | 66  | 85  | 95  | 122 | 132 | 145 | 148 |
| 151 | 155 | 159 | 165 | 209 | 216 | 224 | 252 | 253 | 254 | 264 | 265 |
| 274 | 277 | 284 | 288 | 289 | 290 | 292 | 302 | 308 | 310 | 322 | 328 |
| 345 | 350 | 361 | 371 | 372 | 373 | 392 | 393 | 424 |     |     |     |

intelligence

121

interdisciplinary

|     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 37  | 64  | 114 | 195 | 236 | 260 | 294 | 296 | 297 | 305 | 312 | 330 |
| 338 | 348 | 359 | 368 | 384 | 393 | 401 | 406 | 419 |     |     |     |

issue awareness/knowledge of issues

|     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 3   | 4   | 7   | 13  | 14  | 15  | 32  | 33  | 34  | 36  | 58  | 41  |
| 42  | 52  | 55  | 60  | 74  | 77  | 79  | 80  | 86  | 95  | 100 | 122 |
| 127 | 131 | 134 | 137 | 144 | 146 | 148 | 152 | 154 | 155 | 157 | 158 |
| 160 | 161 | 170 | 177 | 179 | 182 | 185 | 186 | 187 | 198 | 206 | 207 |
| 211 | 215 | 216 | 217 | 219 | 220 | 223 | 224 | 225 | 240 | 248 | 249 |
| 251 | 252 | 253 | 261 | 262 | 264 | 265 | 268 | 269 | 271 | 275 | 290 |
| 291 | 316 | 320 | 328 | 373 | 381 | 382 | 385 | 401 | 405 | 406 | 410 |
| 421 | 423 | 427 |     |     |     |     |     |     |     |     |     |

issue-based

|     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 6   | 7   | 15  | 18  | 23  | 70  | 71  | 79  | 82  | 85  | 102 | 108 |
| 119 | 121 | 122 | 130 | 137 | 139 | 145 | 156 | 157 | 161 | 170 | 176 |
| 179 | 183 | 198 | 199 | 202 | 207 | 210 | 215 | 222 | 249 | 251 | 253 |
| 256 | 301 | 303 | 310 | 316 | 323 | 335 | 340 | 357 | 361 | 401 | 407 |

issue identification skills

|     |     |    |    |    |    |    |     |     |     |     |     |
|-----|-----|----|----|----|----|----|-----|-----|-----|-----|-----|
| 18  | 22  | 24 | 66 | 70 | 77 | 80 | 114 | 129 | 132 | 159 | 265 |
| 291 | 407 |    |    |    |    |    |     |     |     |     |     |

issue investigation/evaluation skills

|     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 6   | 23  | 32  | 71  | 98  | 110 | 114 | 117 | 126 | 131 | 132 | 159 |
| 203 | 208 | 211 | 213 | 222 | 248 | 316 |     |     |     |     |     |

knowledge

|     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1   | 2   | 3   | 4   | 5   | 6   | 7   | 9   | 14  | 18  | 24  | 27  |
| 28  | 32  | 43  | 44  | 46  | 65  | 67  | 72  | 73  | 77  | 79  | 92  |
| 96  | 101 | 105 | 106 | 123 | 124 | 125 | 133 | 137 | 145 | 150 | 158 |
| 160 | 161 | 165 | 166 | 175 | 180 | 182 | 185 | 188 | 190 | 193 | 198 |
| 201 | 207 | 214 | 215 | 218 | 219 | 220 | 223 | 224 | 233 | 240 | 244 |
| 251 | 252 | 262 | 267 | 277 | 279 | 286 | 290 | 291 | 292 | 293 | 294 |
| 295 | 298 | 300 | 303 | 309 | 310 | 313 | 317 | 322 | 323 | 324 | 329 |
| 334 | 341 | 342 | 344 | 346 | 352 | 364 | 385 | 389 |     |     |     |

language arts

|    |    |     |     |
|----|----|-----|-----|
| 76 | 87 | 103 | 360 |
|----|----|-----|-----|

lecture

311

locus of control

3 4 205 244 246 279 374

marine education

100 270 287 288 292 293 315 365 411 412 415

mathematics education

64 213

middle school

|     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 2   | 3   | 4   | 11  | 19  | 59  | 61  | 69  | 75  | 80  | 93  | 96  |
| 121 | 122 | 123 | 124 | 125 | 133 | 146 | 151 | 157 | 179 | 181 | 193 |
| 220 | 245 | 248 | 264 | 266 | 270 | 271 | 277 | 278 | 287 | 289 | 295 |
| 302 | 307 | 308 | 309 | 313 | 314 | 315 | 317 | 319 | 322 | 328 | 336 |
| 350 | 351 | 360 | 417 | 418 | 424 |     |     |     |     |     |     |

model building

|     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 20  | 21  | 98  | 113 | 131 | 182 | 205 | 213 | 227 | 259 | 265 | 282 |
| 293 | 296 | 297 | 304 | 306 | 307 | 318 | 322 | 325 | 331 | 341 | 354 |
| 355 | 359 | 382 | 388 | 397 | 424 | 428 |     |     |     |     |     |

moral development

133 145 286 302 361 388 397

multidisciplinary-infusion

109 138 236 277 287 294 297 318 365

nonformal

|     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 12  | 42  | 44  | 47  | 53  | 55  | 57  | 69  | 73  | 87  | 118 | 128 |
| 137 | 143 | 151 | 152 | 162 | 173 | 204 | 207 | 258 | 259 | 263 | 268 |
| 269 | 272 | 279 | 282 | 285 | 299 | 311 | 323 | 324 | 335 | 341 | 345 |
| 347 | 352 | 353 | 364 | 374 | 375 | 376 | 377 | 380 | 381 | 382 | 389 |
| 395 | 398 | 402 | 405 | 407 | 410 | 414 | 420 | 423 |     |     |     |

outdoor classroom

|     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 37  | 44  | 47  | 55  | 72  | 78  | 93  | 128 | 134 | 141 | 143 | 151 |
| 154 | 164 | 181 | 200 | 204 | 232 | 271 | 277 | 299 | 329 | 341 | 349 |
| 351 | 378 | 414 |     |     |     |     |     |     |     |     |     |



outdoor education

|     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 12  | 29  | 44  | 55  | 72  | 73  | 78  | 93  | 105 | 128 | 141 | 142 |
| 168 | 151 | 184 | 200 | 212 | 237 | 258 | 259 | 266 | 271 | 279 | 304 |
| 306 | 311 | 319 | 349 | 351 | 353 | 359 | 364 | 370 | 374 | 377 | 378 |
| 380 | 386 | 392 | 398 | 399 | 408 | 409 | 413 | 414 | 417 | 422 | 425 |

personality type

|   |    |    |     |     |     |     |
|---|----|----|-----|-----|-----|-----|
| 9 | 76 | 81 | 129 | 163 | 189 | 370 |
|---|----|----|-----|-----|-----|-----|

population education

|     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 38  | 41  | 49  | 169 | 176 | 177 | 213 | 220 | 221 | 248 | 253 | 260 |
| 284 | 325 | 342 | 348 | 403 | 419 |     |     |     |     |     |     |

pre-experimental

|     |     |    |    |     |     |     |     |     |     |     |     |
|-----|-----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|
| 44  | 55  | 61 | 86 | 112 | 125 | 143 | 156 | 162 | 180 | 193 | 233 |
| 240 | 282 |    |    |     |     |     |     |     |     |     |     |

preferences

|     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 6   | 8   | 20  | 21  | 25  | 54  | 56  | 63  | 81  | 83  | 84  | 89  |
| 108 | 116 | 121 | 139 | 140 | 148 | 164 | 169 | 171 | 183 | 194 | 205 |
| 212 | 218 | 231 | 258 | 264 | 272 | 276 | 353 | 363 | 371 | 375 |     |

program development

|     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 30  | 35  | 110 | 120 | 123 | 127 | 131 | 144 | 173 | 174 | 177 | 202 |
| 211 | 226 | 228 | 229 | 230 | 280 | 281 | 284 | 288 | 293 | 296 | 315 |
| 318 | 322 | 332 | 335 | 337 | 338 | 346 | 354 | 355 | 356 | 363 | 367 |
| 372 | 373 | 387 | 394 | 397 | 400 | 409 | 414 | 423 | 428 |     |     |

program evaluation

|     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 10  | 17  | 19  | 23  | 30  | 55  | 59  | 72  | 75  | 96  | 98  | 110 |
| 114 | 124 | 126 | 133 | 138 | 143 | 158 | 161 | 167 | 177 | 193 | 195 |
| 207 | 226 | 230 | 232 | 237 | 241 | 247 | 249 | 256 | 259 | 263 | 278 |
| 280 | 283 | 288 | 295 | 296 | 308 | 311 | 312 | 315 | 320 | 321 | 327 |
| 328 | 332 | 333 | 335 | 337 | 338 | 343 | 344 | 345 | 346 | 354 | 355 |
| 356 | 357 | 360 | 362 | 367 | 368 | 370 | 372 | 373 | 374 | 375 | 379 |
| 380 | 383 | 387 | 389 | 390 | 391 | 393 | 396 | 397 | 398 | 399 | 400 |
| 401 | 402 | 403 | 406 | 408 | 409 | 413 | 415 | 416 | 418 | 419 | 421 |
| 422 | 425 | 426 | 427 | 428 |     |     |     |     |     |     |     |

program implementation

|     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 38  | 40  | 47  | 64  | 170 | 202 | 230 | 243 | 260 | 287 | 332 | 346 |
| 348 | 354 | 355 | 365 | 408 | 415 |     |     |     |     |     |     |

psychomotor

|     |     |
|-----|-----|
| 237 | 399 |
|-----|-----|

resource management education

|     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 22  | 30  | 34  | 39  | 47  | 55  | 94  | 106 | 110 | 135 | 144 | 146 |
| 148 | 173 | 176 | 191 | 209 | 218 | 237 | 250 | 252 | 255 | 257 | 261 |
| 269 | 281 | 282 | 300 | 312 | 313 | 333 | 335 | 336 | 347 | 353 | 364 |
| 410 | 415 | 420 | 421 | 426 |     |     |     |     |     |     |     |

moral

|     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 26  | 52  | 60  | 111 | 123 | 147 | 151 | 154 | 160 | 191 | 206 | 217 |
| 218 | 223 | 238 | 316 | 325 | 375 | 408 | 413 |     |     |     |     |

science education

|     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 3   | 27  | 114 | 133 | 142 | 177 | 192 | 228 | 233 | 243 | 250 | 276 |
| 293 | 294 | 312 | 324 | 329 | 332 | 333 | 341 | 342 | 356 | 365 | 366 |
| 368 | 371 | 378 | 383 | 384 | 386 | 390 | 397 | 401 | 403 | 412 | 415 |
| 418 | 421 |     |     |     |     |     |     |     |     |     |     |

secondary

|     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 4   | 16  | 31  | 59  | 65  | 67  | 73  | 75  | 97  | 100 | 111 | 114 |
| 126 | 127 | 133 | 141 | 155 | 158 | 160 | 168 | 172 | 178 | 180 | 186 |
| 192 | 198 | 220 | 221 | 228 | 237 | 241 | 245 | 250 | 256 | 260 | 264 |
| 273 | 276 | 278 | 280 | 281 | 284 | 290 | 292 | 294 | 300 | 302 | 303 |
| 308 | 309 | 312 | 315 | 316 | 321 | 322 | 329 | 332 | 334 | 342 | 348 |
| 354 | 355 | 362 | 378 | 379 | 383 | 384 | 386 | 387 | 389 | 390 | 391 |
| 401 | 402 | 412 | 413 | 416 | 419 | 421 | 427 |     |     |     |     |

simulations

|    |    |    |    |     |     |     |     |     |     |
|----|----|----|----|-----|-----|-----|-----|-----|-----|
| 23 | 86 | 89 | 96 | 134 | 256 | 274 | 366 | 397 | 402 |
|----|----|----|----|-----|-----|-----|-----|-----|-----|

social background

|     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 5   | 8   | 14  | 36  | 41  | 50  | 51  | 58  | 89  | 115 | 120 | 121 |
| 146 | 153 | 187 | 194 | 218 | 223 | 231 | 235 | 246 | 261 | 275 | 285 |
| 289 | 295 | 326 | 340 | 405 | 409 | 422 |     |     |     |     |     |

social science education

|     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 19  | 50  | 114 | 133 | 158 | 177 | 250 | 333 | 342 | 383 | 384 | 403 |
| 418 | 421 |     |     |     |     |     |     |     |     |     |     |

teacher training inservice

|     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 57  | 64  | 86  | 88  | 95  | 104 | 125 | 136 | 138 | 142 | 165 | 168 |
| 177 | 180 | 181 | 192 | 196 | 216 | 220 | 233 | 234 | 239 | 249 | 276 |
| 283 | 301 | 305 | 307 | 308 | 324 | 327 | 331 | 337 | 343 | 344 | 358 |
| 359 | 403 | 404 | 406 | 419 |     |     |     |     |     |     |     |

teacher training preservice

|     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 27  | 35  | 37  | 86  | 135 | 157 | 173 | 181 | 196 | 216 | 227 | 236 |
| 239 | 242 | 249 | 252 | 267 | 276 | 307 | 331 | 337 | 359 |     |     |

theoretical research

|   |     |     |     |     |     |  |  |  |  |  |  |
|---|-----|-----|-----|-----|-----|--|--|--|--|--|--|
| 3 | 113 | 135 | 222 | 297 | 326 |  |  |  |  |  |  |
|---|-----|-----|-----|-----|-----|--|--|--|--|--|--|

unobtrusive

|    |    |    |     |     |  |  |  |  |  |  |  |
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