This digest contains an abridgment of a section of a chapter on "Environmental Education Research Related to Issue Awareness" from the 1984 National Commission for Environmental Education Research (NCEER) Report. The paper was prepared by Randall Wiesenmeyer, Maureen Murrin, and Audrey Tomera. Only the section of the paper dealing with instructional strategies for developing awareness of environmental issues is provided. Major areas considered include: (1) use and abuse of wilderness; (2) interdisciplinary approaches; (3) values orientation; (4) integrated curriculum; and (5) research conclusions. A list of references (with ED numbers for documents in ERIC) is included. (ML)

The first NCEER report, *Research in Environmental Education 1971-1980* (Lozz, 1981), contained 429 abstracts of journal papers, conference documents, and dissertations from the decade in question, indexed by author and multiple descriptors. The second report reports an additional 73 papers through December 1982, and consists primarily of six comprehensive papers summarizing the results of the 502 total studies reported in six areas: environmental education research related to ecological foundations, the affective domain, issue awareness, investigation and evaluation skills, environmental action skills, and teacher training.

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The effectiveness of a project designed to enhance awareness of environmental issues was researched by Delucia, Kiser, and Frazer (1978). Seventy-five males and 75 females from each grade level, 10-12, and 100 males and 100 females from each grade level, 4-9, were randomly selected to participate. A nearby school without a similar program served as the control group. Environmental knowledge and attitude tests were administered at all grade levels following instruction, statistically significant differences were found between the two groups, in favor of the experimental group.

Cramer and Mears (1981) studied the impact of an energy unit on the knowledge and attitudes of eighth graders toward energy problems. In this study, the treatment groups received an interdisciplinary energy activity packet developed by the National Science Teachers Association (NSTA) while a control group received a regular science course. Following completion of the unit, the control and treatment groups were evaluated on their knowledge of and attitudes toward energy problems. The treatment group's attitude toward energy problems was more positive for each item on the instrument than was that of the control group. The authors concluded that the treatment group was more conservation-minded and aware of limited energy sources than was the control group.

**Interdisciplinary Approaches**

The effects of utilizing an interdisciplinary approach as opposed to a traditional approach for examining problems were addressed by Hepburn (1978). Her findings revealed differences in post-test scores between science/social studies modules of instruction involving ninth-grade and eleventh-grade students. Comparisons were made at each grade level across four treatments: a science module, a social studies module, an interdisciplinary module, and a control treatment. Results indicated that the interdisciplinary treatment groups attained the highest mean gain scores.

The effectiveness of a problem-solving module in aiding participants in understanding and solving environmental problems was examined by Andren (1979), who used community college students as the study sample. The problem-solving model consisted of 21 questions grouped into six areas of problem identification, historical context, and proposing and testing solutions. An analysis of the contents of the students' investigative reports indicated that the experimental group discussed economics, law, transportation issues, and population issues to a significantly greater extent than did the control group. It was concluded that this model was useful in systematically focusing students' attention to some of the necessary components of environmental problem-solving.

**Values Orientation**

In a descriptive study by Supreka and Harms (1977), two methods of presenting environmental education were compared to determine their effects on students' knowledge and attitudes toward energy and environmental issues. Eight teachers used an inquiry (non-values-oriented) approach, and eight others used a values-oriented approach to teach a six-week environmental education unit to more than 600 high school students. Both treatments were found to produce significant cognitive gains, compared to the control classes. The authors suggested that there was no difference in students' gains in knowledge between the two approaches, and only a slight difference in attitudes toward environmental issues.
In a study of the effectiveness of simulation games over other teaching strategies, Bottinei (1980) found, in his study involving 720 high school students, that the group receiving three days of traditional lecture, with no discussion, fared significantly better on immediate cognitive and affective assessments than did three other groups, each of which participated in a different environmental simulation game. No significant cognitive retention differences were noted among the simulation groups. Bottinei concluded that although simulation games may not be as effective in teaching environmental concepts or in forming immediate positive attitudes as traditional methods, they may act as a foundation from which more positive environmental attitudes can evolve and be retained for longer periods of time.

Bazan's evaluation (1976) of four simulation games addressed two problems associated with environmental simulation games: limited participation and lack of economic relationships. In the four simulation games which he developed, ecological and economic systems were modeled and up to 40 players could participate. The games simulated the behaviors, problems, and conditions of producers, consumers, farmers, agricultural policy makers, and the participants in a complex economic system. Participants became cognizant that the human socioeconomic system was problematic, and without quick and easy solutions. The games were reported to be the most popular part of the course, but their effectiveness over alternative strategies was not tested formally.

**Integrated Curriculum**

Case's study (1979) to determine the effect of an integrated eight-week environmental education curriculum integrated into the regular school curriculum revealed opposite findings, however. In his study, sixth-grade students of a Seventh-Day Adventist School were randomly selected and assigned to three groups. Group A was treated with an integrated curriculum for five weeks, one week of a resident field experience, and an additional two weeks of integrated classroom curriculum. Group B was treated with only the integrated curriculum for eight weeks; Group C acted as a control, receiving no environmental curriculum activities. A test was constructed to measure environmental knowledge. Ominic, the knowledge test, statistically significant differences in favor of the B group were found in comparisons with Group A and with Group C. No significant differences were found between Groups A and C.

Studies that examined the effects of outdoor environmental programs found statistically significant changes in campers' knowledge of environmental issues. Chitwood (1977) found changes in environmental knowledge resulting from a camping experience. In her study, the effects of an eight-week session at a Youth Conservation Camp (YCC) on 58 enrollees were measured to determine the relationship, if any, between environmental knowledge, locus of control, and environmental attitudes. Pre- and post-tests were administered to detect and extent of changes in the variables. Statistical analysis indicated that significant changes, in a positive direction, were attained in environmental knowledge and environmentalattitudes, but not in locus of control.

A study of Davis, Doran, and Farr (1980) supports Chitwood's findings. In the Davis, et al., study, 14,796 YCC campers from 194 camps were sampled to assess their environmental awareness before and after their camp experience. Each camper completed a questionnaire either before or after the camp experience. Of the eleven domains of goals developed, six knowledge domains showed statistically significant gains, as did the attitudinal domain. Reliability of the tests and homogeneity of the domains were estimated.

**Summary**

Based on the results of the studies reviewed above, Wiesenmayer, et al., arrived at the following conclusions:

1. Traditional classroom instruction can increase students' environmental knowledge.
2. Interdisciplinary approaches for examining environmental problems seem to be more effective than traditional approaches.

3. Simulation games tend to be enjoyed by the participants but may not be as effective in teaching environmental concepts or in forming positive attitudes as traditional approaches.
4. A combination of classroom instruction and field trips may be a very effective means of increasing students' knowledge of environmental issues.
5. Field trips appear to have the most impact on student learning when occurring prior to classroom instruction.
6. Resident outdoor environmental learning activities can increase students' knowledge of environmental issues.

**References**


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