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Developing and implementing an environmental education course at a local high school

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DEVELOPING AND IMPLEMENTING AN ENVIRONMENTAL
EDUCATION COURSE AT A LOCAL HIGH SCHOOL

A Project Submitted to
The Faculty of the School of Education
In Partial Fulfillment of the Requirements of the
Degree of

Master of Arts

in

Education: Environmental Education Option

By

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The development and implementation of a hands-on, multi-disciplinary, project centered approach to environmental education is described. This paper provides a rationale for teaching environmental education as a distinct course in high school. Procedures followed in establishing the course are documented. Strategies and materials used in teaching such a course are reviewed.
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DEVELOPING AND IMPLEMENTING AN ENVIRONMENTAL EDUCATION COURSE AT A LOCAL HIGH SCHOOL

INTRODUCTION

This project deals with the development and implementation of an environmental education course at a local high school. The course is an elective class that is designed so a student text is not required. Activities from Project WILD, Aquatic Project WILD, and Project Learning Tree are used extensively along with materials obtained from seminars, workshops, and government agencies.

Since infusion of environmental education into each curricular area could take several years to accomplish, the development of an environmental education course will guarantee that some students will receive environmental education before graduating. As students' projects are publicized in the school and local paper, and as students taking the environmental education course are involved in other classes, environmental education will naturally begin to be infused through class discussions, term papers, and book reports. This will increase awareness of environmental issues in other students and teachers which is the first step for
infusion.

The establishment of the environmental education course will help teachers feel more comfortable with the infusing of environmental education into their courses. The environmental educators will work as resource persons for environmental education. Teachers will then have site personnel that can help with environmental resources and the development and implementation of lessons relating to environmental education.

Local projects will be the main focus of the environmental education course using a multi-disciplinary, hands-on, group-oriented, thematic approach. These teaching methods are used to heighten student awareness and understanding of community environmental problems and to develop action plans to help solve the problems. The administration at the high school and I believe this type of course will be attractive to at-risk students because of the teaching methods and nature of the course.
REVIEW OF THE LITERATURE

The Science Framework for California Public Schools (1990) has three pedagogical recommendations for all science courses. Firstly, hands-on experiences should be emphasized and both printed materials and activities should be related to real experiences. Secondly, textbooks should not be the sole source of information. Thirdly, assessment of learning should go beyond the level of recall and paraphrased recall, and a variety of assessment forms should be used including activities, journals, recorded observations, problem solving, and portfolios of accomplished work. It also suggests a thematic approach by interweaving related topics from other areas into a multi-disciplinary study of the main theme.

The most widely accepted approach by environmental educators is the infusion of environmental education into the curriculum. "Environmental education should permeate the entire curriculum with every subject area at every grade level dealing with the environment in some way. Some subject areas, by their very nature, present greater opportunities for infusion of environmental education, but all have a role to
play" (Engleson, 1985). Infusion allows an "environmentalization" of the total school curriculum. A very practical benefit is that infused environmental education does not become another add-on to the curriculum. Unfortunately research shows that environmental education has not been infused into the curriculum but tends to be treated mostly as an enrichment of the science program (Simmons, 1987).

Responsible environmental behavior has been cited as the ultimate goal of environmental education. Unfortunately most methodologies are not designed to achieve this goal (Ramsey & Hungerford, 1989). Environmental education programs tend to focus primarily on the generation of environmental knowledge and attitudes, not in changing students' overt environmental action (Ramsey, Hungerford, & Tomera, 1981). If students know why they should recycle but do not put this knowledge into practice then the environmental program is not meeting the ultimate goal of environmental education. An effective approach is issue investigation and action training. This has been shown to foster citizen participation in environmental issue remediation (Ramsey & Hungerford, 1989).

Project WILD and Project Learning Tree have been shown to enhance a positive attitude toward core subject
areas, particularly social studies and science (Swartz, 1987). These programs have not only been shown to enhance core subjects but also to improve students' self-esteem, to address different learning styles, to make education relevant, and to improve attendance of at-risk students when working on environmental projects (Stoner, 1989). The local high school has a 24% drop-out rate. By developing an environmental education course that naturally addresses some of the needs of all students, it can be inferred that the environmental education course will help in reducing the drop-out rate.

In summary, by modeling an environmental education course after the Science Framework for California Public Schools recommendations, the course should be thematic, based on a multi-disciplinary, hands-on, group-oriented pedagogy, and centered around school and community projects. This approach will meet the needs of the students, including those at-risk and prepare the students to be responsible citizens who are environmentally aware and able to take positive actions in resolving problems.
PROCEDURE FOLLOWED IN ESTABLISHING AN ENVIRONMENTAL EDUCATION COURSE

The following is a sequential outline of the steps that were necessary to have the environmental education course placed on the master schedule as an elective course:

1. Discuss the implementation of an environmental education course into the class schedule with administrators and guidance personnel emphasizing the following:
   a. A student text is not required for the environmental education course. Therefore there is no financial risk to the school if enrollment does not justify the teaching of the course.
   b. A multi-disciplinary approach will be used in the teaching of the environmental education course.
   c. The projects involve the school and the community. This will give the students and the school positive publicity, therefore improving the students' self-image and the image of the school.
   d. The environmental education course may help solve the litter problem, improve restroom
conditions, reduce utility costs, and develop a workable recycling program. Students are more likely to develop innovative solutions to these situations.

2. Receive approval of the environmental education course proposal from the principal and send the proposal to the school board for final approval.

3. Publicize in the school bulletin that the environmental education course is being offered next year and interested students should sign-up for the course in the counseling office.

4. Discuss the course with students and explain the goals of the course. Emphasize that the course is hands-on and counts as elective credits for graduation.

5. Write the course description to be placed in the course catalog. Make sure the information is correct before the catalog is sent to the printer.
At the local high school, there is a fenced, poorly vegetated area outside the science building. For years the science department and site administration have wanted to do something with this area. When the environmental education course was started, it was decided that this area should be developed for an Environmental Study Center (ESC). The students and science department decided that the ESC will include the following: pond, xeriscaped native plant area, mural, weather station, and seismograph. Two grants were submitted to different organizations, but neither were funded. The East Valley Resource Conservation District was contacted to assist with the planning. Representatives from the Soils and Education Divisions were very willing to help with the technical aspects of the pond and the xeriscaped area.

It was determined that the pond and native plant area could be constructed with money raised from the school-wide recycling program developed by students in the environmental education course and money earned by the Environmental Club's work with Partners for a Revitalized Community.
The construction work for the pond is in the process of being accomplished by the students using hand tools. The edge of the pond was lined with river rock cemented in place. This gives a solid shoreline that prevents erosion into the pond and maintains the pond's shape. The bottom of the pond will be lined with bentonite, a substance used in the construction of farm ponds. The cost of the 3x5 meter pond is under $300.00.

The xeriscaped native plant area will cover a 1x24 meter strip along the outside retaining wall of the enclosure. The plants for the demonstration area will be collected by the environmental education course students with permission from local residents who have acreage with native plant species. Emphasis will be placed on plants that are used by the Cahuilla Indians, the local indigenous people of the area.

The other aspects of the ESC will be continued by the environmental education course next year. Students will be trained in the principles of xeriscape and the use of native drought tolerant plants in landscaping so students can give demonstrations to organizations within the community. The science department will continue to write grants for specific items, such as weather station, seismograph, and test kits.
COURSE DESCRIPTION, MATERIALS, AND TEACHING METHODS

The environmental education course is a multi-disciplinary course that is centered around activities and issues to prepare the students to be responsible citizens with environmental awareness, knowledge, and skills necessary to take positive actions in resolving problems. This requires a hands-on, group-oriented approach which encourages direct involvement by students, thereby increasing interest in and relevance of the materials.

The thematic approach is used to integrate ideas and concepts from as many different areas as possible. By using a variety of activities, different learning styles are addressed. Many of the activities that are incorporated into the theme are from Project WILD, Aquatic Project WILD, and Project Learning Tree. Each activity includes: objectives, description of instructional method, background information, materials list, procedure, ways to evaluate student learning, subjects from which concepts are drawn, skills, duration, group size, setting (indoors or outdoors), and key vocabulary. In the indexes of these materials, the activities are organized by grade, subject, skills,
topics, and indoor or outdoor setting. With this information it is easy to design activities from a variety of areas that focus on a particular theme and involve different learning styles.
Once administrators learned that the environmental education course was capable of completing projects, there was never a shortage things for the class to do. As the environmental education course developed, its expertise was called upon to help with several projects throughout the year. Projects and activities that the students in the environmental education course took part in were: Community Development Proposal, Environmental Study Center, School Wide Recycling Program, Dialoglink (a nationwide computer network system with other schools), the development of an Energy Conservation Program, School Facility Improvement Program, Work with Partners for a Revitalized Community, habitat enhancement at the San Jacinto Wildlife Area, and student participation in the Earth Day Expo held at California State University San Bernardino as Recycle Roo and Woodsy Owl. Many of these activities and projects were unsolicited by students, but because of their experience and past performance they were asked to participate.

Group skills are extremely important in creating a successful program, particularly brainstorming and
prioritizing an action plan. On many occasions there were two or more projects being worked on during the same class period, requiring organization and flexibility of the students and teacher.

Community Development Proposal

The local high school is in an area that is beginning to experience rapid growth. Most of the students in the environmental education course have lived in the community most of their lives and are disturbed by what they see taking place in surrounding communities. The students do not want their community to make the same mistakes. Their objective is to do something that would help the community make environmentally sound decisions now and in the future. The class decided to design a development plan that deals with all aspects of the community on an equal basis.

Through brainstorming and prioritizing, the following critical aspects of the community were identified: geology, watershed, wildlife, historical, recreation, and zoning. The class divided itself into six groups with a minimum and maximum size limit placed on the groups. The students choose a group according
to their area of interest.

Information was gathered from the public library. Maps were provided by city, county, and state agencies for watershed, geology, topography, and zoning. The City was very cooperative and went out of their way to assist the students in their endeavor. A member of the City's Planning Department was a guest lecturer on two separate occasions. The City Water Division and Wastewater Division both gave tours of their facilities. The Water Division gave a tour of the Water Canyon explaining the percolation and pumping systems and showing how electricity is generated during the transporting of water to the city.

Six identical maps were made on velum of the City's boundaries and major streets. Each group marked out areas that were critical to their area of study. All six maps were placed on a light table and a final composite map made of mylar indicated the critical areas. The class consensus was that these areas should not be developed, but used in a multiple of ways by the citizens of the community. An example would be the large wash on the southside of the city. Instead of concreting and allowing the development next to the wash, the watershed group felt it would be better to keep the wash as a natural percolation area for
recharging underground aquifers. The Recreation Group designated this area as a long linear park with bicycle paths, hiking and equestrian trails, and low maintenance sports areas. During times of severe flooding property damage would be minimal and public safety insured.

The class is finishing the "City Development Proposal" and getting ready for the city council presentation.

Environmental Study Center

As stated in the Outdoor Facilities section the Environmental Study Center (ESC) will consist of a pond, xeriscaped native plant area, mural, weather station and seismograph. The pond will be the only part of the ESC to be completed this year due to the non-funding of two grant proposals.

Students in the Environmental Club decided to spend the money earned from the Recycling Program and their work with Partners for a Revitalized Community on materials for the pond. At this time the Environmental Club has earned $250.00 painting the home of an underprivileged family selected by Partners for a Revitalized Community.

By the end of the first quarter next year, the
outdoor portion of the ESC should be completed. A math teacher, two social studies teachers, two English teachers, and an art teacher have expressed interest in incorporating the ESC into some of their lessons. As this occurs there will be a natural infusion of environmental education into the curriculum of the local high school.

Recycling Project

During the second semester the students had finished a lesson on recycling and the problems associated with landfills. The students decided to participate with the neighboring elementary school in the recycling of polystyrene trays used by the cafeteria.

The students designed and constructed 15 collection bins for the used cafeteria trays. These bins were strategically placed around the campus. The environmental education course students divided themselves into groups of two. Each group made three or four classroom visits explaining the program, answering questions, and encouraging the use of the bins. The trays had to be collected daily from the bins before the cafeteria was cleaned by the custodian.
Unfortunately, the use of the bins by the high school students has had little success. If it were not for my fifth period student assistant the project would have failed. The student assistant daily pulled the trays and aluminum cans from the trash cans so they can be recycled. This individual has made the recycling program succeed. As for changing the high school students' attitude and behavior, the recycling program has had little success.

Next year the environmental education course students will not recycle the polystyrene trays because of the economics of the project. A total of 960 pounds of polystyrene were collected and delivered to the recycling plant at a cost of $82.00 to the school district. The polystyrene generated only $36.00, leaving a $46.00 deficit. The district agrees that the recycling program is the right thing to do, but that economically the district is not in a position to continue paying for the transportation of the polystyrene trays.

The students in the environmental education course are in the process of researching the feasibility of acquiring plastic or metal trays that can be washed and reused. This approach is more environmentally and economically sound. The next step is to convince the
cafeteria staff and district office that this is the best way to proceed and that planning for this change should begin before summer vacation.

**Dialoglink**

Dialoglink is a company that has developed a program to facilitate computer communications and research services. The company has offered its services to schools across the nation. The local high school became involved last summer in telecommunication with another school.

With this program the environmental education students have conducted a survey comparing their water use with that of students in a New York math class. The local high school students found that they used less water than the New York students. The next step in this project will be to determine if this is due to a conscious change in behavior or through the use of water saving devices. Following this, a survey of the two classes will determine the number and type of water saving devises being used.

Future areas of study discussed for next year are energy surveys and transportation. In the course here and in New York there is particular interest in
comparing automobile usage versus alternative transportation.

This project allows students to compare their environmental awareness and lifestyles with students across the nation. It has given the students an opportunity to learn about and actually use up-to-date technology that otherwise would not be available to the students at the local high school.

Energy Conservation Program

The district is in the process of developing an energy conservation plan to reduce energy costs. The students designed a plan for the high school that has been adopted by the district. The environmental education course's plan consist of three phases. The first phase involves things that can be done immediately with little or no costs. This includes signs above light switches to remind people to turn them off when not in use; closing windows and doors when the heater or air conditioner is in operation; debulbing light fixtures in areas that are over lit. The second phase involves more time and money for its implementation. Some examples are inservice programs to get student and staff buy-in and to increase their awareness; the
development of an incentive program that returns a percentage of the money saved to the individual school sites; purchasing and installing energy saving devices like motion detector light switches. The third phase requires large investments with pay-back periods of several years. An example of this would be the replacement of old inefficient equipment, with new technically advanced equipment particularly heating and cooling units.

School Facilities Improvement Program

This project is in the beginning stages of the development. To date a list of 38 items have been compiled and prioritized. This list will be discussed with the principal and presented at the next school site council meeting which involves students, parents, teachers, and administrators. As money is available, the environmental education course will assist with the planning and carrying out of particular improvement projects when appropriate.

Riparian Habitat Enhancement Project

This project was scheduled first quarter, but
because of state budget cuts and the transfer of personnel from the San Jacinto Wildlife Area, it has been rescheduled for a later time. It is mentioned only because local, state, and federal agencies provide unique opportunities for unusual projects that are beneficial to students and the agencies.
REFERENCES


