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Environmental Education: A Community /University Approach

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The current reassessment of higher education [1-4], coupled with increasing concern for our environment, has indicated several shortcomings in science-oriented curricula. Perhaps the most obvious one is that most basic courses in physics and chemistry focus the primary learning experience in the classroom. This isolation from the real world is further enforced by laboratory experiments which are primarily pedagogical exercises with little or no direct application to existing problems—only the techniques and principles which are learned can be carried over, and often this can be done only indirectly.

A parallel problem (which can be largely attributed to discipline-trained faculty) is the separation of physics, chemistry, biology, and the other sciences into fixed sequences of discrete courses except at the upper divisional levels. This sequencing may not permit the student to develop at a pace concomitant with his ability to learn and forces him to do his own integration of the scientific knowledge gleaned from "separate" disciplines. It also creates a curriculum which may offer the science-oriented student minimum involvement in social science and particularly humanities courses, creating intellectual isolation.

Another major concern (especially in institutions with no graduate programs) is that most science courses do not provide an opportunity for cooperative, in-class learning experience through close association with more advanced students, a type of learning often found in actual research situations. Coupled with this is the fact that little, if any, use is made of community resources—either laboratory facilities or personnel with specific training and experience. This is crucial, since the majority of students will be working for industry or governmental agencies, and much time and effort is spent by these groups re-educating their college-trained employees.

The use of community "faculty" and direct involvement of students in community problems are rare in an era where the predominant university-community interaction is the use of faculty experts as consultants or project directors. The historical development of universities as elitist "ivory towers" embracing pure knowledge militates against involvement in the surrounding community to this day. Concern for the purity of knowledge may have been replaced on the contemporary scene by an informed caution regarding potential political and cultural clashes if a predominantly middle and upper-middle class professor-student group tries to work too closely with a rural or working-class community. Yet, in the end, it is the community that is affected most by the research and training which take place in the universities. We felt it was time that the difficulties inherent in developing these university/community interactions be faced and worked out instead of astutely avoided.

This paper, written at the close of the first semester of our first full-year experiment, is a discussion of the way in which we have begun to use the community as a learning resource. Prior to entering upon the details of the project's initiation and progress thus far, however, a concern which particularly underlies the effort needs elaboration. We call it "the myth of the expert," and here we refer to the tendency of both students and lay community persons to delegate planning and decision making to individuals labeled doctor or scientist or professor, with the rationale that the label gives its holder relevant, superior knowledge. As first the Peace Corps and then intra-U.S. anti-poverty programs have learned by hard experience, initiative and decision-making prerogatives must remain in the hands of the community if viable long-term change is to come about. Community members must acquire the skill to use expert help without relying upon it to the detriment of expressing and implementing their own ideas, needs, and preferences. In our experience, "the myth of the expert" is equally likely to be believed by the expert as by those who so view him: therefore, a certain amount of consciousness-raising has been necessary for all those who have become involved in the project. High school and university students need to learn to work together as equals, just as do scientists, county board chairmen, and individual members of the community.

An Approach to the Problem The founding of the University of Wisconsin at Green Bay represents an effort to come to grips with some of the difficulties in university/community interaction and disciplinary fragmentation. Its problem-oriented rather than discipline-oriented ap-

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proach to world ecology encourages interdisciplinary and community-university efforts. However, even with such an institutional framework, significant efforts speaking to the above concerns have been slow in coming. One answer to this dilemma is the development of a problem-oriented course or courses. The "problem" should be one which is recognized by both the university and the community. Such a course, focusing on real rather than abstract problems, must meet several requirements:

1. It should deal with a problem which would permit the significant involvement of several disciplines from various branches of the institution.

2. It should require several years of involvement, allowing students who become deeply engaged with the work to pursue their interest for more than one semester and preferably for more than one year.

3. It should offer opportunities for significant field work at both the semi-skilled and highly skilled levels, to permit naive project workers to learn from those with more training.

4. It should offer faculty the opportunity for significant scientific work of publication quality.

Within the university, off-campus efforts were formally delegated to the sophomore Liberal Education Seminar (LES) program. Alleging itself to be community oriented and interdisciplinary, the program for science students had usually been limited to simplistic "off-campus experiences," which had no continuity from semester to semester, little if any relationship to university research, and minimal effect upon the community. A more substantive focus was needed.

Watershed Project The Kewaunee River watershed seemed to meet all the criteria mentioned above. Therefore, it was adopted as a long-term study area not only for the sophomore LES course, but as a general project area where students in other courses and disciplines could participate. The entire watershed is close enough to the university to permit ready access to it. The largest city, Kewaunee, is the greatest distance from the university (approximately 30 miles). (See Figure 1.)

The watershed is approximately 140 square miles and is primarily a region of dairy farms. In addition to Kewaunee there are two other small population centers in the heart of the watershed—Luxemburg and Casco. The river system has the potential of becoming the finest cold water resource on Lake Michigan. The primary physical problems appear to be agricultural runoff (siltation plus chemical and bacterial pollution) and poor sewage treatment facilities in the small communities in the watershed. One of the major concerns is spring flooding.

The socio-economic problems appear to be similar to those of other rural areas throughout the United States—decrease in farming, high unemployment, and an outward migration of younger members of the community. Furthermore, the county of Kewaunee had not developed any long-term plans for its own development and had not cooperated actively in any regional planning.

The university became involved in the watershed shortly after the county board finished a feasibility study [5] of the Kewaunee River indicating the possibility of federal funding for the watershed under Public Law 566, which would provide water-retardation structures to control siltation and flooding. Careful analysis of the feasibility study indicated that any watershed improvement under Public Law 566 would focus primarily on improvement of physical problems with minimum consideration for socio-economic aspects of the watershed. Further analysis indicated that the watershed plan was in no way tied to community, county, or regional development. The primary problem in most cases of this type is a lack of manpower and/or funding to provide the essential data for a total study. The use of university students for this task seemed to be one solution. If university students could provide some manpower, why couldn't some of the data also be gathered by citizens in the region, notably high school students, so that a really complete study could be made? In order to ascertain the feasibility of such an undertaking, the faculty and students of Kewaunee High School were contacted. Not only was interest high, but the high school was willing to commit student and faculty time and school facilities.

Consequently, we initiated a series of informal meetings with local high school faculty, local officials, and university faculty. While there was general agreement that university and high school participation was highly desirable, the major issue to be worked out was the level of university involvement. To ensure that the university would remain in a supportive rather than a central role, the following general guidelines were developed:

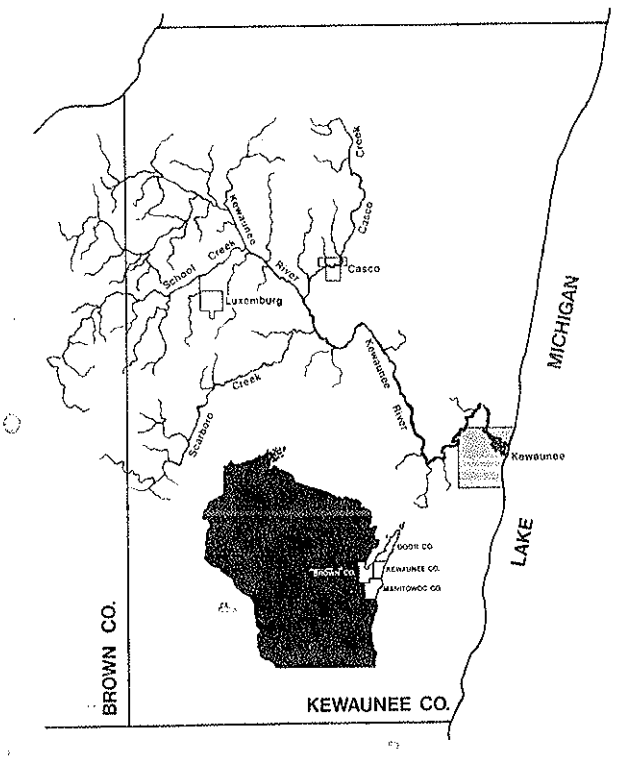

Figure 1. Kewaunee River watershed.

1. High school and university students would be directly involved in collecting and analyzing physical, biological, and socio-economic data.

2. University students and faculty would help high school students and faculty by providing seminars, laboratory facilities, and some leadership of high school teams.

3. High school students would be appointed to the citizen's watershed planning committee with full voting privileges.

4. Both high school and university facilities would be used to analyze data. In addition, an independent testing laboratory volunteered its services to verify measurements.

5. The high school students would begin a campaign to inform and involve the community. This was to be initiated through news articles and public speaking engagements. Here university personnel would also participate on invitation.

This proposal was endorsed by all local officials concerned with the project, and specific encouragement was received from the Soil Conservation Service, which agreed to cooperate actively.

Academic Planning Central to the whole program is the assumption that university undergraduates and high school students can do reliable and meaningful field work and that these students can work constructively in a community. To test this assumption, a pilot summer course was taught at UWGB called Environmental Awareness. Since there were no prerequisites, the students included high school seniors through college seniors in all disciplines.

The first half of the course consisted of a series of lectures on basic social and physical problems which might be relevant in the watershed. Some of the government officials involved in the watershed-development program were invited to lecture or discuss issues informally with students. During this period, students did reading on environmental problems and searched out available information on the watershed area.

The second half of the course was devoted primarily to field work. Each student focused on one of two general topic areas, socio-economic or physical-biological. All students were required to familiarize themselves with the physical region via walking tours and photographs. Since no real analysis had been started prior to this class, the socio-economic group focused primarily on trying to develop a picture of how the local government functioned both in principle and practice, while the physical-biological group started to identify potential testing sites. All students, regardless of primary concern, were required to become conversant with both areas through simple experiments and group meetings where status reports were discussed.

The results of the summer course justified the establishment of a full-year course for sophomore LES. In a yearlong course, we felt it would be possible to develop both physical and social parameters far more fully before students embarked on field work. There would also be time to involve more community people in the classroom to discuss environmental, legal, and economic issues.

The fall course was an expanded and refined version of the pilot program. The first 10 weeks were used to introduce the students to a much broader spectrum of the community through lectures, panels, and discussions with government officials and concerned cititzens, such as farmers and members of the business community. In addition, students were introduced to basic physical and biological measurements through field kits and experiments. The socio-economic parameters were largely explored through information gathered by the summer course and existing statistics. This latter factor was crucial since this was the first step in integrating past work by the university with the current project status.

At the end of the 10-week period, students selected a particular problem area in the watershed. A field project for each was designed through a written contract negotiated with the instructor, which took account of the student's skills, available resources for research, and the needs of the project. The students were grouped according to the type of project they had designed, each student being given specific readings and laboratory experiments to familiarize him with the techniques needed. In addition, all students attended lectures in each of the general areas of relevance (that is, hydrology, chemistry, biology).

The second semester will be devoted entirely to field work. The students are organized in teams according to the area of the watershed in which they are working, an arrangement designed to maintain the interdisciplinary approach. Each team is headed by a science student who is a senior in the university. Some of the teams are also working with high school students in carrying out field work.

Evaluation Though the project is young, many of its results thus far speak directly to the concerns mentioned initially. One major benefit was that students with strong interest and experience began to involve themselves in field work prior to the scheduled time; the controlled breadth of the program allowed each student to find a level of involvement which suited his skill and concern without the faculty burden of innumerable independent study projects. The course was genuinely interdisciplinary, though it was designed to meet the needs of science students first and foremost; students in the social sciences who were looking for meaningful projects were readily integrated (along with their faculty advisor!).

The desired peer learning was reflected in the fact that senior science students became involved in this sophomore course as guest lecturers in their specialties. Several volunteered their participation at a fairly high level of involvement without compensation of any kind; we hope this was an indication of the appeal that "real world problems" have for students. Several students from the watershed area asked to participate in the project as part of another course; the source of their interest is clear.

Finally, several faculty research projects are being established in the watershed, including meteorology, microbiology, water chemistry, and sociology—indicating a potentially greater involvement by students and their mentors in years to come.

As the project gains momentum, however, we find that we need to keep several potential areas of difficulty in mind. First, there is the omnipresent question of funding;

for what and from whence? External financing can generate artificial enthusiasm in the community, which could lead to poor decisions and limited long-range effectiveness once the novelty wears off. In a true university-community effort, the community needs to provide some support other than tacit approval—in manpower, equipment, or dollars. Hopefully, such support will be forthcoming, perhaps augmented by external funding but not overshadowed by it.

The project also needs to acquire sufficient university involvement to assure its continuity despite fiscal cutbacks, faculty turnover, and other institutional impairments to long-term commitment. Lacking this, the potential for community disappointment as the university abruptly or gradually withdraws support is great, and the political consequences could be unfortunate.

Finally, the need for careful faculty supervision remains uppermost in our minds. Students can develop "activist" approaches which alienate the community. Data collection is a valuable educational experience, but in a project such as this where the data are actually to be used in community planning, accuracy is necessary. In many ways, the success of the project hangs on complete and accurate scientific data collection; yet somehow we need not to neglect the other aspects of the project in requiring rigorous scientific procedure in our monitoring activities. This is a great challenge to our own capacity, as faculty, to maintain a balanced approach to the project.

Currently there are approximately twenty university and an equal number of high school students actively involved on this project. Two-thirds of the group is focused on physical/biological measurements. Test sites have been established, hydrological and meteorological measurements and some chemical testing has begun. A three-dimensional model of the watershed is being constructed and existing data are being assembled.

The high school has started a series of environmental articles in the local paper and has finished the groundwork for the first community survey on basic environmental attitudes. Also, a seminar series has been started in the high schools for both students and faculty. In the area outside the sciences, the university has largely confined its activities to developing a socio-economic profile using existing information. A power-structure analysis of the watershed is contemplated in the near future.

All work to this point has been carried out with existing course budgets at both the university and the high school. External funding is being investigated as to type, amount, and desirability.

The Future The success of the program has led to consideration of controlled broadening of the effort in two directions. First, we hope to strengthen community/university interaction by developing more active participation of community personnel in formal course work. A first step is the development of a summer course for high school and university students and interested community members, to be taught jointly by high school, university, and community "faculty." Also, possibilities of integrating this project with a regional plan are being explored. The use of the University Extension to provide a broader learning experience for the community is also in the planning stage. This will include the use of local civic groups to help gather data and to provide input to the final plan. We are actively exploring the potential contributions of senior citizens to the project.

Secondly, methods of integrating this and similar projects into the formal university educational curriculum are being explored. This includes both the use of the project in other classes and for independent study and the use of the watershed for carrying out more fundamental research on the environment.

Though the project is still in its infancy, it has already demonstrated that science education need not be confined to the formal classroom, that students can learn from one another, and that an interdisciplinary approach can enrich the scientific learning experience. Perhaps even more significantly, an enthusiastic working relationship is beginning to unite high school, university, and community personnel around a common goal: that of improving a segment of the environment which they all share. We foresee this relationship intensifying as involvement broadens and deepens, with beneficial results for all concerned. While problems and potential problems are not absent by any means, the benefits seem to outweigh them by far. It is our hope that other universities, high schools, or regional planning committees will see fit to attempt such efforts, which might also include industry, service agencies, farm organizations, and other community groups. Then the finite beginning and ending of "education" will start to dissolve for everyone, and science will become part of the learning process which surrounds decision making on a much broader scale. ■

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