

Organizing a Campus Activity: An Alternative Learning Approach

Mary Tracy Bee^{1,2}, James Montante¹, Kate Lanigan³, Michelle Andrzejak¹, Greg Grabowski¹

¹Biology Department, University of Detroit Mercy, Detroit, MI 48221

²Oakland University William Beaumont School of Medicine, Rochester, MI 48309

³Chemistry Department, University of Detroit Mercy, Detroit, MI 48221

Email: mtracyma@udmercy.edu

Abstract: Alternative teaching styles provide a unique and rewarding approach to reinforcing student knowledge and developing social skills. An approach that we implemented required students from the ecology class to organize and present information at the university-wide Earth Day celebration and exposition. In addition to the informational and research posters presented by the ecology class, the exposition included displays by local environmental groups, local and state agencies, student organizations on campus, research groups from the chemistry department, and an ethics class. We found that the level of student engagement far exceeded our expectations and that the students felt they had made a significant impact on the community. We highly recommend this approach to other faculty.

Key Words: Earth Day, Service Learning, Ecology, Innovative Teaching Approach, Experiential Learning

INTRODUCTION

Student-centered pedagogy presents opportunities to increase student interest and involvement in learning. Alternative forms of teaching such as problem-based or project-based learning, inquiry-based learning, case studies, and community-based or service learning approaches have been utilized with great success for students and faculty alike (Draper, 2004; Wenzel, 2002). These approaches are each a type of experiential education, as is the community-based project presented here. Experiential education is defined as the process for learning through action (Kolb and Kolb, 2005).

Project-based learning has the capacity to benefit the student in ways that are very difficult to achieve in the classroom (Strage, 2004). Community-based or service learning projects foster personal growth by teaching students to take risks and accept challenges, develop their own personal values and beliefs, and accept responsibility for their learning (Eyler and Giles, 1999). The interactions in community-based projects also develop communication and leadership skills. Students learn how to interact with each other and members of the community in a professional manner, how to engage and cooperate with peers, and how to manage their time effectively while working towards long term goals. Students also learn to apply the knowledge from the classroom to the world around them and to develop critical thinking skills (Markus et al., 1993). Finally, and perhaps most importantly, students come to feel they are a part of the community around them and develop a sense of civic responsibility (Stage, 2004; Eyler and Giles, 1999).

This paper describes a community-based, alternative teaching strategy that was implemented in the senior level undergraduate ecology course at University of Detroit Mercy. University of Detroit Mercy is a private four year college with an enrollment of 5,600 students. The student population is diverse, and consists of 30 percent minority and 60 percent female students.

At University of Detroit Mercy, ecology is an upper-level biology course that has prerequisites of two semesters of freshman biology, two semesters of inorganic chemistry and one semester of elementary functions. Most of the students in the course are biology majors, although there are usually a few biochemistry or chemistry majors. The 34 students in the ecology course were required to participate in a semester-long project commemorating the annual Earth Day celebration. The goal of the project was to engage students in an active, community-based learning experience that was student driven and emphasized cooperative learning techniques among students. The project comprised twenty percent of their final grade in the course.

Concern over environmental issues has become mainstream thought over the last few decades, and a part of the life experience of typical university students. As a result, students are familiar with many environmental issues and they bring a variety of prior knowledge to the classroom. Mercury contamination in fish, water resource use, and global warming have become part of our daily news cycle and popular consciousness. Civic programs and governmental regulations dealing with environmental problems have become part of our everyday lives. Curbside recycling programs and hazardous waste reclamation

mandates on automobile oil, batteries, and tires are examples. In addition, younger university students have been increasingly exposed to the idea of environmental stewardship throughout their public and private educations. Because of their everyday exposure to environmental issues, most students have a sense that our environment is at risk and that managing it is a continuing and ongoing job. A project-based learning experience dealing with environmental issues and remedial actions naturally resonates with them.

Earth Day presents an ideal opportunity to engage university students since it is an example of how university students helped to affect meaningful change in both the United States and the rest of the world. The first Earth Day celebration, held on April 22, 1970, was organized by Senator Gaylord Nelson of Wisconsin with the help of university students. It involved two million people in communities throughout the United States (Lewis, 1990) and it represented a watershed moment in US history when the environmental movement became part of mainstream politics. The impact of that first Earth Day on the environmental movement, and on the laws passed in the few years afterwards, was substantial. The creation of the United States Environmental Protection Agency, the passage of the Clean Air Act, Clean Water Act, and other legislation protecting the drinking water, oceans, and soils were direct results of Earth Day. By 1980, Earth Day was celebrated by 500 million people in 175 countries across the planet. Furthermore, the USA EPA estimates that currently over a billion people take part in Earth Day events annually (Jackson, 2011).

In summary, the increasing interest in environmental issues among young people, the unique potential that community-based education has for affecting students, and Earth Day's historical connection to university education all make Earth Day seem like the perfect alternative teaching opportunity.

METHODS

At the beginning of the semester students were given an introduction to the history of Earth Day that highlighted the seminal role university students played in the founding of Earth Day. They also learned about the substantial impact Earth Day had on both the environmental movement and the environmental legislation enacted in the early 1970's.

After reviewing the syllabus description, students were given an interest form that asked them to rank their preference for involvement in one of the following four activities: (a) organizing the Earth Day exposition for the entire campus, (b) conducting a research project and presenting it as a research poster at the Earth Day exposition, (c) developing

and implementing a physical project to make the campus a more "green" environment, and then presenting it at the exposition in poster format, and (d) organizing an informational booth for the exposition on an environmentally-oriented topic and providing attendees with an item related to the topic.

Students were assigned by the instructor to one of the four activities based on their preference rankings. Allowing the students a choice on their assignments was meant to give them a feeling of confidence and ownership over the assignment. It was thought that students with more laboratory experience might gravitate towards research projects for example, while tactile learners with less laboratory experience might chose to work on a greening project for the campus. Students were then grouped in teams of three or four, and one person from each team was elected as the team leader. The team leader served as the main liaison with the professor and ensured that the team was progressing in a timely manner to reach their final goals. There were two organizational teams, two greening teams, three research teams, and four informational teams.

The Earth Day exposition was held during the second to the last week of the semester. Students were informed of the event date on the first day of class. This time frame allowed students to commit to the date well in advance and gave them plenty of time to plan and complete their project.

Organization teams were responsible for the logistics involved in running the exposition and in community outreach. The organization teams worked together to create a list of logistic goals, which they divided between the teams. This component was designed to raise student and attendee awareness of the public and private organizations that address environmental problems, how these organizations approach the problems, and how they interact with each other and the community. The organizational teams contacted the local and state governments, environmental groups, and educational institutions and arranged for them to set up informational booths at the exposition. Members of this group also worked with the university marketing department to publicize the exposition and invited various local political figures in Detroit and the State of Michigan. In addition, organizational teams solicited donations from local businesses and the community, posted advertisements around campus, set up before and cleaned up after the exposition, and arranged for a campus fraternity to provide heavy labor. A deadline was set for initial ideas from the organizational teams, but student involvement evolved considerably as the semester progressed. The professor met with the organization teams bimonthly outside of class time.

Table 1. EARTH DAY ASSESSMENT. Student responses to the statements are listed as means with standard errors in parentheses. Students answered questions out of 10, with 1 as the lowest and 10 as the highest, n=34.

Question number	Survey statement	Student response
#	<i>Earth Day as an Educational Tool</i>	
1	I utilized leadership skills	8.0 (2.1)
2	This helped me learn and use effective time management	8.0 (2.0)
3	I learned more than a textbook had to offer	8.2 (2.0)
5	This helped me develop my abilities to correspond with professionals and/or develop my researching/investigational skills	8.0 (2.5)
6	Participating in this event INTELLECTUALLY intrigued and challenged me	8.1 (1.8)
7	I learned the importance of being environmentally AWARE	8.8 (1.2)
8	I learned the importance of being environmentally ACTIVE	8.9 (1.3)
9	I was pleased by the interaction members of OTHER departments	8.5 (1.8)
10	Interacting with members of OTHER departments aided in my learning	7.4 (2.2)
	<i>Earth Day: How it affected me personally</i>	
11	I made a difference	8.3 (1.6)
13	I will get involved more in the future	8.4 (2.0)
14	This event was fun	8.6 (2.9)
15	I liked working as a team with other members	7.8 (2.3)
16	I like how all of the teams worked together in our class as a whole to produce Earth Day	8.7 (1.7)
17	I felt part of our university community	8.4 (2.2)
18	This affected my outlook on the world (for the better)	8.6 (1.9)
20	This motivated me to change my current way of living	8.2 (1.9)
	<i>Earth Day as an Behavior-Affecting Tool</i>	
21	I was proud of how <u>I</u> made an impact	8.2 (2.1)
22	I was proud of how <u>my team</u> made an impact	8.4 (2.2)
23	I was proud of how <u>our class</u> made an impact	8.9 (1.7)
24	I felt satisfaction from the hard work I accomplished	8.4 (2.2)
25	I felt that the attendees were interested in Earth Day	8.2 (1.9)
26	There were more people there than I expected	8.9 (1.6)
27	I felt part of a community	8.4 (1.2)
	<i>Earth Day: The Future</i>	
29	To what extent did this help you learn the material of the course?	7.7 (2.4)
30	To what extent did you grow in your own sense of worth as a person engaged in making our society better?	7.5 (2.7)
31	I think that Dr Bee should keep this Earth Day assignment as part of the ecology course requirement	8.7 (1.8)

Open-ended question: What would you do differently next year?

Research teams conducted experiments related to various environmental issues and presented their findings as a research poster. This component was designed to raise student and attendee awareness of the role scientific research plays in our assessment of environmental problems and strategies for mitigation efforts. The students in the research teams were introduced to some of the methods used to assess and monitor environmental parameters and received guidance in conducting their analyses by a collaborating faculty member in the chemistry department. Examples of projects conducted by the research teams included the assessment of metal concentrations in local sediments and the levels of calcium and magnesium in Detroit city water. Deadline dates for research proposals, data collection, data analysis, and drafts of the final reports and posters were set on the third, sixth, eighth and tenth week of the semester respectively.

Greening teams worked on projects to improve the environmental profile of the campus. This component was designed to demonstrate practical examples of changes students and attendees could make that would have a positive effect on the environment. Students presented an informational poster on their project. Financial resources and the time frame of the project limited the scope of many projects. Examples of projects included planting and handing out tree seedlings and the design of a new campus flowerbed using perennial rather than annual species. Deadline dates for the selection of the project and the final poster were set early in the semester. Individual project completion goals were monitored by the instructor throughout the semester.

Informational teams constructed display booths each of which highlighted an environmental issue and distributed materials related to their topic to expo attendees. The goal of this component was to raise

student and attendee awareness of environmental concerns and their causes, mitigation efforts we employ, and technological developments related to environmental concerns. Presentation topics ranged from local applications like composting and recycling to planetary concerns like global warming. Examples of items distributed included pamphlets on global warming, posters delineating local watersheds, and cans of pop with information about recycling attached to them. Deadline dates were set for topics, materials to be distributed, rough drafts, and final posters on the third, sixth, eighth, and tenth week of the semester respectively. Progress on presentation development was monitored by the instructor throughout the semester.

The instructor reserved the campus facility for the exposition and notified other faculty of the event. All faculty and their students were invited to attend, and forms verifying student attendance were distributed at the organizational booth in case any faculty awarded credit for attendance. The exposition was held during university "free" time, which is a designated time when no classes are offered on campus, to ensure that all students had a chance to attend.

Students in the organizational, informational, research, and greening project teams were individually graded for the quality of their project or presentation, their knowledge of the topic as assessed by the instructor during their presentation, and their post-exposition reflection. Each of these counted as 30% of their project grade. In addition, all students filled out a confidential peer evaluation form for each member of their team, which provided insight into the efforts of each participant. The peer review counted as 10% of the grade for the project. The organizational teams were graded on the quality of the exposition itself (60%), their post-exposition reflection (30%), and peer review (10%). Students completed a survey (questions listed in Table 1) and post-survey reflection within one week after the event.

Collaboration with the chemistry department was critical to the success of the research teams. The chemistry department provided the instrumentation for the ecology research projects and instruction on its use, including a flame atomic absorption spectrophotometer that was obtained through a NSF-CCLI grant. Original research was carried out by students in the ecology course and presented at the exposition. In addition, students in the chemistry department's quantitative chemical analysis course also presented group posters reviewing chemical analyses used in environmental studies in the United States National Parks. Topics ranged from snowmobile exhaust pollution at Yellowstone National Park to airborne pesticide contamination on Isle Royale National Park.

RESULTS

Approximately 300 students attended the Earth Day exposition. In addition to the presentations by our ecology students, students from collaborating classes also set up booths. Examples include six booths from the analytical chemistry class and a booth on environmental ethics from a psychology course. Individuals from the community also participated with booths on global warming and political action. The Sierra Club, Detroit Science Center, Wayne County Water Management, Michigan Department of Environmental Quality, and two local watershed organizations participated in the exposition. The library exhibited copies of environmental resources and texts, and played the movie *Inconvenient Truth* in their booth. In all, approximately 40 booths were set up. Little Caesar's donated free pizza and soft drinks for the duration of the exposition, which was a tremendous draw for our students, and a local band called Silent Violet performed music with an environmental theme for free.

Feedback from our students was overwhelmingly positive (Table 1). The work involved in the project was in addition to the normal workload in the course. At the beginning of the semester, many students expressed feelings of being overworked in the course or worried over how the exposition would affect their grade in the course. However, after the exposition many expressed feelings of pride and satisfaction. Most students found their participation in the exposition highly rewarding.

Student reflections of the project showed similar themes. First, many students felt the exercise was an effective educational tool that helped them to understand and learn the material. Some of these comments include: "it gave me a chance to share some of my newfound knowledge with people in our college and community. By talking about the information over and over it really solidified it in my head" and "I learned so much more than just what a textbook had to offer." One student noted that "this experience taught me about networking and corresponding with professionals," and another claimed that "it was a great success for me intellectually."

A second theme identified throughout the student reflections was the sense of pride that students felt from this experience. Comments included: "I was proud to be part of this assignment", "...this was the most fun I've had out of a class assignment throughout my entire college career", "I feel satisfaction from all the hard work", "... our class had accomplished something great", "I'm so proud of our class", and "You could see the pride on people's faces as they either presented or strolled through the displays."

Third, the exercise changed the students' perspective on the impact they can have on

environmental issues. Comments in this vein included: "...this lead me to realize that just one student can make a difference", "... inspired me to be passionate about the environment." Further, "I will forever be conscious of my impact on the environment as well as my role in the solution" and "I believe we made an impact."

As with all experiences, there is always room for improvement. Student comments included "...have recycle bins next year for the trash," and "...include a battery recycling depot."

DISCUSSION

A major goal of any service learning experience, and of Earth Day itself, is to allow individuals to discover that they are part of a larger whole, that their futures are tied to everyone else, and that they are part of a community. In this regard our exposition far exceeded the expectations of both faculty and presenters. The students were pleasantly surprised with the number of attendees and felt part of a community. In addition, the students were pleased with their interactions with members from other departments, and with how all the teams worked together to produce the exposition. Perhaps the most telling point in this regard was how the students ranked their feeling of pride in the exposition. Although they clearly felt that one person can make a difference, and that they as individuals contributed to making a difference, their pride in the success of the exposition was overwhelmingly attributed to the entire class. As noted in the informal survey, pride in the performance of the entire class as a whole was followed next by pride in their team and lastly pride in their individual accomplishment.

A major advantage of alternative teaching and service learning strategies in particular is that they have real world relevance. Students are asked to create, to problem solve, and to act and think independently. This kind of experience has the potential to engage students and to make the course material meaningful to students in a way that didactic study cannot. It also has the potential to profoundly affect their world view, and their lives. Our Earth Day exposition achieved this result. The assessment results show that the students overwhelmingly felt that participation in this project taught them the importance of being environmentally aware and active. They also felt that the experience changed their outlook on the world for the better, and that they were more likely to become involved in environmental issues in the future. Lastly, they found the experience to be fun.

In addition, the students felt the Earth Day exposition was a successful learning experience and that participation in the project taught them more than they could learn from a textbook. Students strongly favored keeping the assignment as part of the class in the future. Why did they value this

experience so much? Our personal observations include that the students internalized the importance of being environmentally aware and active. More importantly, they learned to apply that knowledge, as demonstrated by the comments suggesting that future expositions include recycling containers. Furthermore the students realized that the information they learned in the classroom was relevant to the world in which they live. They felt that their efforts and abilities have a real and demonstrable impact on the world around them. We believe that the high level of energy at the exposition contributed to this internalization and that the students themselves felt changed by their experience. The students reported that they wanted to change the way they live and that they felt they could make a difference. They learned that they were part of a community. The experience left them with a more positive outlook on the world. One student commented that her favorite booth was the one where tree seedlings with planting instructions were handed to all attendees. "I beamed with pride as I walked through the room carrying my little pine tree. I went home and planted it that night, and one day when my kids ask me where it came from I'll let them know how I worked hard and really made a difference in the world on Earth Day." The faculty felt the same way about this project.

In conclusion, this assignment was a great success and it is highly recommended that other faculty incorporate this approach. In our experience, it fostered a sense of ownership and responsibility that allowed the students to internalize their knowledge, and that ultimately changed the way they viewed their coursework, their role in society, and themselves.

ACKNOWLEDGEMENTS

Support for instrumentation comes from NSF CCLI grant #0535943. We'd like to acknowledge the extraordinary efforts of Karrie Clark, donors to the exposition, and all of the students of the UDM ecology class (winter term 2007).

REFERENCES

- DRAPER, A. 2004. Integrated Project-Based Service-Learning into an Advanced Environmental Chemistry Course. *J. Chem. Educ.* 81(2): 221-224.
- EYLER, J. AND D. GILES. 1999. *Where's the learning in service learning?* San Francisco, CA: Jossey-Bass. 315 p.
- JACKSON, L. 2011. "About Earth Day Network". Accessed from www.earthday.org on 21 July 2011.
- KOLB, A. AND D. KOLB. 2005. Learning styles and learning spaces: Enhancing Experiential Learning in Higher Education. *Acad. Manag. Learn. Edu.* 4(2): 193-212.
- LEWIS, J. 1990. The spirit of the first Earth Day. *EPA Journal*: January/February 1990.
- MARKUS, G., HOWARD, J., AND D. KING. 1993. Integrating community service and classroom instruction enhances learning: Results from an experiment. *Educ. Eval. Pol. Anal.* 15: 410-419.
- STRAGE, A. 2004. Long term academic benefits of service-learning: when and where do they manifest themselves? *Coll. Stud. J.* 38: 257.
- WENZEL, T. 2002. Community-based Projects in Analytical Chemistry Courses. *Anal. Chem.* 74(9), 279A-280A.