

Incorporating Political, Social, and Legal Issues into an Environmental Engineering Course

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1. Introduction

Environmental Engineering is largely driven by the political and social forces that shape environmental legislation and that influence the feasibility of environmental projects. As such, it is essential that environmental engineering be taught in the context of these issues rather than as a purely technical subject with no social or political relevance. To achieve this without sacrificing too much in technical course content, educators are challenged to develop innovative ways to incorporate legal, social, and political topics into environmental engineering courses and curricula.

This paper describes various projects and assignments developed for an introductory environmental engineering course at the U.S. Coast Guard Academy designed to address these non-technical issues. The course was recently changed from a Water and Wastewater course to a broader introductory environmental engineering course. Although it is impossible to cover legal, political, and social topics in-depth in an introductory technical course, it is possible to raise student awareness of these issues. Graduates of the Coast Guard Academy will benefit from this broader perspective as citizens, engineers, and as Coast Guard Officers who, as environmental project managers, may be more involved in public relations and legal issues than in technical details.

2. Political Project

A. Project Overview

In the fall of 1996, students were asked to investigate the environmental records of President Clinton and Senator Dole and to write a position paper on which candidate would lead the country best on environmental issues. The day papers were due, the class participated in a discussion of their views. Some of the objectives of the assignment included familiarizing students with environmental politics as a force in shaping laws and policies, encouraging students to take an interest in the political process, and developing student skills in information acquisition and analysis, writing, and critical thinking.

The project was split into two phases; information acquisition and preparation of the report. To avoid significant duplication of information, students were divided into several information acquisition teams as listed below:

Information Acquisition Groups:

Environmental Groups/ Industry Groups
The Dole Platform: Presidential and other Campaigns
The Clinton Platform: Presidential and other Campaigns
Dole: Newspaper and Magazine Articles
Clinton: Newspaper and Magazine Articles
Internet Group
Dole Record in Office: All Political Offices Held
Clinton Record in Office: All Political Offices Held

These specific groups were determined in a class brainstorming session. There was some overlap of information collected, however, generally these acquisition teams were effective in gathering a complete file of information in all crucial areas. Library staff were instrumental in suggesting resources, teaching students how to search for the information, and in helping to develop the concept of using information acquisition teams.

Approximately one month before the papers were due, each team submitted their information with a summary of how they conducted their search. This enabled teams to get credit based on resourcefulness and effort level, because the amount of information collected did not always correspond to effort and skill. The information collected by each group was kept in a common area.

Originally, the papers were intended to be individual efforts, however, students were allowed to work in teams of two. If the team members opinions on the candidates differed at all they were required to write separate opinion sections.

On the day the papers were due, students engaged in a lively discussion about the candidates. This was supposed to be on election day, however, the deadline was postponed one week. Students earned bonus points on their final paper grade for participation in the discussion. The discussion demonstrated that most of the students did a great deal of research and analysis in writing their papers. The project was worth 10% of the final course grade. The project grade was 75% paper and 25% information acquisition plus bonus points from the discussion.

B. Student Feedback

As a part of the course evaluation process, students were asked some specific questions about the political project. Among the things students liked most about the project was getting out of textbooks and into the real world, learning about the candidates positions and records, participating in the discussion, researching in groups, and getting more involved in the elections. Included in the things students liked least about the project was doing the research and writing, not completing the project by election day, predetermined outcome, and the fact that the students didn't know enough about American government going into the project.

The most important things students learned as a result of the project included the growing role of environmental issues in politics, the candidates' records in office, politicians and the use of facts, what each candidate has done in the past and what their ideas are for the future regarding the environment, the vast amounts of research sources available, how third parties get their ideas out to the public and enacted through the major parties, the influence of journalists in elections, and the role of activist groups in the political process.

Suggestions for improving the project included finishing by election day, inviting guest speakers from each party to lead the discussion, having a mock debate, having larger groups, and reworking information acquisition groups so that there is less overlap in information gathered.

C. Observations and Recommendations

The papers were generally of high quality and demonstrated that most students were successful at analyzing the information to form a cogent argument about each candidate. The fact that most of

the class participated meaningfully to the discussion was further confirmation that the students had done thorough research and analysis.

There were a few areas where the student's work could have improved. In particular, many students failed to use proper referencing methods. They were particularly confused about how to critically examine and cite material taken off the internet. Some students failed to make use of all of the material gathered. Some papers lacked focus and were not well organized.

Based on instructor and student observations, some suggestions are offered for fine-tuning the project.

1. Rework data acquisition groups to avoid overlap.
2. Give some guidance on gathering sources and citing references (especially the internet information). Perhaps the project could begin with a visit to the library.
3. Get feedback and ideas from faculty in the Government major to insure that this assignment builds on the students' understanding of the political system.
4. Make the informal discussion into a more formal debate.
5. Invite guest speakers to represent various political views.

This particular project was tied to a presidential election, however, there are similar projects that could be assigned that are not related to an election. For example, students could research the political and legal issues surrounding a particular piece of environmental legislation that is being debated in Congress. The project could involve researching the history of the legislation, including the social, political, and technical issues involved. Another potential project is to have the students research and debate various issues in class. The students could also research a particular case study with an emphasis on examining how legal, social, and political forces affected the chain of events.

3. Town Meeting

A. Project Overview

For this assignment, students were presented with a hazardous waste site scenario and assigned roles to participate in a town meeting. Students were required to arrive at the meeting with typed research notes that would enable them to participate at the meeting in character. The major purpose of this assignment was to build student awareness of the diverse array of issues and people involved when there is an environmental crisis. Another objective was to have students gain a better understanding of the legal and technical issues involved when a potential hazardous waste site is identified. The town meeting was actually developed in the spring of 1996 as a part of a special topics course where only two weeks were devoted to environmental issues. The project was incorporated in Fall 1996 into the introductory environmental engineering course.

In brief, the scenario involved an elementary school playground built on a potential lead contaminated site. Several students exhibited symptoms of lead poisoning and tested high for lead in their blood. The mayor of the town called a public meeting where representatives from the school district and the state department of environmental protection (DEP) were asked to brief the town on the status of the situation. Other attendees were part of the audience and came to the meeting prepared to ask questions and raise concerns. The meeting started and ended with

live broadcasts from the TV reporter. The newspaper reporter wrote pre meeting and post meeting articles which were distributed to each meeting attendee.

The list of characters included:

Speakers: The Mayor
 The Superintendent of Schools
DEP: 2 Environmental Engineers
 2 Lawyers
 1 Toxicologist

Audience: Several concerned parents
Local residents living down gradient from the site
A local PhD student studying the fate of lead in soils
Two members of a pro-environment group
Two members of an anti-environmentalist group
A local T.V. reporter
A local newspaper reporter
The school nurse and the school principal

The mayor was responsible for conducting the meeting and keeping it moving so that everyone had a chance to participate. The mayor was also encouraged to confer with all speakers to find out what they planned to cover and how long their presentations would be. Students were encouraged to discuss the meeting and coordinate with each other where necessary, but it was made clear that each student was required to do independent research and to prepare their own notes.

Students were graded 50 % on their notes and 50% on their participation at the meeting. It was important to ensure that everyone had a chance to participate and that students with "small" roles were not penalized for talking less at the meeting.

B. Student Feedback

As for the political project, students were asked a few specific questions concerning the town meeting. What students liked most about the town meeting assignment was the entertainment value and the opportunity to play a role. Several students also commented that they also learned a lot about various perspectives and issues involved. The least popular aspects of the project included the note preparation, having roles that were not "meaty" enough, uneven participation among attendees, and lack of adequate research beforehand.

The most important things students learned included the CERCLA process, symptoms of lead poisoning, lead transport through soil, the personal concerns of town citizens, the role of lawyers and government agencies, how toxic waste affects many people, and the importance of preparation for the meeting.

Some suggestions for improvement included eliminating the notes, allowing more total time to let everyone speak, having everyone in costume, spending more time with the audience and less for the speakers, providing more guidance for concerned parents, and having students turn in research days earlier to ensure they are prepared.

C. Observations and Recommendations

The town meeting was effective in that students participated enthusiastically and were able to work together effectively at the meeting. Many students arrived in costume and added details to their characters that enhanced the value of the meeting. The reporters did an excellent job of covering the story. However, there were some shortcomings that require fine tuning of the assignment. The most significant problem was that some of the students did not do an adequate job researching the issue and either declined to participate or led the discussion in the wrong direction. For example, the environmental engineers dwelled on details of the Safe Drinking

Water Act rather than procedures under CERCLA. Some of the students never seemed to grasp the issues that their character should have addressed. A few students did little to no research and simply showed up at the meeting to complain loudly. As pointed out in the critiques, many students felt their parts were insignificant. The mayor did not always keep the meeting moving smoothly and occasionally let people ramble or go off on tangents. Another problem was too much overacting and not enough attention to the issues at hand. Finally, there were times when the group got a bit out of control.

Many of the problems with the town meeting project can be addressed by some minor adjustments. Some suggestions for improvement include:

1. Meet with each student briefly to discuss with them some ideas for their character. Each student could come to this meeting with an outline on what they plan to research and what issues are of concern to their character.
2. Have students hand in notes at least a week in advance so that the teacher can comment on whether they are on the right track.
3. Meet with the mayor to discuss some strategies for keeping the meeting on track.
4. Limit the amount of time for each speaker so that the audience has more time to participate. Brief the speakers on coordinating with each other and on keeping on topic.
5. Have students meet in logical groups to discuss strategy before the town meeting (eg. the DEP staff could meet, the concerned parents could get together, etc.). Each group could develop notes from their meeting for review or the instructor could be present at these meetings.
6. Be more specific in the assignment statement about the quality of the research expected with an emphasis on using and citing references.
7. Use real life case studies that cover a broader range of issues.

4. Other Assignments

A minor assignment used in past years that addresses legal, social, and political issues is an environmental journal. One half of the journal was devoted to writing about newspaper and magazine articles on any environmental topic. Rather than summarizing articles, students were encouraged to provide thoughtful, critical comments and to relate the articles to what they learned in class. This assignment exposed students to the breadth of the field and the many social, political, ethical, and legal issues involved. It also inspired them to read the newspaper on a regular basis. The other half of the journal consisted of informal writings on various topics assigned in class. This provided another opportunity to incorporate ethical, legal, social, and political topics. Journals were graded on the quality of the entries and on the number of articles that students commented on thoughtfully.

In another assignment, students designed their own environmental laws and regulations to address problems raised in various case studies. Among the cases posed were Love Canal, the 1853 Cholera outbreak in London, and a recent incident near the Coast Guard Academy where raw sewage was discharged into a river due to a toxic industrial input to the wastewater treatment plant. It was essential to assign this prior to discussing existing environmental legislation and students were directed to design their laws without doing research. The students came up with many interesting ideas, some that were similar to actual laws. As intended, it was apparent that the students completed the assignment with little knowledge of environmental legislation. An in-class discussion of the students' ideas was used to introduce major environmental legislation.

This assignment gave students an opportunity to be creative and to think about how laws might be used to address pollution problems.

5. Conclusions

Environmental engineering educators have come to realize the importance of fostering an awareness of legal, social, and political issues. H.G. Schwartz, Jr.¹ addressed this need in a keynote speech at the 6th Conference on Environmental Engineering Education: "It behooves universities to incorporate an appreciation of political science into their curriculum...We need to turn out engineers with high ethical standards, professionally motivated, and yet who understand and can operate within our political process. All too often, engineers develop and devise the "best" technical solutions in a vacuum; technical solutions that are totally rejected by society."

By developing innovative assignments, it is possible to incorporate legal, social, and political issues into basic environmental engineering courses without sacrificing technical content. Students at the Coast Guard Academy have exhibited a high level of enthusiasm, expertise, and creativity in completing assignments designed to emphasize non-technical topics. At the same time they sharpened their skills in writing, speaking, using information resources, and critical thinking. Hopefully, an enhanced awareness of non-technical issues will foster student interest in participating in the political process as environmental engineers, citizens, and members of the global community.

References

1. Schwartz, H.G. Jr. Environmental engineering education in the year 2000 - A random walk. *In: Proceedings of the Sixth Conference on Environmental Engineering Education*. Williamson, K.J. and M.R. Miller, Eds. August 18-20, 1991. Corvallis, Oregon.

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