

## Designing a First-year Seminar Course to Promote Significant Learning

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### Abstract

Faculty at The Citadel are working diligently to develop a new Freshman Seminar general education program. The fundamental purpose of new program is to improve students' abilities in inquiry and analysis, critical thinking, written communication, quantitative literacy, intercultural knowledge, and ethical reasoning. The overall theme of the seminar, as well as the topics of the individual seminar sections, are being determined by the faculty. In spring 2019, school of engineering will pilot a Freshman Seminar course titled "Environmental Hazards". Backward design is used to develop the course by articulating a clear set of learning goals, and then choosing the assessments, projects, and activities specifically to enable the students to achieve those goals.

### Keywords

Freshman Seminar, Backward Design

### Literature Review

Backward design is an instructional design model where an instructor identifies outcomes and then aligns them to instructional activities or assessments. While Ralph W. Tyler<sup>1</sup> developed model in 1949, the term "backward design" was presented in 1998 by Jay McTighe and Grant Wiggins<sup>2</sup> as a part of the Understanding by Design® framework (UbD). Considered the gold standard by many in instructional design, UbD focuses on learning outcomes first as opposed to traditional design, where learning activities are developed first, and then assessment. Standards or outcome-based design is another name for this approach most commonly found in assessment. Backward design or UbD typically involves the following three stages<sup>3,4,5</sup>: 1. Identify the desired results or outcomes; 2. Determine measurable assessments that align to outcomes; 3. Design activities that align to outcomes and assessments to promote learning.

Research supports the use of the UbD to enhance and strengthen not only student learning but also attitudes towards teaching<sup>5,6</sup>. Childre et al.<sup>7</sup> contends that employing the UbD model helps students gain a richer depth of knowledge.

### Institutional Context

The Citadel is developing a new general education program. Known as a high impact practice, the Freshman Seminar has been credibly shown to improve student retention and enhance student learning. The Freshman Seminar will serve as the common starting point for all entering freshman. The fundamental purpose of new general education program is to improve students' abilities in inquiry and analysis, critical thinking, written communication, quantitative literacy, intercultural knowledge, and ethical reasoning. The overall theme of the seminar, as well as the

topics of the individual seminar sections, will be determined by the faculty. The new plan calls for each section of the Freshman Seminar to be matched with a three-credit-hour composition class. The composition class is an essential complement to the academic seminar. The instructor of the composition class and the instructor of the seminar will develop together their reading lists and assignments. The intention here is to maximize each student's development in the written communication outcome by taking advantage of his or her interest in the seminar topic.

In spring 2019, school of engineering will pilot a freshman seminar course titled "Environmental Hazards". This paper discusses details about how the backward design process (Identify desired results; Determine Acceptable Evidence; Plan Learning Experiences) was used to design curriculum for the course.

### **Using Backward Design to Develop "Environmental Hazards" Freshman Seminar Course**

**Stage 1-** Identify Desired Results or Outcomes. First step of the backward design which focuses on transfer of learning was employed to develop learning goals and objectives. The following five learning outcomes were developed:

- Analyze own point-of-view critically about a position. Main focus of this learning outcome is the development of critical thinking and written communication.
- Propose solutions to a local, national, or global environmental hazard by incorporating the elements of the scientific method. Main focus of this learning outcome is the development of quantitative analysis, inquiry and analysis.
- Apply ethical reasoning in implementing a contaminant issue. Main focus of learning outcome is the development of ethical consideration.
- Recognize the social, economic, cultural, political aspects of the environmental hazards. This learning outcome focuses on the development of intercultural knowledge.
- Critically examine multiple perspectives about contaminant issue/problem faced by a local, national, or global community. Main focus of this learning outcome is development of critical thinking, inquiry and analysis.

**Stage 2 -** Determine the assessment evidence. After the desired results were identified, attention was shifted to development of acceptable evidence. Signature assignments such as site cleanup report, position paper, project proposal and reflective assignments were developed to assess the learning outcomes. The following paragraphs provide a short description of each signature assignment.

**Site Cleanup Report Assignment -** Purpose of this assignment is to assess the quantitative and inquiry analysis outcomes. Students are asked to identify some significant cleanup site within the region that has progressed to the point where active cleanup is taking place. They will prepare a two-page summary and five power point slides that they will present in class that summarize: site name, site location, responsible parties, regulatory agencies involved, chemicals spilled, extent of contamination, cleanup goals (concentrations and target time frames), cleanup

and containment; technologies involvement, how much has been cleaned up and how much time has elapsed during the cleanup, and any other features that make this an interesting site.

**Position Paper Assignment** - Purpose of this assignment is to assess critical thinking and written communication outcomes. Following is a description of the assignment: Cost of site characterization and corrective action at groundwater contaminated sites can be quite expensive. Gas station sites can cost \$200,000 to \$1,000,000 each and larger sites can easily cost in excess of \$20,000,000. Proponents argue that the cost of cleanup is irrelevant because the polluter damaged a valuable resource (groundwater) and they should be responsible for cleaning it up, no matter what the cost. They also argue that high clean-up costs are a good thing because they deter industry from polluting today as much as they did in the past. Others argue that this money could be put to better use to solve other problems in society, that the damaged “resource” is often not really used for drinking water supply, the process of cleanup generates more pollution than is cleaned-up, and point-of-use treatment of groundwater eliminates the need for aquifer clean-up. Write a paper in which you take a firm position on this topic (i.e., is clean-up always necessary?) Your paper should be about three pages long, and with one-inch margins. It should include facts from a few literature citations to back up key points of your position.

**Project Proposal assignment, Revitalization of a Brownfield site in City of Charleston-** A brownfield site is any real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant<sup>8</sup>. Purpose of this assignment is to assess Quantitative, Inquiry and Analysis, Ethical Consideration, and Critical Thinking. The following is a brief description of the assignment. Demand for prime real estate in Charleston has significantly increased the last few years. City officials are looking for solutions to solve the problem and have contacted you to prepare a proposal for a Brownfield site redevelopment study. Each team will prepare an engineering proposal on the Brownfield site redevelopment study to be submitted to city officials. The proposal should include the following: detailed scope of work; management plan; task descriptions; schedule of tasks; budget table; project benefits; economic benefits; analysis of data; tables, figures, drawings, exhibits; and cost of redevelopment. Each team will also present a summary of the project proposal in the form of a poster on the last day of semester.

**Reflective Assignment** - Purpose of this assignment is for the students to take an hour or two to stop, look back over the notes from class, and the assignments, and to deeply consider what experience they have gained throughout lessons. They will be asked to write a one page (single-spaced, 10-12 pt. font) self-reflection to summarize their thoughts about what they have gained and future considerations that they have realized (400 words).

**Course Enrichment Contribution Assignment** - Lastly, this assignment was developed requiring students to contribute supplementary materials to the course that they feel could improve the understanding of a topic or add to the knowledge learned in class.

**Stage 3** - Final step of backward design is to develop the learning plan and course instruction. Various active learning techniques will be employed to improve the student learning of key concepts. These include: pre-class reading responses on the course website; Facilitated

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discussions; Project; Case Study; Movies; Library investigation; Journaling; Discussion board; Role playing; Think-Pair-Share; Field trips; Guest speakers; Hands-on group activities; Formative assessments; poster presentation, and Games. Table 1 shows a tentative schedule of learning plan throughout semester.

Table 1 Learning plan tentative schedule

Week	Topic	In-class Activities
1	Introductions, Course Procedures and Logistics	Concept Map
2	Case Study- “A Civil Action” Background on Health Issues; Civil and Social issues, Exploring Interfaces between Science, Citizen Action, Public Health, and U.S. Legal System	A Civil Action (Movie), Facilitated discussion, Minute Paper
3	Case Study- “A Civil Action” Human Health Contaminant Hydrology-Familiarizing students with the basic geology of the study site and how TCE/ PCE move through subsurface.	Guest Speaker ( Nurse practitioner), Facilitated Discussion, Think-Pair-Share, Muddiest Point Paper
4	Case Study- “A Civil Action” Discussion of the conflicting approaches of the opposing experts. Learn why expert witnesses are treated differently by the courts. Learn why so many experts were involved in the Woburn toxic trial, Civil Procedures- Purpose for depositions, and why they are important to the trial process.	Field trip- Water Treatment Plant Facilitated discussion Student depositions Role playing
5	Case Study-“Flint Water Crisis”	Facilitated Discussion
6	Superfund and Brownfield sites in the region	Facilitated Discussion, Guest Speaker (EPA), Minute Paper
7	Case Study-Love Canal-An Environmental Disaster	Case Study, Facilitated Discussion
8	Case Study-Love Canal, The Forgotten Wastes of Love Canal	Case Study, Facilitated Discussion
9	Case Study- Erin Brockovich (Movie)	Facilitated Discussion
10	Teams work on project	Field trip-Project Site Visit
11	Teams work on project	Library Investigation
12	Teams work on project	Project, Formative assessments
13	Teams work on project	Project, Pictionary
14	Project is due	Poster presentation

## Conclusion

To help first-year students at The Citadel gain a richer depth of knowledge, a seminar course has been designed backward through a three-stage design process (Desired Results, Evidence, and Learning Plan). This has been accomplished by articulating a clear set of learning goals, by choosing the appropriate assessments, projects, and activities specifically designed to enable the students to achieve those goals.

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