The Making of Sustainability: A Case Study of an Undergraduate Technology Course Project

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Abstract

21st century engineers need skills not just to develop technologies but also to assess broad implications of those technologies. We present a faculty-librarian collaborative project designed to enable students to acquire both technical knowledge and information literacy skills to assess needs, research and evaluate emerging technologies, identify social, economic, and environmental issues, synthesize findings, and make sound decisions in a global economy.

Background

Academic inquiry requires critical thinking and is based on the ability to determine the information you need, locate, evaluate, synthesize, and utilize that information. This ability is known as information literacy. As new students arrive at college without such a skill set, equipping them with the ability to utilize diverse sources of information properly has become an important part of higher education and provides a basis for lifelong learning. This collaboration was designed for undergraduates in industrial technology to bridge the information literacy gap between high school and university and give the skills necessary for the future.

Course Learning Objectives

Industrial Technology 150: Industrial Power Systems

- Course learning outcomes were mapped to Industrial Technology Learning Goals:
  - Clearly specify research questions that cover various aspects of deployment in order to determine whether the implementation of such a technology would be successful.
  - Identify the capacity and limitations of common methods of energy production in terms of availability, efficiency, and sustainability.
  - Select the most suitable method for comparison and subject to multiple constraints, e.g., social implications, competencies of internal and external stakeholders, and financial resources.
  - Present final research outcomes that will include suitable limits, and critical information and conclusions.

Preliminary Findings

The pre-test result revealed that students’ information retrieval and evaluation skills ranged from adequate to poor. Students’ initial feedback on the library training session was positive, especially regarding the usefulness of citation management software. This finding is interesting, as most instructors only provide students the “how to find information” lecture. In evaluating the first assignment and presentation it was evident that the students did identify relevant and reliable resources, how to evaluate sources, search techniques and hints, etc.

Research Assignment Components

- Rationale for selecting a particular technology application and comparison with current technology for the same application.
- Clearly specified research questions that cover various aspects of deployment in order to determine whether the implementation of such a technology would be successful.
- Background Essay and Presentation
- Presentations and assignments were graded independently by the instructor and librarian and grades were discussed in the context of learning outcomes and perspectives.

Example Research Project and Information Needs

Deployment of Fuel-cell Based Electric Transit Buses in Argentina

Background information: A transit company in Buenos Aires is considering bringing fuel-cell electric transit busses to service. In order to evaluate the situation carefully, and identify potential benefits and problems, the following types of questions need to be asked:

- What is the initial cost? What is the operational cost? What is the total cost compared with the current solution (e.g., buses using gas)?
- What sort of infrastructure or utility is needed in order to operate the electrical bus? For example, where and how can the busses be fueled?
- Who can drive the electrical bus? Is special training needed?
- How about bus maintenance?
- Will the consumer benefit from such an action? Will the government partially sponsor the purchase or operation? Is there any impact toward the company’s revenue?
- Does the consumer care? Will a clean bus attract more riders, or will the driver come from a union?
- What is the carbon footprint of electrical busses?
- Which route should be used as a pilot?

Further Reading


Social Studies, 91, 121-125.

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