Online Active Learning Module for Engineering Research Methods

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Background

It is well known that early exposure in research with summer research, capstone projects, and senior design projects facilitates students' development as independent thinkers. Institutionally, undergraduate (UG) research activities have shown to increase the matriculation rates and graduate program application rates. Currently, the opportunities to learn about research methods and to conduct research are few, limited to such programs like National Science Foundation's Research Experiences for Undergraduates (REU) program, a small number of research grants (e.g. IDEA grants), and individual contacts to faculty members. Faculty members are hesitant to accept many novice researchers for summer research activities because of limited time and resources. Furthermore, when students are required to finish their senior design, Honors thesis, and graduate school application without proper education about teaching and research, it is too late. Here comes the need of online module of engineering research methods.

Components

The components of the online active learning module for engineering research methods have three components: (1) online lectures in introduction, ethics, conference presentation, research planning, literature review, journal paper, and teaching methods, (2) active learning module (self-assessment quizzes, assignments), and (3) assessment tools for further improvement and implementation. Online lecture material was created using civil engineering examples. The material was then delivered using UConn's Lightboard, and uploaded to Mediasite. Self-assessment quizzes and weekly assignments in engineering disciplines were developed on HuskyCT.

Assessment

The learning videos were implemented for a small group of undergraduate students under my supervision in CE4999 Senior Design, CE3610 Honors Conversion, CE4999 Independent Study, and individual research assistants. The survey was conducted anonymously.

Broader Impact

The developed online learning module will help a wide range of students from high school students to PhD students due to its flexibility of modular implementation. The module can be used for a flipped version of a full semester course, a short-term professional training program for any undergraduate summer research, REU students for pre-training, high school students for early college experience, entry level graduate students, and anyone who is in need of refreshing. In addition, project assessment/evaluation data can be used to improve the course itself, and for research on teaching and learning, and to be further analyzed and developed for conference presentation and journal publication for engineering education research.

Lightboard Videos: Structures and features

Sponsor

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