

Assessment Grants

Application Form for 2008-2009

The name of the project: **A web-based automated student learning assessment tool**

Total dollar amount requested from Assessment Grant funds: \$5,600

If the department intends to provide matching funds, please include the total dollar amount of matching funds. Otherwise leave this blank: _____

Primary contact:

Name: Ilteris Demirkiran
Email: demir4a4@erau.edu
Phone: 386-226-6988

The goal(s) of the project:

This project seeks to obtain objective assessment data for an engineering course in a timely fashion through a web-based assessment tool. The proposed online assessment has great potential in improving assessment efficiency, helping instructors align instruction with specific learning outcomes and identify students with difficulty as early as possible.

Project abstract:

Web-based assessment has many unique advantages such as convenient administration, automated data collection and analysis, timely feedback, and easy update. In this project, we develop such an online assessment tool through Blackboard's question pool function.

The question bank will be designed for EE 335 (Electrical Engineering I), an engineering course with large class size and multiple sections in which effective assessment is often a challenging task. Questions specifically targeted to each learning objective will be used in Blackboard to assess student learning multiple times throughout the semester. Assessment data will be collected to assist instructors to improve instruction and help students with low performance.

The project will be implemented for Fall 2008 and Spring 2009, and results and findings will be reported internally and in an assessment conference paper. The web-based assessment tool will be updated on a regular basis (at least once a semester) for better assessment qualities. In addition, the new practice can be adapted for use in other engineering courses upon completion of the project.

Objective:

It is well known that an assessment challenge facing most academic institutions is how to establish cost-effective procedures that provide necessary assessment outcomes without excessive academic staff efforts. Quality measures in education are always difficult to quantify because they depend on various parameters and factors. In addition, assessment becomes increasingly problematical for large classes, because it demands excessive instructor resources. Computer-based online assessment has great potential to provide viable solutions to the aforementioned problem. In this project, we will develop a web-based tool used for summative assessment. The investigators believe that web-based assessment will help faculty members manage workloads in spite of rising class sizes and that student learning will be objectively assessed in terms of targeted learning outcomes.

Participants:

Iteris Demirkiran, Ph.D.
Department of Electrical and Systems Engineering
Phone: 386-226-6988
Email: demir4a4@erau.edu

Thomas Yang, Ph.D.
Department of Electrical and Systems Engineering
Phone: 386-226-7098
Email: yang482@erau.edu

Jianhua Liu, Ph.D.
Department of Electrical and Systems Engineering
Phone: 386-226-7713
Email: liu620@erau.edu

Description:

Previous studies through student surveys, interviews, focus-group discussions and informal conversations showed that students consider online assessment tools easy to use and may provide valuable and timely feedback about their understanding and skills. In this project, a web-based assessment tool will be developed to improve the assessment of Electrical Engineering I (EE 335).

Aerospace Engineering, Civil Engineering, Mechanical Engineering and Engineering Physics students are required to take EE 335. Over the past decade, the number of students taking Electrical Engineering I has been steadily increasing and particularly so as new degrees such as Mechanical Engineering and Civil Engineering were introduced. Consequently there has been a significant challenge for quality assessment of student learning. To assist the instructors in providing feedback and obtaining assessment data in a timely fashion, a novel web-based assessment tool developed in this project will be introduced to students taking EE 335.

To assess students in terms of specific learning outcomes, a large database of questions covering EE 335 course material will be constructed. Two types of questions will be developed. The first type is designed to test knowledge of basic circuit concepts. For example, after the Thevenin and Norton equivalent theorems are presented in class, student will be asked the relationship between Thevenin voltage and Norton current. To accommodate a large number of educational outcomes and conveniently generate assessment data, this type of questions will be multiple choices. The second type of questions will be designed as analysis questions. They test students' ability to analyze various circuits using concepts expressed in specific learning outcomes. For example, for educational outcome "Perform circuit analysis with nodal voltage and mesh current methods", student may be asked to determine some unknown voltages or currents in a given network using these methods. To facilitate automatic grading and data collection, this type of questions will only require the students to fill the final result in a blank.

The assessment tool will be implemented in Blackboard. Thus, it is very convenient for students to access the question bank in their own time and pace from any location. The questions will be used to form take-home assignments and resulting assessment data will be automatically collected and reported through Blackboard.

Once a section or a chapter is presented in class, students are required to finish the relevant assignments online within certain time period. Also, the students will be assessed at the end of the semester with a comprehensive set of questions. Based on students' performance, total mark for each student is obtained, and detailed statistics is displayed to instructors on a question-by-question basis.

The obtained assessment data can help instructors identify students with difficulties and topics that most students fail to grasp. These data serves as the basis for improvement of instruction in the current and subsequent semesters. Also, these data indicates the level of difficulty and appropriateness for all questions, based on which the database can be updated periodically for better assessment quality.

Timeline:

Task #	Task Description	Period
1	Determine question topics according to EE 335 learning objectives	July 1, 2008 to July 31, 2008
2	Design questions and solutions	August 1, 2008 to August 31, 2008
3	Upload the first set of questions and conduct initial assessment; first quarterly report	September 1, 2008 to September 30, 2008
4	Upload the remainder of the questions and continue with web-based assessment; second quarterly report	October 1, 2008 to December 31, 2008
5	Improve the question pool and address student learning difficulties based on assessment data	January 1, 2008 to June 30, 2009

	collected; third quarterly report	
6	Prepare final report, internal presentation and conference paper	July 1, 2009 to August 15, 2009

Assessment Plan:

The proposed project has the following advantages:

1. The web-based assessment tool will generate objective assessment data automatically in a timely fashion, thus saving significant amount of assessment efforts and improving the assessment efficiency compared to traditional methods;
2. Based on collected assessment data, instructors are able to identify students with difficulties in learning and intervene at an early stage;
3. Based on collected assessment data, instructors can easily identify educational outcomes in which most students are not able to achieve. This is extremely helpful in enhancing the classroom instruction and addressing potential problems early in the semester.
4. The assessment data generated will provide valuable feedback concerning the quality, level of difficulty and appropriateness of assessment questions. Consequently, the assessment tool can be dynamically updated and improved during the implementation of the project.

The questions designed for use in the web-based assessment will be strictly targeted to specific learning objectives of EE 335, as specified in the course syllabus. Therefore, this project directly contributes to the achievement of overall student learning outcomes and program outcomes.

To determine the success of this project, students' performance in assignments, quizzes and exams in fall 2008 and spring 2009 will be compared with previous semesters in which no web-based assessment is administered. The indicators of success include the overall average performance, the number of students with low performance and how they have improved during the semester. In addition, student survey will be conducted to obtain subjective evaluation data regarding the effectiveness of online assessment.

The assessment instrument utilized in this project is Blackboard's question pool function. This function is particularly convenient for grading students' online work and generating student performance statistics.

All three participants will be instructor of EE 335 for Fall 2008 and Spring 2009. Question bank will be developed collaboratively and administered to multiple EE 335 sections. Each instructor will then collect assessment data from his own section. Finally, collectively assessment data will be reported, with the help of a student assistant, in the project report and possible conference publication.

As mentioned before, the developed web-based assessment question bank is a dynamic process. The question pool will be updated periodically (at least once a semester) based

on feedbacks derived from collected assessment data. Moreover, the frequency of online assessment administration may also be adjusted occasionally.

Adoption of the new assessment practice will be attempted for other engineering courses upon completion of this project. Lessons learned from the initial implementation of online assessment will certainly help other programs in designing their own assessment tools. In this sense, our project serves as a pilot study and contributes to continuous program improvement.