

The Overall Framework of a National Science Foundation-Sponsored Scholarship Program for Enhancing Undergraduate Engineering Education at Utah State University

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Abstract

As technology increasingly impacts the nation's economy and security, high demands have been set for engineering schools to graduate an ever greater number of quality students optimally educated to meet business and industry needs. However, recent statistics compiled by the American Society for Engineering Education reveals that engineering graduation and retention rates at U.S. universities are not keeping up with the nation's increasing demands for engineering talent. In 2000, less than 5% of all undergraduate degrees were awarded to engineers. Engineering bachelor's degrees have grown only 1% since 2005.

This presentation describes the overall framework of a project that has been recently funded by the Scholarships in Science, Technology, Engineering, and Mathematics Program (S-STEM) of the National Science Foundation. The goal of the project is to provide S-STEM scholarship support for academically-talented, financially-needy engineering students, and to train these students to become effective scientific and technological contributors when entering the engineering workforce. The first cohort of S-STEM students has been recruited from two departments at Utah State University: Mechanical and Aerospace Engineering (MAE) and Civil and Environment Engineering (CEE).

This presentation describes the project objectives, multi-disciplinary collaboration to promote undergraduate engineering education, and major educational activities that have been particularly designed for this project. Particular emphasis of this presentation is given to the description of a problem-based learning approach that has been implemented in the curriculum since the start of the project. In problem-based learning, students work in teams and learn about an engineering subject in the context of multifaceted and realistic problems. This presentation provides representative examples of how problem-based learning has been implemented in two engineering courses: a sophomore-level Engineering Dynamics course and a junior-level Environmental Management course.