

Stakeholder Summary

Study examines experiential learning approaches to teaching engineering design

A new study by the Higher Education Quality Council of Ontario (HEQCO) examines the potential impact of experiential learning strategies, like simulation and prototyping, on teaching design to first-year engineering students. Specifically, the study examines the impact of these strategies on self-efficacy, which is a belief in one's ability to achieve a certain level of attainment and can lead to improved student performance. The study found that experiential learning can promote an increase in self-efficacy, in particular with simulation projects.

Project Description

The study examines students in McMaster University's first-year design and graphics course, which is required for all engineering students. Lab groups were randomly assigned one of three experiential learning modes: simulation, where they produce and verify a design using a simulation tool; prototyping, where they use a 3D printer to create a working plastic model of their design; or simulation and prototyping, where both tools are combined to complete a design.

A survey was sent to all 800 students in the course and 170 valid responses were received. Project groups were surveyed before and after the completion of the design project and individual, group and total grades were collected for the individual project as well as the course.

Findings

Self-efficacy improved throughout the term for all three project modes, but students in the simulation groups had higher group performance scores and better total project grades than those involving prototyping. Prototyping of some form, either on its own or combined with simulation, did appear to improve students' ability to visualize their designs compared to students who did not have access to these learning modes.

Authors of *Closing the Design Loop in First-year Engineering: Modelling and Simulation for Iterative Design* are Thomas E. Doyle, Jon-Michael J. Booth, David M. Musson.