A Flipped Classroom Model for Teaching Engineering Design

Abstract: Newly created instructional resources support teaching first-year engineering design using a flipped classroom model. Students watch videos and complete a short quiz before coming to class. During class time, students work collaboratively on in-class exercises that require them to analyze and evaluate design situations or problems. Then, design teams tackle their own unique semester-long design project.

Three assessment methods have examined the impact of using a flipped classroom model. Two assessment methods were summative in nature and showed little difference between the flipped and lecture models. The third assessment method was formative and relied on evaluating teams’ technical memos, documents that were created as students applied steps in the design process to their project. When assessing some technical memos, we saw statistically significant differences between the lecture and the flipped models. We hypothesize that using a flipped model of instruction in engineering design may have a significant impact when students are expected to master and apply complex ideas and methods.

Biography: Ann Saterbak is Professor of the Practice in Biomedical Engineering and Director of the First-Year Engineering Program. Since joining Duke in June 2017, she launched the new Engineering Design and Communication course. In this course, first-year students work in teams to solve community-based, client-driven problems and build physical prototypes. Prior to Duke, she taught a similar course at Rice University, where she was on the faculty since 1999. Saterbak is the lead author of the textbook, Bioengineering Fundamentals. At Rice, Saterbak’s outstanding teaching was recognized through four university-wide teaching awards. In 2013, Saterbak received the ASEE Biomedical Engineering Division Theo C. Pilkington Outstanding Educator Award. For her contribution to education within biomedical engineering, she was elected Fellow in the Biomedical Engineering Society and the American Society of Engineering Education.