

A methodology for improving active learning engineering courses with a large number of students and teachers through feedback gathering and iterative refinement

Cita: Estevez, I., Alario, C., Perez, M., Pardo, A., Crespo, R., Leony, D., ... Delgado, C. (2015). A methodology for improving active learning engineering courses with a large number of students and teachers through feedback gathering and iterative refinement. *International Journal of Technology and Design Education*, 25(3), pp. 387-408. <https://doi.org/10.1007/s10798-014-9288-6>

Abstract

In the last decade, engineering education has evolved in many ways to meet society demands. Universities offer more flexible curricula and put a lot of effort on the acquisition of professional engineering skills by the students. In many universities, the courses in the first years of different engineering degrees share program and objectives, having a large number of students and teachers. These common courses are expected to provide the students with meaningful learning experiences, which could be achieved by using active learning. The use of active learning in engineering courses improves traditional teaching by promoting students' participation and engagement, although active learning courses can be very sensitive to differences in learning paces or team conflicts; this being a challenge for the widespread adoption of active learning in courses with many students and teachers. This paper proposes a methodology that facilitates the detection and reaction to problems in active learning engineering courses with many students and teachers. This methodology is based on gathering feedback (from students and teachers) and decision-making processes at selected milestones. The methodology integrates intra-edition mechanisms in order to detect problems and react as the courses are being taught, and inter-edition mechanisms to ensure the persistence of necessary changes in the courses design. The methodology has been successfully applied during four consecutive editions to improve an undergraduate active learning programming course with an average of 257 students and 9 teachers per edition. An extended validation of expert educators suggests that this methodology can also be applied to traditional engineering courses.