

## **A Student Centered Learning Environment in Engineering Education: Design and a Longitudinal Study of Impact**

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**Abstract :** This article considers the design of a student-centered learning environment in engineering education. The learning environment integrates a number of components, including project-based learning, collaborative learning, two-stage assignments, active learning lectures, and a flipped-classroom. Together these elements place the individual learner and their learning at the center of the environment by focusing on understanding, enhancing relevance, applying learning, obtaining rich feedback, making choices, and taking responsibility. The evolution of this environment from 2014 to the present day is outlined. The impact of this environment on learners and their learning is evaluated via student questionnaires that consist of both open and closed-ended questions. The closed questions indicate that students found the learning environment to be really interesting and enjoyable (rated as 4.7 on a 5 point scale) and encouraged students to adopt a deep approach towards studying the course materials (rated as 4.0 on a 5 point scale). A content analysis of the open-ended questions provides evidence that the project, active learning lectures, and flipped classroom all contribute to the success of this environment. Furthermore, this analysis indicates that the two-stage assessment process, in which feedback is provided between a draft and final assignment, is the key component and the dominant theme. A limitation of the study is the small class size (less than 20 learners per year), but, to some degree, this is compensated for by the longitudinal nature of the study.

**Keywords :** deep approaches, formative assessment, project-based learning, student-centered learning

**Conference Title :** ICAHE 2021 : International Conference on Advances in Higher Education

**Conference Location :** Athens, Greece

**Conference Dates :** April 08-09, 2021