

Abstract ScAIEM 2023

Proposed for track S3T2: Pedagogical perspectives in Innovation, Engineering and Management.

Title

Use of gamification techniques in digital learning platforms – effects on students' active participation, level of learning and exam results

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Abstract

Is students' engagement a critical factor for deep-level learning in higher education? Most research on the topic affirms this question with a clear "yes" (e.g. Biggs, 2003). Student attendance, active participation, and engagement are clearly found to be correlated with student success such as deep-level learning and academic progression. Nevertheless, lecturers globally are experiencing a concerning decline in classroom attendance rates, and more worryingly, a decrease in the number of vocal and engaged students in lecture halls. The decline in physical attendance can be linked to various factors, amongst these a post-covid effect, technology advancements and the availability of digital tools that reduce the necessity for in-person presence. Considering these factors, there is a need for changes in learning facilitation to rekindle student involvement and, promote deep-level learning, in both innovation, engineering and management programs.

So how can university teachers facilitate student engagement, by utilising functionality of available digital tools? To address this question in our study, we apply innovative gamification techniques (Sanchez, Langer and Kaur 2020), within our digital learning platform (DLP) to innovate pedagogical methods. Respondents in this study are from diverse group of 160 undergraduate university students in Norway.

Our DLP, developed by CANVAS, designed within a gamification framework, contains modules developed to foster student activity at both individual and collaborative group levels. Modules have been designed to offer a varied learning experience, with video material with explanations of the basic theories and elaborations of difficult theory. More importantly, students are given learning paths with specific tasks, discussion questions and self-tests where they can test their basic understanding of concepts, to then 'move to the next level' within a gamification learning framework. and facilitate students' learning process. These gamification elements trigger psychological processes that can positively impact motivation. Within each module, students must engage in critical reflection and practice explaining subjects in their own words. This involves both individual written answers to questions, and oral discussions within colloquium groups. This promotes deep learning, according to Bloom's taxonomy (Bloom et al., 1956).

Hattie (2015) suggests measuring student progress throughout the semester, preferably with tests and various tasks that provide insights into students' learning progress. In the modules, students evaluate their own understanding through self-assessment tests, and both students and instructors can track their progression. These tests are subsequently integrated into the lectures as repetition. Depending on test results, we adapt our teaching approach by revisiting and elaborating on specific concepts as needed.

Our key findings indicate initial resistance to the digital modules as they require consistent work in order to open the next module and presentations. However, findings from the final course evaluations report a shift with positive student involvement, a more consistent study approach, and reduced stress during exam preparation. Over a span of three years, course statistics show that failure rates decreased from 20% to 6%, and the average grade climbed from 'C' to 'B'.

We propose that positive results extend beyond academic performance improvements, as they provide deep-level learning which equips students with the essential skills and knowledge needed for a successful transition into the workforce.

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