

Abstract: Challenges in mathematics

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Challenges in mathematics have been recognized as a central cause for dropouts among undergraduate engineering students. Most often, the challenge lies in understanding the basic concepts, which is often difficult to discover in a timely manner when teaching large university classes. To address this, we developed and implemented an alternative way of organising problem sessions in mathematics that involved the use of a student response system (SRS).

The students responded to a set of multiple-choice questions before the session using SRS, and the teacher then used the responses to detect gaps of understanding among the students. In the session, the teacher gave immediate dialogical feedback, and then the understanding of the students was further tested by employing conceptual follow-up questions in small discussion groups also by using SRS. Finally, the conceptual questions were addressed by immediate dialogical feedback from the teacher. The questioning method and the immediate dialogical feedback is hypothesized to promote cognitive processing in three ways: a) before answering questions, the students may be more attentive to the material, b) during the process of answering questions, students may work harder to organize and integrate the material, and c) after receiving feedback, students may develop metacognitive skills for gauging how well they have understood the material. The results indicate that the method used leads to an improved understanding of the basic concepts, and that the students clearly favour immediate dialogical feedback over delayed written feedback. This finding is in line with the theory of generative learning.