Adaptive Tutorials to Support Learning

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This study aims to compare the benefits of students who make use of adaptive tutorials in their revision regime, compared with students who do not. Adaptive Tutorials were created using Smart Sparrow's Adaptive eLearning Platform, which is a flexible authoring tool enabling educators to create adaptive and engaging online tutorials, including instant feedback and customised instructional content, while maintaining educator's pedagogical ownership (Ben-Naim et al, 2010). Tutorials were created with the aim of providing students an opportunity for guided practice, relating to content covered in lectures. They were based on a number of Cognitive Load Theory principles, particularly split attention, redundancy and worked example effects (Sweller, Ayres, & Kalyuga, 2011).

We hypothesize that adaptive tutorials created within a framework of Cognitive Load Theory as a supplementary learning resource, provides students with guided practice which may lead to improved confidence and learning outcomes (Kirschner, Sweller & Clark, 2006). A real world study was conducted as part of a third year mathematics course at UNIVERSITY OF NSW, Australia. We chose a quasi-experimental research design, to provide educators with practical suggestions based on real world data.

Third year mechanical engineering mathematics students were invited to take part in the study. Participants voluntarily elected to use, or ignore the adaptive tutorial. This created two groups; those who completed the tutorial and those who did not use the tutorial. Groups were further subdivided into three categories based on academic ability. On completion of the tutorial, participants who had used the tutorial were required to complete an online survey regarding their perceptions and learning experiences. Likert scale type questions and open-ended questions were asked, where qualitative data was collected. In addition, quantitative data was collected from the relevant question in the end of semester examination, comparing performance of both groups.

A Mann-Whitney U test revealed a significant difference in examination marks (U=9500, p<.001) between students who made use of the tutorial (Median=17, IQR=8) and those that did not (Median=11, IQR=14). Furthermore, although all students benefited from the inclusion of adaptive tutorials in their revision regime, mid to lower ability students benefitted the most (p<.001).

Results suggest that when adaptive tutorials are created within a Cognitive Load Theory framework, including guided instruction, students overwhelmingly indicated improved subject confidence and understanding. This was backed up by the high tutorial completion rate as well as the end of semester examination results. Moreover, well designed, adaptive tutorials provide opportunities for learning and revision that particularly support mid to low ability students. Future research could focus on why some students elected not to use the tutorials, as well as comparing participants' confidence levels with learning outcomes. In addition, other learning domains could be investigated.