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A dynamic and multimodal approach

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Bridging the gap between actual and required mathematics background at undergraduate university level: a dynamic and multimodal approach

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Abstract

Over the last years, an increased number of students are taking time out from study after completing high school – often referred to as a"gap year". This fact along with wider participation in higher education and changes in the specification of qualifications for high school students have made traditional assumptions about the knowledge of entrants to university courses obsolete. According to our experience at the Media Technology Department (Medialogy) in Aalborg University, one area in which this seems to be particularly true is mathematics. Related research has proved that this conclusion is valid for many other technical and non-technical studies.

The major problem facing many undergraduates is a lack of basic skills in number and algebra, which severely hinders the exposition and development of mathematical ideas. However, these mathematical ideas are very important for basic technical courses of Medialogy, e.g. computer graphics programming. Moreover, this poor performance in mathematics is one of the main causes for dropout at university level.

This paper presents our ongoing research aiming at tackling with this problem by developing dynamic and multimodal media for mathematics teaching and learning which will make mathematics more attractive and easier to understand to undergraduate students. These tools realise an interactive educational method by giving mathematics learners opportunities to develop visualization skills, explore mathematical concepts, and obtain solutions to self-selected problems. They are also multimodal by supporting different modes of interaction.

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The proposed media will be used for two consecutive years during the"Mathematics for Multimedia Application" course and combined with Problem Based Learning, which is already applied as a teaching method at Aalborg University. The impact of its use will be evaluated by analysing video transcriptions of lectures, student performance, interviews and evaluation questionnaires. For our evaluation we adopt a multisemiotic approach in an attempt to define a broader concept of learning. We believe that the multimodality and interactivity of our method can engage students with different learning styles and therefore enable them to assimilate the mathematics knowledge required despite their academic deficiencies.

Keywords: Mathematics; Teaching and Learning; Multimodal; Dynamic; Problem Based Learning