Teaching mathematics to non-mathematicians: the case of media technology undergraduate students

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Over the past years, a number of engineering programs have arisen that transcend the division between technical, scientific and art-related disciplines. Media Technology at Aalborg University, Denmark is such an engineering program. In relation to mathematics education, this new development has changed the way mathematics is applied in practice and is taught in these disciplines. This paper discusses a doctoral dissertation that investigated and assessed interventions to increase student motivation and engagement in mathematics among Media Technology students. The results of this dissertation have been used to assess and improve practice in Media Technology and they may inspire interventions in other trans-disciplinary engineering programs.

Keywords: Mathematics education, non-mathematicians, media technology.

Introduction

This poster presents the main contributions of a doctoral dissertation, which aimed at investigating mathematics teaching and learning for Media Technology students (Triantafyllou, 2016). Media Technology at Aalborg University is a program that focuses on research and development, which combines technology and arts and looks at the technology behind areas such as advanced computer graphics, games, electronic music, animations, interactive art and entertainment, to name a few. This dissertation investigated and assessed interventions to increase student motivation and engagement in mathematics among Media Technology students. These interventions focused on two directions: a) teaching methods and b) ICT-based learning environments. As far as teaching methods are concerned, this project has applied the flipped instruction model (or the flipped classroom). Regarding ICT-based learning environments, a game engine (Unity) has been introduced as a domain for mathematical learning. Since many studies have indicated that the attitude towards mathematics influence the achievement of learning goals, Media Technology students’ attitudes towards mathematics were also investigated.

This dissertation employed several mixed method studies. Observations and a survey study were employed for gathering information on student attitudes towards mathematics, student approaches on mathematical problem solving and student competences (Triantafyllou, Misfeldt, & Timcenko, 2016). In regard to research on ICT-based learning environments, a use case study was conducted exploring development of student mathematical knowledge and effect on student motivation, when mathematics is being taught by programming in a game engine (Triantafyllou, Misfeldt, & Timcenko, in press). As far as the flipped classroom approach is concerned, two use case studies and a statistics course redesign and assessment took place (Triantafyllou & Timcenko, 2014; Triantafyllou & Timcenko, 2015; Triantafyllou, Timcenko, & Busk Kofoed, 2015).
This dissertation has provided insights in student attitudes towards mathematics in Media Technology. It was found that these students often lack mathematics confidence and they consider mathematics a difficult subject that they do not like but value. The adoption of the flipped classroom instructional model revealed that students perceive learning with online resources on their own pace as contributing to their understanding and they reported that they could adjust the learning process to their own needs. This dissertation has also proposed the use of a model of reflection for designing activities that promote experience-based learning in flipped classrooms. As far as ICT-based learning environments are concerned, the study on the use of a game engine for mathematics learning provided insights on how students apply knowledge from a mathematical model to implement a physical model. This study shed light on students’ misconceptions and difficulties but also on their opportunities to challenge their understanding. This dissertation contributed to the discussion of the theoretical foundation of the flipped classroom and discussed aspects of ICT-based mathematics learning for Media Technology. These results can be furthermore used to assess and improve practice in Media Technology and other trans-disciplinary engineering programs.

References


