Identifying the reasons behind students' engagement patterns

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This study focuses on identifying the reasons behind students' specific engagement patterns in a large first year mathematics course in UCD. Maths for Business is a unique course in that students have a choice of whether to engage with the course material through lectures, videos or a combination of both. Cluster analysis of the engagement data (lecture attendance and video usage) has identified four distinct clusters of engagement. For explanations of resource use, surveys were distributed to the Maths for Business 2015/16 class (of approximately 550 students of mixed ability). 166 survey responses were received. Qualitative analysis is currently being performed on the survey responses in order to explain engagement patterns.

Keywords: Engagement patterns, Blended mathematics education, College mathematics

Introduction/Literature Review

Previous studies of courses with both live face-to-face lectures and online lectures/videos (Inglis, Palipana, Trenholm, & Ward, 2011) have identified clusters of students based on their resource engagement. They found that students who attended face-to-face lectures or the maths support centre achieved higher grades than students who predominantly used online lectures. Inglis et al. (2011, p. 490) furthermore discuss how "what remains poorly understood is the overall pattern of study choices made when students are presented with many options", and comments on how valuable research into examining student choices would be. Other studies have made suggestions as to why students might opt for a particular engagement pattern including: performance in course to date, proficiency of IT; convenience; and personality type (Bassili, 2006). Bassili found that both promotion and prevention factors influence students' engagement decisions. This study seeks to expand on the literature by explaining reasons behind students' choices. Subsequently, the research questions for this study are:

- Which resources do students engage with when studying the course content?

- Why do students choose to engage with these resources?

Method

This study took place in University College Dublin (UCD). Data was collected from a large first year undergraduate module, Maths for Business. A primary aim of this course is to introduce students to mathematical techniques and concepts, mainly in Calculus, that can be used in business, and emphasis is placed on mastery of mathematical techniques. This is not a traditional, blended or e-learning course, rather it is a course in which students have a choice of whether to complete the course material through lectures, online videos or a combination of both. The e-learning segment of the course consists of 68 short videos with average length of 7.6 minutes. The lecturer has chosen to offer online support for students in response to: the large class size; the diverse mathematical background of the student cohort; acknowledging differences in approaches to learning; and additional support needed by 'weaker' students. For our study, we combine quantitative and

qualitative survey data to identify engagement clusters based on resource usage, and explain the reasons behind students' engagement clusters. To develop a complete understanding of students' engagement, the data for this study broadly covers three areas: survey response data, background information of students, and engagement data. Students' data was linked together from each of the sections. The first stage was cluster analysis. Rather than cluster students under total videos and lectures, we decided to cluster students based on what resources they engaged with for the lecture material they covered. We developed three variables to describe this; lecture usage, video usage and overlap of resources. Cluster analysis was performed on these three variables using model-based clustering. Qualitative data analysis is currently being performed under the Braun and Clarke (2006) framework.

Initial Results

Cluster analysis has identified four distinct clusters: high lecture usage cluster; high video usage cluster; a cluster with high lecture, high video usage and high overlap between resources; and a cluster which features both lecture usage and video usage but with little overlap. Initial qualitative analysis has suggested the high lecture usage cluster is formed by students who perceive videos as a secondary tool; they find the lecture content has more depth, and enjoy the interactive lecture environment. In comparison, the high video usage cluster is formed by students who have issues with the lecture environment, and find little if any benefit from lectures. Videos offer these students an efficient and flexible method to study. The third cluster, with high overlap, has occurred owing to weak students accessing all available resources. The final cluster with little overlap of resources is formed by students who have switched from lectures to videos during the semester or are avoiding a specific lecture every week owing to the inconvenience of the timetable. The poster will expand on the initial qualitative analysis of the survey responses by explaining in detail the reasons behind each engagement cluster.

The use of online videos in Maths for Business enables 'stronger' students to progress at a fast, flexible pace while supporting the 'weaker' students through providing access to multiple resources. In this course students are expected to master mathematical techniques, and whether the use of videos in this manner would translate well to other disciplines, or indeed advanced mathematics courses is an open question. As one student remarked: "[online learning] works very well for maths however I don't know if it would work well for other modules".

References

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