Behavioral Analysis of Math Students' Engagement

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As science and technology become increasingly complex and ubiquitous in our everyday lives, Science, Technology, Engineering and Mathematics (STEM) education plays an evermore important role in the overall development of society. Thus, given that research suggests a positive impact of active learning techniques in students' learning performance and engagement [1, 2], it is crucial to adapt these strategies to STEM classes, particularly in an engineering school such as Instituto Superior Técnico[1].

Even so, the engagement construct itself is hard to measure, because of its wide psychological definition, comprehending both extrinsic (attitudes) and intrinsic (motivational and cognitive) backgrounds [3]. Fortunately, we can use observation protocols such as Classroom Observation Protocol for Undergraduate STEM (COPUS) [4], in order to obtain a behavior profile of a class during a given period, and can also use observation to estimate the behavioral engagement of a class through students' attitudes.

Keeping this in mind, we started by profiling several Linear Algebra and Differential and Integral Calculus in-presence classes using the COPUS protocol, with the hope of verifying that the observed classes were interactive and promoted active learning techniques. As demonstrated through our data analysis, statistics and graphs, this was the case. After behavior-profiling such classes, we also constructed several regression models relating the occurrence of in-class behaviors with the students' engagement during different class periods. Our models indicated that students' initial individual thinking and later participation in group activities had a positive influence in the engagement of the class, as well as the later application of active strategies by the instructors, such as moving through class and giving support. Given this, we suggest that deploying a Math class that allows for initial individual thinking and that later promotes interactive support and tutor's guidance, can help to increase students' engagement levels, and ultimately aid students' inclusion and support discussion from different points of view.

References

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