

Understanding the factors contributing to persistence among undergraduate engineering students in online courses

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ABSTRACT: This poster will report on the research design and methodology planned for a recently funded National Science Foundation-sponsored project focused on advancing knowledge about the factors that influence the decisions of undergraduate engineering student to complete (rather than drop out of) online courses. Through the application of both social science and learner analytics-based research methods, the research will explore how students' perceptions about the characteristics of their online undergraduate engineering courses and engagement with their course learning management system (LMS) influence their persistence. To support these studies, we draw on the undergraduate engineering student population at a large, public university in the southwestern United States that has been an early adopter of comprehensive online undergraduate engineering education. The findings from this work will be both important and timely, as the field of engineering education shows signs of embracing the online presence critical to increasing access and participation in engineering.

Keywords: Persistence, Online learning, Learner analytics, Structural equation modeling

1 PROJECT OVERVIEW

Ensuring widespread access to education is both a national imperative and a call to action for the engineering education community (National Research Council, 2007). Online education is simultaneously disrupting and transforming the educational landscape, demonstrating potential to address the issues of access (Allen et al., 2016). In contrast to many other fields, until quite recently, engineering education has been slow to adopt or research the online pathway. However, there are now some indications the field is in transition to a greater online presence, with ABET now accrediting several online undergraduate degree programs (ABET, Inc., 2018) and an increasing number of other undergraduate engineering programs offering online courses as well. The work proposed here will take advantage of the early adoption of online engineering education at a large, public university in the southwestern United States to study and report critical information to the online and engineering education communities on factors that influence its efficacy.

2 RESEARCH DESIGN AND METHODOLOGY

This project has the overarching goal of advancing understanding of the factors influencing course-level persistence among the population of online undergraduate engineering students. The choice of course-level persistence as a measure of educational efficacy is in line with much of the literature related to online learning (e.g., Xu & Jaggars, 2013) and has clear links to more traditional persistence-related measures such as degree completion. A Model of Online Course-level Persistence in Engineering (MOCPE), which is grounded in online and undergraduate engineering

student persistence and which combines findings and ideas from theories of student motivation (Keller, 1987; Wigfield & Eccles, 2000), will be developed and empirically evaluated.

The project will be comprised of three studies. The Diary Study will use a within-person diary method (Bolger & Laurenceau, 2013) to investigate how online undergraduate engineering students' perceptions of their course affect: (i) their beliefs about their chances of success in the course, (ii) their perceptions of the value of the course, (iii) their level of engagement with the online course learning management system (LMS), and (iv) their decision to complete the course. Students will be recruited from 7.5 week-long online engineering courses and surveyed bi-weekly until they complete or drop out of the course. The LMS Interaction Study will then apply the learner analytics-based technique of associative classification (Sun et al., 2006) to historical data from online undergraduate engineering courses in order to generate "rules of engagement" that describe LMS-interaction behaviors associated with course-level persistence. These rules will be combined with measures of students' perceptions and beliefs to develop a complete model of course-level persistence in the Persistence Modeling Study. This model will be tested using longitudinal structural equation modeling with data from a sample of current online engineering students to determine whether the complete model predicts student persistence better than LMS data or student attribute data alone.

3 IMPLICATIONS FOR ONLINE AND ENGINEERING EDUCATION

While this study is not without limitations (such as the possibility to influence course completion and drop-out rates), knowledge will be generated about whether and how online course characteristics related to the LMS, instructor practices, and peer support influence students' persistence decisions. Additionally, the development and evaluation of the MOCPE will yield evidence to support a proposed theoretical framework upon which future research and educational practice can build.

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