Work in Progress - Role of Faculty in Promoting Lifelong Learning

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***Abstract* - Students' development of self-directed and lifelong learning capacities is vital for their success in today's engineering environment. Instructors play a critical role in influencing outcomes related to self-directed learning (SDL) through their design of courses that support students' transitions from controlled to autonomous learning behaviors. Yet there is a critical lack of research examining how instructor choices promote self-directed (and eventually lifelong) learning development in undergraduate engineering students. In this work in progress, we introduce a project that explores how instructor choices affect a range of student outcomes related to their development as self-directed and lifelong learners. Drawing on existing research that suggests strong correlations between student autonomy support and outcomes related to SDL, we plan to examine the ways in which engineering instructors assist students in becoming self-directed learners, the role of instructors' autonomy support on students' behavioral, motivational, affective responses, and the effect of autonomy on students' perceptions of learning.**

Index Terms – lifelong learning, self-directed learning, student autonomy, autonomy support

INTRODUCTION

Calls for educational reform emphasize the need for student-centered learning approaches that foster a capacity for lifelong learning [1]-[2]. Engineering educators recognize that students' development of such capacity is vital for their success in today's engineering environment, and that instructors play a critical role in influencing outcomes related to self-directed learning (SDL) through their design of courses that support students' transitions from controlled to autonomous learning behaviors. Yet there is a critical lack of research examining how instructor choices promote self-directed learning development in undergraduate engineering students. The current emphasis in the engineering education community is on *assessing* students' lifelong learning capacity by measuring outcomes associated with SDL, rather than on *understanding* the complex relationship between instructor practices and SDL outcomes.

Limited existing studies show no significant gains in undergraduate engineering students' capacity for SDL via traditional instruction [3]-[4]. However, some literature suggests that non-traditional instructional approaches such as problem-based learning are more effective at developing self-directed learners [5]. There is little empirical data on factors that promote SDL amongst engineering undergraduates. Here, we introduce a project that seeks to fill this research gap.

WHAT IS LIFELONG LEARNING?

Growth as a lifelong learner requires the development of capacities consistent with those of self-directed learners. For example, self-directed learners are characterized as curious, motivated, reflective, analytical, persistent, flexible, and independent [6]. They possess skills in self-regulation and are "metacognitively, motivationally, and behaviorally active participants in their own learning" [7]. Educational research has shown that the building of these SDL aptitudes involves a complex interplay among nearly every aspect of human development, and that cognitions, motivations, behaviors, emotions, and the social and physical context all contribute to SDL growth. Instructor support of students' SDL development relies on an understanding and balancing of these factors in the classroom.

EDUCATIONAL GOALS

This study will explore how instructor choices affect a range of student outcomes related to their development as self-directed and lifelong learners. Specifically, our work will examine how variations in the support of student autonomy in undergraduate engineering courses affect students' sense of control and responsibility, and influence their development as self-directed learners. The project's primary objectives are to: (a) characterize engineering learning environments with respect to the ways instructors support student autonomy, (b) complete a mixed-method assessment to determine the relationships between various autonomy-supportive learning environments and outcomes related to lifelong learning, and (c) report the results of this work to the technical community to begin to develop a deeper understanding of factors that promote lifelong learning.

RESEARCH METHODOLOGY

Drawing on existing research that suggests strong correlations between student autonomy support and outcomes related to SDL, we plan to examine the following research questions: In what ways do engineering instructors

assist students to become self-directed learners? Are there instructor practices and behaviors that lead to greater student involvement in and ownership of their own learning? What are students' behavioral and affective responses to different ways autonomy is supported in undergraduate engineering settings? What effect does a sense of autonomy have on students' perceptions of their own learning? Participants in this study are engineering faculty and students at a diverse group of primarily undergraduate institutions, including large public and private universities, a small liberal arts university, and a small engineering college. Education faculty with expertise in motivation and assessment will coordinate the mixed-method evaluation plan.

This study will examine a variety of undergraduate engineering courses, ranging from more traditional courses to project- and problem-based courses. Each course environment will be characterized according to a framework developed by Stefanou et al. [8]. This characterization uses instructor course information, videotaped classroom observations of instructor-student interactions, student responses to the Learning Climate Questionnaire [9], and instructor responses to the Epistemic Beliefs Inventory [10]. Focus groups and student dialogue from the videotaped class sessions will be used to gauge students' perceptions of the degree to which the learning environment supported their autonomy. This approach should provide for rich, contextualized descriptions of what instructors and learners do, how instructors and students relate to each other, and how students view their classrooms.

Students' capacity for SDL will be measured at the start and end of the term using the Motivated Strategies for Learning Questionnaire (MSLQ) [11]. This instrument targets a variety of relevant outcomes, including (a) cognitive factors, such as goal-setting, selection of learning strategies, metacognitive awareness, and self-reflection; (b) motivational factors, such as self-efficacy for learning, intrinsic goal orientation, and task interest; (c) behavioral factors, such as time management, instructor- and peer-interactions, and adaptive help-seeking. The MSLQ provides the opportunity to correlate differences in outcomes with specific instructor practices and classroom environments.

EXPECTED OUTCOMES

Our aim is that this study will provide new knowledge that enables faculty to be better designers of autonomy-supportive course materials, classroom environments, and engineering curricula that promote students' development as lifelong learners.

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