Research Brief
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The Role of Doggedness in the Completion of an Undergraduate Degree in Engineering

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Research in engineering education over the past 15 years has shown that the interest in pursuing undergraduate degrees in engineering has declined among graduating high school students. A large portion of this engineering education research focuses on factors used to predict the likelihood that a student will successfully complete an undergraduate degree in engineering. However, there is lack of research and discussion pertaining to the significance of personal motivation that can be described as "doggedness" relative to successful completion of graduation requirements.

Implications of Findings

A small but identifiable group of dogged engineering students was found in the structured interview segment of the study. Doggedness is a characteristic that develops and increases with time. The need to complete a task that has been started becomes more urgent the longer a student sticks with the program. Further, with regard to satisfaction, students identified as dogged exhibited varying levels of enjoyment and satisfaction. Students that primarily enjoyed experiences associated with pursuing their engineering degrees were more intent on working in the engineering industry. A dogged student may or may not enjoy his/her studies, but innately feels it is their responsibility to proceed with the academic program they started.

Since the most dogged students persevere without a high level of satisfaction they are perhaps the most likely to make non-engineering post-baccalaureate career choices even if they are able to complete the undergraduate degree.

Continued effort needs to be made to promote graduate education among engineering degree recipients. To increase the number of engineering students entering graduate school, undergraduate program coordinators need to address some of the aspects of the program that students dislike.

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Method and Background

This study takes a longitudinal, multi-method approach to investigate the engineering experiences of undergraduate engineering students at four US universities. This study is based on a subset of data from a larger study initiated in 2004. A total of 60 engineering students participated in structured interviews in the first three years of the study; data from a subset of this sample were used to assess levels of commitment, persistence,

satisfaction, and ultimately doggedness, among respondents. A “within case” analysis was used to provide a snapshot of characteristics that demonstrate doggedness in the sample. The validity of the study’s findings rests in the analysis of multiple structured interview questions, both open-ended and closed-ended, over the course of three years that assess levels of commitment, persistence, and enjoyment.

Additionally, as structured interview data was examined, evidence for doggedness was revealed by student responses in two primary areas: level of commitment and persistence. This data was supplemented by responses to interview questions used to measure level of enjoyment and satisfaction. Enjoyment and satisfaction were used as secondary measures for doggedness to assess whether or not they are important factors and to determine the range of responses for persisters.

What We Found

Overall, student commitment to studying engineering grew stronger over time. In Year 1, 45% of first-year students (from the full sample of 60) stated that they were "very committed" to completing their major in engineering. In Year 2, this number increased to 81.6%, and in Year 3 increased again to 86.7%. Correspondingly, the number of students that indicated they were "somewhat committed" decreased with time.

Students from this sample who indicated that they were both "very committed" and "persistent" were considered strong candidates that exhibited the characteristics of doggedness and were included in a subset for further study. Students identified in this group represent a range of engineering disciplines.

Students displaying intense levels of persistence prompted further examination of their level of satisfaction with their academic programs. During the structured interview, students were asked "Are there any aspects of engineering that you particularly like?" and "Are there any aspects of engineering that you particularly dislike?" Several students that indicated that they disliked the level of difficulty of their courses, recanted their statements by adding that they “liked engineering.” In a sense, the level of stated difficulty can be equated with the value students place on obtaining their degrees.

Interviews with second and third year engineering students illustrate this intense level of student persistence and can be summed up in the following categories: unyielding persister (engineering is what they are supposed to do), intense goal setter (continue for the sake of completing what they have already started), and economic rationalizer (fear the financial ramifications of switching majors to their parents, benefactors, or themselves).

Doggedness is defined as being very committed to pursuing a major in engineering, displaying a strong sense of determination, and showing varying levels of enjoyment and satisfaction with the academic program. While the number of dogged students was small, their total numbers grew in each sequential year of the study. This follows the pattern of growing persistence that increases with time. The longer students are in school, the more they show characteristics of doggedness. However, the number of students that started out as dogged in their first year and who remained dogged through their third year of study, decreased.

It was initially posited that a dogged student would be one that was very committed to completing the major in engineering. However, the function that enjoyment, interest, and satisfaction play in determining the level of doggedness among engineering students is mixed. The survey found that enjoyment and satisfaction rated high among both students who were determined to be dogged and students who were not.

Where high achieving engineering majors decide to use their skills is of vital importance to the engineering community. Dogged students that enjoyed their educational experience and that planned to go to graduate school totaled 35.7 percent. Conversely, students that placed greater emphasis on areas of dissatisfaction and are more likely to join the workforce totaled 60.7 percent. The remaining students were either undecided or planned to take time away from engineering altogether.

Doggedness is not limited to application in engineering and related technical fields only. It is a characteristic that may prove useful across other fields, especially as it relates to promoting academic and professional persistence.