

A Preliminary Analysis of Correlates of Engineering Persistence: Results from a Longitudinal Study

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A knowledge of the differences between persisters and nonpersisters may aid in the design of engineering curricula as well as strategies for academic advising. In the preliminary stage of analysis, as reported in this paper, the differences between persisters and non-persisters in engineering are apparent in the freshmen and sophomore years. In general, non-persisters are more likely to be motivated to study engineering by external (family) influences, are less confident in their math and science skills, and less likely to be engaged in their studies than persisters.

Refinement and Administration of the PIE Survey

During the six administrations of the Persistence in Engineering (PIE) survey, the constructs (research variables) have been continuously refined. The items (survey questions) that make up the constructs have been fairly stable, however, the groupings of items under constructs have been refined based on the outcomes of qualitative and statistical analysis of the responses. (See complete list of constructs in the paper at the link below.)

The longitudinal PIE survey has been administered to a cohort of 160 students, 40 at each of the four CAEE APS campuses, beginning during their first year of college. Six surveys have been administered since fall 2003, approximately once per semester (or every other quarter). The seventh and final administration is scheduled for spring 2007, the participant's senior year. The raw survey data required processing before analysis could be begin.

The PIE survey will serve as the basis of a more refined national survey, the Academic Pathways for People Learning Engineering Survey (APPLES) that will be administered to a stratified sample of students representing the undergraduate engineering student population of the United States.

Persisters report a higher degree of satisfaction with their overall academic experience.

Preliminary Analysis Outcomes

As of December 2006, there was complete longitudinal data for 141 participants in this study, of whom 107 are majoring in engineering (34 have decided to major in a non-engineering subject). Students who are continuing to major in engineering are referred to as persisters; those who have left engineering are nonpersisters.

A preliminary analysis was performed to look for disproportionate representation by gender or school. The persistence rate, or percentage of persisters among the total is 76% for the whole group. It should be noted that PIE survey respondents have a much higher rate of persistence in engineering than the national average of approximately 60%, presumably due to the self-selection of the survey participants. The persistence rate of women is 80% and that of men is 73%.

Preliminary results for persisters and nonpersisters include the following:

Persisters

- demonstrate higher levels of agreement with statements that relate to both academic persistence and professional persistence
- rate the importance of interpersonal and professional skills higher than nonpersisters
- report a higher degree of satisfaction with their overall academic experience

Nonpersisters

- are equally likely, relative to persisters, to be motivated by financial reasons
- are equally likely, relative to persisters, to be motivated by a perception of engineering as being socially beneficial
- report a higher degree of family influence in the decision to study engineering than for persisters; there is also a statistically significant difference in responses in the first year
- are less likely to attribute their motivation to study engineering to an academic mentor
- report lower levels of confidence in their math and science skills
- show slightly lower involvement in team-based problem-based learning
- show higher levels of academic disengagement in liberal arts courses, in engineering-related courses, and overall
- report a higher degree of satisfaction with academic facilities and services

Both Groups

- report family influence dropped sharply after the first year
- show similar perception of the importance of math and science skills
- indicate similar confidence in their interpersonal and professional skills
- report similar levels of familiarity with the engineering profession until the second semester of their junior year
- show similar frequency of interaction and satisfaction with instructors

For a full description of the preliminary results, including statistical information and figures, please follow the link to the full-text document below.

A comprehensive set of analyses will be performed after the final administration of the survey. These will include additional statistical analyses that will isolate the effects of time and differences between persisters and nonpersisters; explore the representation of the different subgroups (gender, schools) within the persisters and nonpersisters; investigate the differences in these constructs between genders, ethnicities, and schools; and explore the potential early identification of nonpersisters.

Throughout the next phase of analysis, PIE Survey findings will also be interpreted against and compared with those from the literature, other national survey instruments, and the APPLES instrument.

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