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### **Persistence, Engagement, and Migration in Engineering Programs**

Our study started by exploring the context of persistence in engineering education. Earlier studies had already explored the persistence of engineering students both quantitatively and qualitatively, but we felt that those earlier explorations were not set in the context of other disciplines in higher education. To understand this context, we compared persistence (and eventually engagement as a hypothesized precursor to persistence) across various discipline groups in higher education.

Our central research question was "How do the persistence, engagement, and migration of students who matriculate in engineering compare to those of students enrolled in other academic majors?" We felt this was important to understanding the sphere of influence of engineering faculty and administrators—if a large portion of attrition is common to all disciplines in higher education, then the solution to that portion of the attrition most likely requires a solution that must be considered at the institutional level.

Our work relies significantly on Astin's IEO model of Inputs, Environment, and Outcomes in college, and our data was three-fold. Analysis of whole-population institutional data in the Multiple-Institution Database for Investigating Engineering Longitudinal Development (MIDFIELD) established persistence on a large quantitative scale. Studies of data from the National Survey of Student Engagement explored the engagement of engineering and other students on a similarly large scale. To connect these two concepts, we turned to data from the Persistence in Engineering survey of the Center for the Advancement of Engineering Education's Academic Pathways Study. With such large sample size, much of our analysis was exploratory and graphical (see the reflective essay for more details).

Our findings show that, in the aggregate, engineering is similar to other disciplines in a surprising number of ways: persistence in major; persistence by gender and ethnicity; racial/ethnic distribution; grade distribution; and engagement outcomes including course challenge, faculty interaction, satisfaction with institution, and overall satisfaction. Engineering differs from other majors most notably by a dearth of female students and a low rate of migration into the major. The most fascinating finding was the similarity of the stories told by a large longitudinal database of student records and a large-scale survey of student engagement.

The most significant variability was by institution—a reminder that institutional vision, mission,

policy, and how that policy is implemented have an important connection to the student experience. We also believe there is still considerable opportunity to explore the relationship between engagement and persistence.

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