

## Research Brief

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# An Engineering Degree Does Not (Necessarily) an Engineer Make: Career Decision Making Among Undergraduate Engineering Majors

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This paper explores the career-related decision making of seniors enrolled in undergraduate engineering programs at two nationally recognized institutions. This strand of the Academic Pathways Study (APS) research revealed that many engineering students were undecided about their career plans, even late into their senior years and that many were deciding not to pursue engineering careers.

### Implications of Findings

Findings from this study suggest both good news and bad news. The bad news, from the perspective of infusing the engineering profession with a talented, qualified applicant pool, is that an engineering major does not necessarily an engineer make. Many students are planning careers outside of engineering, feeling that the technical and problem solving skills they acquire in their engineering major equips them for success in a broad range of professions.

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The good news is that students' decision making is malleable. Precisely because students are open to a range of alternatives, engineering as a career can be marketed to engineering students. In fact, research in career decision making suggests that some students can be persuaded into a career based on how the career is described. More substantially, providing students with exposure to a range of engineering activities and jobs could attract them to engineering careers. Encouraging students to pursue careers in engineering would require deliberate planning and programming on the part of engineering departments, possibly working in collaboration with campus career centers. At the same time, knowing the powerful influence of internship experiences on students' decision making, engineering departments might become more deliberate in structuring opportunities to meet a range of student interests.

In addition, the findings indicate that students' decision making about their post-graduate plans often takes place without the knowledge or influence of engineering faculty, who could conceivably provide valuable insights and guidance. Structuring such guidance into existing programs could ensure that qualified, talented graduates of engineering programs will use their skills and abilities in the service of engineering-related careers.

### Methods and Background

Data in this paper come from undergraduates enrolled at two universities that were part of the APS portion of CAEE. There was an important programmatic difference between these two institutions: one offers a broad range of alternatives to engineering, while the other is primarily focused on technical majors and does not offer as much variety.

Students were recruited for the study who indicated engineering as their intended major when entering each institution as freshmen. A total of 80 students were recruited in the 2003-2004 academic year (40 from each campus). Students completed surveys and interviews each year for four years, until spring 2007. Data presented in this paper are from two sources. The first is quantitative, gathered from the Persistence in Engineering (PIE) Survey. The second source is qualitative, based on extensive student interviews. In both sets of data, the definition of “professional persistence” in engineering is based on students’ articulated intention whether to persist in engineering. The PIE survey data were gathered during the spring of 2007 from 74 senior engineering majors. The second source of data is ethnographic interviews. A subset of 28 students across the two institutions participated in lengthy (one- to three-hour) semi-structured interviews each year, beginning in their first year. For a complete description of the methodology, please see the full paper at the link below.

### **What We Found**

When seniors were asked on the PIE survey about their intention to pursue an engineering career, distinct institutional differences across the two schools emerged. At the campus focused primarily on technical majors, 80% of students reported that they were *Definitely* or *Probably* going to pursue engineering for at least three years after graduation, compared to 54% at the campus offering more options. At the technical campus, 14% of respondents were *Definitely Not* or *Probably Not* going to pursue engineering, while the figure was 36% at the other campus. These differences are statistically significant. Looking at the data from both schools, 66% of all students were *Definitely* or *Probably* going to pursue a job in engineering. On the other hand, 26% reported they will *Definitely Not* or *Probably Not* choose engineering, and 8% were *Unsure*.

In addition, the students entering the workforce were not considering their initial career choice as a lifetime commitment. Instead, they were thinking about their “first job” or maybe their “first career.” Many students expect to have diverse professional experiences. Participants saw their engineering education as a good start, and they valued the problem solving skills they acquired in their major. But they believed that their skills would also be valued by future employers, regardless of the profession in which those skills might be applied.

Another salient finding of the research is that during the span of students’ tenure as undergraduates, they reported that their thoughts about career options were often strongly swayed by a single experience, such as an internship, interaction with faculty or even staff, or advice from a mentor. Students are also swayed by family and other outside forces but only rarely did we hear students describe specific, deliberate assistance in their decision making by the engineering department. Institutional support for decision making came almost exclusively from career centers or campus Web sites. Thus, students were not expressly guided towards jobs and careers by those with STEM backgrounds and expertise.

This study provides unique insights into career decision making among senior undergraduate engineering majors. The data have significant implications for undergraduate engineering program policy and practice.

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