FuturePaths

Early Data Analysis

The Futurepaths study follows a group of undergraduate engineering majors through their years of college. Our ultimate goal is to better understand the experience of going to college at the beginning of the 21st century. We began the project in 2004, by asking incoming freshman engineering majors at four different institutions a wide range of questions about their family backgrounds, confidence in beginning school, political views and other topics.

- We surveyed this group once a year, which allows us to develop a broad picture of the diversity of subjects studied and passions developed, while tracking the changes in interests and interpretations of members of this cohort as they progress through their degree programs.

- In addition to this longitudinal component, we are interested in tracking the *differences* between students' experiences in four engineering programs: MIT, Smith College, Olin College of Engineering and University of Massachusetts, Amherst.

- Though we are particularly interested in the experiences of students who in their first year intended to major in engineering or decide to major in engineering after they arrive at school, we follow students regardless of the subjects they ultimately study.

The tables below summarize some of what we have learned so far about this group of students.

Basic Demographic Information

Variable	MIT	Olin	Smith College	UMass
% female	40%	43%	100%	18%
% White	60%	83%	70%	82%
% born outside USA	12%	8%	25%	8%
Mean SAT, math	758	756	677	648
Mean SAT, verbal	716	734	641	600
Mother's mean education	B.A. plus	B.A. plus	B.A. plus	High school, plus
Father's mean education	B.A. plus	B.A. plus	B.A. plus	High school, plus
% with engineers in their immediate family	29%	39%	9%	12%
% who participated in Science Fairs in HS	35%	28%	33%	25%
% who thought engineering program quality was very important in college selection	88%	74%	62%	85%

Representations of Diversity in Engineering Programs

Our demographic data show notable differences in the representation of women and non-White students at the four institutions.

- A great deal of care and resources went into the recruitment of women into the engineering programs at MIT and Olin, and the education of women is an explicit part of Smith's mission. UMass, however, is quite typical of public institutions which have limited resources for the promotion of diversity.

- Similarly, the representation of non-White and foreign-born students is highest at MIT and Smith. The engineering program at Smith College is particularly committed to the recruitment of "nontraditional students"—a commitment that appears to be paying off.

Educational Background of Students

The educational backgrounds of students from the four institutions are comparable, with some important variations.

- The average math and verbal SAT scores of students at MIT and Olin are much higher than the other institutions. Though there may seem to be an obvious connection between standardized test scores and performance in engineering, this study hopes to examine if such a trend really does exist.

- The parents of UMass students have less formal education than parents of MIT, Olin and Smith students.

- Students enrolled at MIT and Olin are more likely to have an engineer in their immediate family than are those from Smith and UMass. As this study progresses, we will be in a position to measure the relative impact of these variations among students and across institutions.

- At our four sites, about a third of the students enrolled in engineering programs as of their first year reported that they had participated in science fairs in high school. Again, it is our goal to sort out whether and to what extent these types of high school experiences affect the probability of persisting in an engineering major and entering the field upon graduation.

Political Views of Engineering Students by School

Variables	MIT	Olin	Smith College	UMass
Percent of Respondents Registered to Vote	95%	96%	90%	76%
Level of Political Participation (0=Inactive to 7=Very Active)	95%	96%	90%	76%
From Liberal to Conservative (0=Very Liberal to 6=Very Conservative)	2.63	3.38	2.67	2.76
Political Party Affiliation:	2.78	2.69	3.00	2.62
Republican	25%	26%	17%	10%
Independent	8%	11%	0%	24%
Democrat	57%	48%	58%	52%
Green	3%	7%	0%	5%
Libertarian	2%	7%	0%	10%
Other	5%	2%	25%	0%
Candidate Respondents voted for in 2004 election:				
Bush	20%	23%	22%	17%
Kerry	77%	73%	78%	83%
Nader	0%	0%	0%	0%
Other	3%	5%	0%	0%
Concern about Environmental Degradation:				
Percent who are Concerned/Very Concerned	59%	73%	83%	71%
Concern about the Iraq war:				
Percent who are Concerned/Very Concerned	77%	71%	92%	72%

Political views of engineering students

- At all four institutions, students tend to associate themselves with a liberal political party and support liberal candidates to a much greater extent than the broader US population.
- Students at all institutions are more politically active than the rest of the population, and show concern for two current hot-button political issues: environmental degradation and the war in Iraq.
- Comparing the institutions, Smith students identify as the most liberal, but overall these students report that they are fairly "middle of the road" on a liberal-to-conservative scale.

Change in Confidence Between Year 1 (2004) and Year 3 (2006)

Confidence Indicator	MIT	Olin	Smith	UMass
Academic Ability	-	++	+	-
Science Ability	+	+	+	no significance
Ability to succeed in an engineering career	no significance	+	-	+
Choice of the right engineering field	+	+	-	-
Advancement to the next level of engineering courses	no significance	no significance	-	-
Choice of engineering as a profession	no significance	+	--	-
Ability to complete an engineering degree	++	++	++	+
Academic ability compared to classmates	++	+++	+++	++
Grasp of class concepts compared to classmates	+	++	+++	++
Problem Solving ability compared to classmates	++	++	++	+++

+++Large increase in confidence ++Moderate increase in confidence +Small increase in confidence
- - - Large decrease in confidence - - Moderate decrease in confidence - Small decrease in confidence

Changes in self-confidence between first year (2004) and third year (2006) in college. As students progress through engineering programs, faculty hope that their confidence in their abilities would increase. If the opposite occurs, engineering programs are in danger of losing committed and capable students.

- For the students in our study, we see an increase in students' confidence when they are asked to compare themselves to their classmates. This sort of confidence allows students to feel comfortable in their intellectual skins with peer groups and in their classes. An increase in confidence is particularly noticeable for Olin and Smith students, whose institutions pay special attention to the development of effective learning environments.

- The changes in confidence are less positive when students are reporting on their confidence without reference to their peers. Students at Olin and Smith were more confident in their academic and science abilities, but this pattern is not as clear for MIT and UMass students. As is common, students enter these prestigious programs quite confident in their abilities to succeed, but that confidence tends to decrease as they encounter challenging course material.

We look forward to deepening our knowledge of these engineering programs as we analyze the results of year 4 (2007) and year 5 (2008) surveys.