

Portraying the Academic Experiences of Students in Engineering: Students' Perceptions of their Educational Experiences and Career Aspirations in Engineering.

Academic Pathways Study: Cohort 1', Center for the Advancement of Engineering Education (CAEE)
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APS Study Site: Cohort 1'

This study extended the APS study to a cross section of engineering students in upper and lower division programs at the University of Minnesota. We used an online survey and focus groups to gather data on student motivations to study engineering and student experiences in engineering programs.

Research Design & Questions

Gather direct input from students through an exploratory, descriptive study.

- Quantitative data gathered from two administrations of the APS online survey: Fall '05 (123 students) and spring '06 (217 students—including 55 transfer students).
- Qualitative data gathered from six focus groups: Spring '07 (nearly 50 students).

Research questions

- What motivates students to study engineering?
- How do students navigate their educational programs at UMN?

Student Motivations to Study Engineering.

Students reported their highest motivational factor was improving **social well-being** (solving and fixing societal problems) followed by **financial incentives** (pay and job assurance). We found no differences by gender or division, although non-transfer students ($m = .63$) were significantly more motivated by financial incentives than transfer students ($m = .53, p = .019$).

The qualitative analysis indicated an additional motivating factor to be students' **fascination with math and science**.

"I always enjoyed **that challenge of the problem-solving part** where actually it's . . . more than just your opinion."

"But I think it's something where you can -- when you create something, -- especially like new technology -- **you're helping people.**"

"I just think it's absolutely fascinating to be able **to find answers to problems in our world.**"

Acknowledgments

This work was supported by the Dean's Office at the University of Minnesota and the National Science Foundation under grant no. ESI-0227558, which funds the Center for the Advancement of Engineering Education (CAEE).

Student Learning Experiences.

Students reported the highest level of frustration and disillusionment with the grading system, perceived disconnect of course work from reality, and low levels of support.

- Women reported more difficulty coping with course pace and load ($t_{(158)} = 3.625, p < .001$).
- Women reported higher levels of involvement in extra-curricular activities ($t_{(158)} = 2.311, p = .022$).
- Transfer students reported higher levels of academic disengagement for liberal arts classes ($t_{(161)} = -2.351, p = .020$).
- Transfer students reported lower levels of satisfaction with overall collegiate experiences ($t_{(214)} = 2.943, p = .004$).

"I don't think it's a very good way to run an academic environment where everybody's failing all the time. But I've **heard the things like weeding out**. Like too many people take engineering and they've got to fail some people."

"Cause I've **had great instructors**, and I've had instructors who seem like they could really care less when it came to actually presenting accurate information, or actually making an effort to make sure people understood things."

"I don't understand what is going on in that class, for the life of me, but I'm doing wonderful in the class. **But I don't feel like I understand it.**"

Conclusions & Discussion

Student motivators

- Personal interest in science, math, and engineering
- Student-student interactions
- Student-instructor interactions
- Student-professional (practice) interactions

Student demotivators

- Extreme difficulty or course content
- Highly competitive and disconnected grading system (the curve)
- Poor levels of support from TAs, faculty, and institution

Principles for good practice

- Encourage contact between faculty and students.
- Develop reciprocity and cooperation among students.
- Encourage active learning.
- Provide prompt feedback.
- Emphasize time on task.
- Communicate high expectations.
- Respect diverse talents and ways of learning.

For more information:

Korte, R. F., & Smith K. A. Portraying the academic experiences of students in engineering: Students' perceptions of their educational experiences and career aspirations in engineering. *Proceedings of the American Society for Engineering Education Conference, 2007* Honolulu, HI.