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Study: Women Aren't Becoming Engineers Because of Confidence Issues

WASHINGTON, DC, October 25, 2011 — Women are less likely than men to stay in engineering majors and to become engineers because they want to have families and are more insecure about their math abilities, right? Not necessarily, suggests a new study in the October issue of the *American Sociological Review*.

The study found that the real issue for female engineering students is their lack of “professional role confidence.” Among other things, this term encompasses people’s faith in their ability to go out into the world and be professional engineers and their belief that engineering fits their interests and values, which the study authors refer to as “expertise confidence” and “career-fit confidence,” respectively.

“Women engineering students go to the same classes, take the same tests, and get the same GPAs as men, sometimes even higher,” said the study’s lead author Erin Cech, a Postdoctoral Fellow at Stanford University’s Clayman Institute for Gender Research. “But, what we found is that the women in our study developed less confidence in their engineering expertise than men did and they also developed less confidence that engineering is the career that fits them best, even though they went through the same preparation process as men.”

As result of these confidence issues, women who begin college as engineering majors are less likely than men to remain engineering majors and less likely than men to believe that they will be professional engineers in the future, Cech said.

So, why do women engineering students develop significantly less confidence than men?

“It stems from very subtle differences in the way that men and women are treated in engineering programs and from cultural ideologies about what it means to be a competent engineer,” Cech said. “Often, competence in engineering is associated in people’s minds with men and masculinity more than it is with women and femininity. So, there are these micro-biases that happen, and when they add up, they result in women being less confident in their expertise and their career fit.”

The study considers 288 students who entered engineering programs in 2003 at four institutions of higher education: Massachusetts Institute of Technology, the University of Massachusetts at Amherst, the Franklin W. Olin College of Engineering, and Smith College. As part of the study, the students were surveyed in 2003 and again in 2007.

“While our sample is small, we found no evidence that women’s desire to have families leads them to leave engineering majors or impacts whether they believe they will be professional engineers in the future,” Cech said. “In addition, for both men and women, there was no evidence that negative math self-assessment predicts persistence in engineering majors or impacts whether they believe they will be professional engineers.”

Interestingly, the study found that the desire to have a family is negatively associated with whether men believe that they will be professional engineers in the future.

“What we think is going on is that men who have strong traditional family plans may have some

expectation of being the bread winner for their family and, therefore, they seek jobs outside of engineering that are actually better paid," Cech said. "So, they go onto law school or into finance or something like that."

As for what can be done to improve women's confidence and increase the likelihood that they will persist in engineering majors and go onto engineering careers, Cech offered several recommendations.

"I think the most direct way that engineering programs can address this issue of women giving up on engineering is by doing a better job of bringing practicing engineers into the classroom," said Cech, who suggested that some of these engineers could be part of panels put on by women in engineering organizations.

Practicing engineers who are brought into classrooms should address the issue of confidence head on, Cech said. "It would be good for them to talk about their confidence in their expertise and their confidence that engineering is the right fit for them," she said. "If these things can be brought to the forefront and explicitly talked about, it may help women and men engineering students develop confidence of their own."

Cech also recommended that engineering programs offer more directed internship opportunities that place students with working engineers on real-world engineering projects. "This experience would integrate explicit learning objectives related to advancement in an engineering career with a broad range of skills required for success as an engineer," Cech said.

"This type of practical real life experience, designed in part by educators familiar with gender biases in the profession, could help broaden students' often narrow conceptions of the role of engineers to include skills that they might not realize are important such as communication and teamwork. These internships could also increase students' awareness about the wide variety of engineering careers available to them, allowing more students to find their fit within the profession."

Cech's study coauthors include: Brian Rubineau, an Assistant Professor of Organizational Behavior at Cornell University's School of Industrial and Labor Relations; Susan Silbey, the Leon and Anne Goldberg Professor of Sociology and Anthropology at Massachusetts Institute of Technology; and Carroll Seron, a Professor in the Department of Criminology, Law, and Society at the University of California-Irvine.

Their study is part of a larger project, "Future Paths: Developing Diverse Leadership for Engineering," funded by the National Science Foundation.

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About the American Sociological Association and the *American Sociological Review*

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The research article described above is available by request for members of the media. For a copy of the full study, contact Daniel Fowler, ASA's Media Relations and Public Affairs Officer, at (202) 527-7885 or pubinfo@asanet.org.