Education practices influence women engineer shortage, study finds

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As the need for engineering professionals grows, educators and industry leaders are increasingly concerned with how to attract women to a traditional male career. A new University of Missouri study found the impact of the engineering curriculum and obstacles, including self-efficacy and feelings of inclusion, can impede women's success in the predominantly male discipline of engineering.

MU researchers examined the role of self-efficacy, the belief in one's capabilities to execute the course of action required to produce desired goals, to understand why women continue to be under-represented in engineering. Their findings suggest a strong sense of self-efficacy, especially for women students who are under-represented in engineering classrooms, can help students persist and succeed.

"Efficacy applies to any situation; it is particularly important in choosing and executing constructive action in situations that can be barriers to successfully achieving the ultimately desired outcome," said Rose Marra, associate professor of information science and learning technologies in the MU College of Education. "In engineering, these barriers might include negative stereotypes, active discouragements by peers or faculty, or scoring poorly on a calculus exam."

In the study, Marra evaluated 196 undergraduate women engineering students throughout a two-year period at five public institutions in the United States. The researchers examined the students' engineering career expectations, self-efficacy, feelings of inclusion, efficacy in coping with

difficulties and math outcomes efficacy. The assessment provided a better understanding of students' overall self-efficacy.

"We compared the students' assessments from each year. The results indicate that women students show positive progress in some self-efficacy measures, but they show significant decrease in progress on feelings of inclusion," Marra said. "We hope that the results of the study can be used to influence engineering education practices, both in and outside of the classroom, which can impact the success of women studying engineering."

Marra's study, "Women Engineering Students and Self-Efficacy: A Multi-Year, Multi-Institution Study of Women Engineering Student Self-Efficacy," which will be published in the January *Journal of Engineering Education*, also found a relationship between ethnicity and feelings of inclusion, which Marra hopes to examine in future studies. The study was sponsored by a grant from the National Science Foundation.

Source: University of Missouri-Columbia