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## Featured Researcher | Beth Powell

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The high attrition rate nationally of women in engineering has long been a concern for educators. They are not dropping out because of low grades; about half of the women who leave are earning As and Bs.

Theories abound as to why women disproportionately leave the field, including a lack of self-confidence or fear of stereotypes. Another theory is that women leave because of the way engineers learn to communicate and the culture of the field. TTU English instructor Beth Powell is conducting research to discover if women are dropping out of engineering fields because of differences in speech styles and interpersonal communication habits gained almost subconsciously through experience, or tacit knowledge. Ultimately, she and fellow researcher Joanna Wolfe of Carnegie Mellon University seek to help prepare students for some of the social challenges they may face in their engineering careers as and help decrease the attrition rate among women in those fields.



### **Investigators:**

Joanna Wolfe, Carnegie Mellon, PI

Beth Powell, TTU, co-PI

### **Funding:**

Wolfe and Powell were awarded more than \$300,000 to complete their three-year research project from the National Science Foundation.

### **Research procedure:**

In the first stage of the project, Wolfe and Powell interviewed engineering students across the country to find out what common interpersonal problems they encounter. Many of those problems involved team interaction, collaboration and communicating with faculty.

In the second stage, professional engineers and faculty are being asked how they would react to the problems the students discussed. The pair of researchers are also still interviewing students to find similarities and differences between their reactions and those of the professionals.

"We're asking them what they would do in these situations," Powell said. "We're uncovering what's called tacit knowledge that the engineering professionals have of how to communicate, how to problem solve, how to make decisions in interpersonal interactions."

Next, Powell and Wolfe will create a model of tacit knowledge that will be shared with students. Tacit knowledge is the knowledge a person gains informally through experience. Interpersonal communication is one type of tacit knowledge.

### **Preliminary findings:**

Because the research is ongoing, all data are preliminary and tentative. However, Powell and Wolfe are finding some interesting differences between engineering students and professionals.

"Students' communication strategies are to try to ignore the problem and hope it goes away, or to talk about their feelings," Powell said. "We're just starting to tease out the differences between the students and the professionals."

"The professionals always say never do nothing. If you have a problem, you have to address it immediately. Don't wait. Another thing that professionals have been talking about is to avoid talking about feelings. They say you should talk about the project, the task and don't make personal attacks."

**How will this research be applied?**

"Our goal is to articulate that tacit knowledge that successful women engineers have that has helped them to become successful," she said. "This project has a lot of potential impact on engineering educators and engineering education research. This idea of tacit knowledge is a new concept in engineering education so it could be really helpful for engineering education researchers."

**What motives you to do this work?**

"I'm interested in how language creates perceptions of ourselves and others. Are people negatively perceived or do women and men have different understandings of how to get things done through communication and interpersonal interaction in engineering?"

**What are your future plans for this research?**

"We're going to apply for a dissemination research grant. With that grant, we'll create multi-modal tutorials that we can give to a variety of people here and elsewhere, like videos people can use to help teach teamwork skills."

**What challenges have you faced?**

"Men and women engineers, faculty and professionals are so eager to help. They want to be mentors; they want the new students and engineers to be successful. The only challenges we've had are the logistics of trying to schedule interviews."

**If you had unlimited time and resources, what form would this research take?**

"The next step would be to turn this into a long-term study, where we follow up with student participants every few years to see where they are and what kind of engineering they are practicing, as well as to determine long-term effects of learning about the interpersonal communication strategies that we are going to share with them in the third stage of the project."

**Previous Research:**

Wolfe, J., & Powell, E. (2006). Gender and expressions of dissatisfaction: A study of complaining in mixed-gendered student work groups. *Women and Language*, 29(2), 13-21.

Wolfe, J., & Powell, E. (2009). Biases in interpersonal communication: How engineering students perceive gender typical speech acts in teamwork. *Journal of Engineering Education*, 98(1), 5-16.

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