

PROJECT SUMMARY

Overview:

Despite efforts toward change, the engineering profession continues to struggle with retaining a diverse and highly qualified workforce. Research shows that less than two-thirds of engineering bachelor's graduates actually enter and remain in engineering careers. There are also concerns about graduates' preparation for professional practice. The proposed project examines these issues by considering how students choose, prepare for, and embark in their future careers.

The overall goal of the project is to make improvements to undergraduate engineering education that support student choices to remain in engineering fields. Such improvements can enhance the engineering workforce and, ultimately, lead to greater U.S. global competitiveness. We have two sub-goals to guide our work, 1) to investigate how students' perceptions of their career options, engineering skills, and educational experiences relate to their plans to pursue engineering careers, and 2) to engage engineering educators and industry professionals in using our research findings to reform undergraduate engineering education.

Consistent with our goals, this three-year project includes two interconnected elements: the research element and the community of practice element. The research element will explore the early career decision-making of engineering students from six institutions longitudinally - from their junior year to their first year post-graduation - using both qualitative and quantitative research methods. We will also gather information at the school level about the career and skill-related resources available to engineering students on each campus. The community of practice element will convene stakeholders at each partner institution who are invested in translating the results from this project into educational practice. Community members will review reports of the research results and discuss implications for their campuses via annual meetings. They will help the project team with the selection, framing, and presentation of these results to other stakeholders. They will also monitor, support, and report on implementation efforts at their institution. It is the integration of our research and practice elements that will enable us to make change rather than simply informing change.

Intellectual Merit :

This project will collect, analyze, and drive change using longitudinal data connecting engineering students' career goals and actual postgraduate outcomes; data has not previously been collected or used to drive change in this way. We will develop knowledge on how students' beliefs develop and change over time. Finally, we will contribute to theory development. Drawing on expectancy X value theory and cognitive information processing theory, we propose a Professional Pathways Model that explains how students' beliefs about their career options and their own abilities affect their career decisions.

This project builds upon two major NSF-funded bodies of work, 1) research findings from the Academic Pathways Study, Engineering Pathways Study, and the Epicenter study, and 2) the community-building expertise of the Rigorous Research in Engineering Education project. The PI team has significant experience in the areas required to conduct this work: conducting mixed-methods, longitudinal and multi-institutional research, developing robust communities of educators, and bridging research-to-practice.

Broader Impacts :

The partner institutions in this project offer a diverse sample of approximately four thousand engineering juniors. Thus, one way our project will have impact is by helping us to better understand the early career decision-making of underrepresented students including racial/ethnic minorities, women, and transfer students. Our community of practice approach also allows us to go beyond mere understanding to actually making changes to educational practice. We anticipate that our results will help engineering programs, career development centers, and alumni associations to reevaluate the programs and resources they offer to soon-to-be-degreed engineers. The project itself will serve as a model for using longitudinal student data to drive program improvement.