

## **How can science teacher educators best prepare students to teach engineering practices?**

### **Proceedings Abstract**

Teacher education is facing challenges given the recent incorporation of engineering practices and core ideas into the Next Generation Science Standards and state standards of learning. To help teachers meet these standards in their future classrooms, education courses for preservice teachers [PSTs] must provide opportunities to increase science and engineering knowledge, and the associated pedagogies. To address this need, Ed+gineering, an NSF-funded multidisciplinary service-learning project, was implemented to study ways in which PSTs are prepared to meet this challenge. This study provides the models and supporting data for four unique methods of infusion of engineering skills and practices into an elementary science methods course. The four models differ in mode of course delivery, integration of a group project (with or without partnering undergraduate engineering students), and final product (e.g., no product, video, interactive presentation, live lesson delivery). In three of the models, teams of 4-6 undergraduates collaborated to design and deliver (when applicable) lessons for elementary students. This multiple semester, mixed-methods research study, explored the ways in which four unique instructional models, with varied levels of engineering instruction enhancement, influenced PSTs' science knowledge and pedagogical understanding. Both quantitative (e.g., science content knowledge assessment) and qualitative (e.g., student written reflections) data were used to assess science knowledge gains and pedagogical understanding. Findings suggest that the PSTs learned science content and were often able to explain particular science/ engineering concepts following the interventions. PSTs in more enhanced levels of intervention also shared ways in which their lessons reflected their students' cultures through culturally responsive pedagogical strategies and how important engineering integration is to the elementary classroom, particularly through hands-on, inquiry-based instruction.