

## Abstract

We studied Native American college students' perceptions of educational barriers and supports while pursuing degrees leading to careers in engineering. Based on findings from our qualitative study, we provide recommendations for students, professors, departments, and institutions on how to support Native American students to be successful as they pursue careers in science, math, and engineering careers.

## Introduction

Engineering occupations are expected to be some of the fastest growing occupations in the U.S. over the next 10 years (Occupational Outlook Handbook, 2018); yet, there are current and projected shortages of workers in the engineering workforce so that many engineering jobs will go unfilled (Bureau of Labor Statistics, 2015) Native Americans are highly underrepresented in engineering (NSF, 2017). They comprise approximately 2% of the U.S. population (U.S. Census Bureau, 2013), but only 0.3% of engineers (Sandia National Laboratories, 2016).

We studied aspects of Native American student's educational experiences that supported and impeded their progress toward engineering careers.

## Method

A total of 24 Native American College Students participated in individual and small group interviews. Data were collected over a one-year period in-person on college campuses and at professional development conferences, and also via phone. Students described supports that facilitated their enrollment in (including early influences), persistence in, and completion of degrees that lead to engineering careers.

# Native American engineering students' success in degree completion

Gale Mason-Chagil, Ph.D., Sherri Turner, Ph.D., Mark Bellcourt, Ph.D.,  
Sue C. Jacobs, Ph.D., Nicole Colston, Ph.D., and Sara Johnson, Ph.D.

## Findings

### Engaging Early Supports Success

- Students initial interests in engineering could be traced to early childhood experiences. According to the participants, recognizing that they were interested in engineering occurred most often in high school or college.
- **Exposure at home** included building toys, dismantling and rebuilding household items, and observing engineers at work in family and community
- **Exposure at school** included enrichment clubs in middle school including science fairs, and introduction to advanced math in high school.

### Academic Successes in First Year

- Participants reported "**catching up**" academically to meet college-level criteria, especially with math, during the first year of higher education, was a barrier. *"It was very frustrating that I didn't feel super prepared from my high school, I think intelligence-wise I was like I'm totally capable of doing this, but I felt like when I got to college that I just had so much catching up to do."*

### Financing Higher Education

- The **costs** involved in pursuing higher education, *"Honestly, so I think the biggest hurdle for me was finances."*
- **Capitalizing on the financial opportunities** was challenging. For example, in high school, "I was applying for scholarship money *I didn't qualify for any of it because all the scholarships through my tribe were school specific.*" Also, few people are familiar the plethora of financial aid opportunities, so identifying feasible options was challenging.

### Social and Emotional Supports

- Opportunities to **reduce the isolation** of Native American students is important. One student *"I do know of one other native student in graduate school here".* One support for students would be, *"a cultural type of club or anything like that but I think it has to be something where you're comfortable and where you're with people that you would also want to hang out with too."*

## Student's Perspective

A student summarized what is supportive of his/his successful pursuit of an engineering career: *"a lot of resources that are available to students," "take care of students," "great professors," and "tutors."*

## Recommendations

- **Facilitate enrichment opportunities** for middle school and high school students to formally and informally introduce engineering as a career. Student recognition of the broader field of engineering is one way for students to identify and move toward a specific engineering career.
- **Academic support programs are important** for students in higher education, especially those programs specifically designed for engineering students. Resources may provide an academic bridge from high school content and also specialized in advance content of engineering courses.
- **Financial aid counselors focused on Native American students** could provide reliable advice on geographically or tribally affiliated aid as well as federal/state opportunities.
- **Reduce isolation for Native American** students by facilitating social and academic gatherings and programs.