

Native American Engineering Faculty: Insights into Entry and Persistence

**AUTHORS: SUE C. JACOBS, SARAH B. JOHNSON, KELSEY PATZKOWSKY, &
NICOLE COLSTON: OKLAHOMA STATE UNIVERSITY**

**AUTHORS & PRESENTERS: GALE MASON-CHAGIL: CULTURAL INQUIRY CONSULTING, LLC
SHERRI TURNER: UNIVERSITY OF MINNESOTA**

PRESENTED APRIL 1, 2019

KEEPING OUR FACULTY VIII: RECRUITING, RETAINING, ADVANCING
AMERICAN INDIAN FACULTY AND FACULTY OF COLOR CONFERENCE





NATIVE AMERICANS ENGINEERING ASPIRATIONS

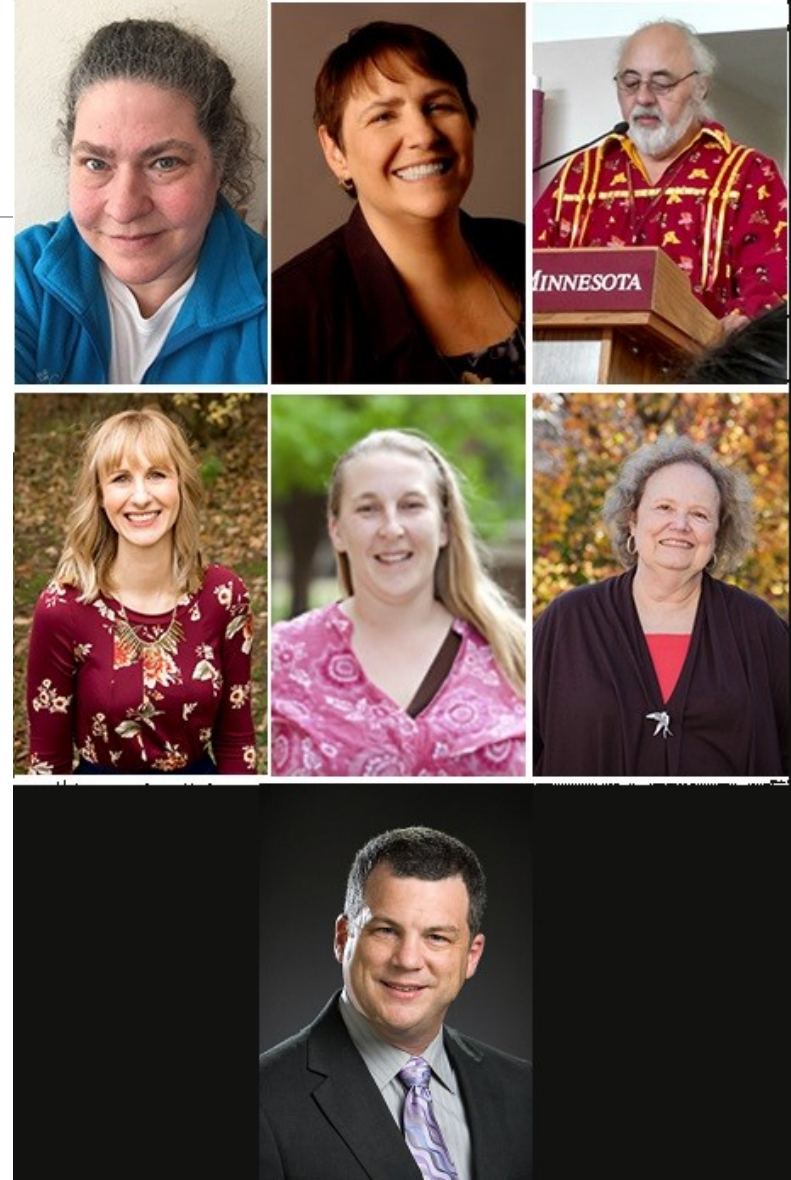
Research Team

Presenters:

- Sherri Turner
- Gale Mason-Chagil

Research team:

- Mark Bellcourt
- Nicole Colston
- Sue C. Jacobs
- Sarah Johnson
- Kelsey Patzkowsky
- Jim Smay



Background and Rationale

- STEM initiatives in higher education increasingly call for career mentorship opportunities for underrepresented minorities (URM).
- Researchers (Johnson & Sheppard, 2004; Nelson & Brammer, 2010) note the importance of having faculty, especially of the same culture, to mentor and act as role models for students
- Native American faculty members are underrepresented in most fields in colleges and universities, and exceedingly so in engineering.



Background and Rationale (cont.)

- Native American students are underrepresented in undergraduate (0.6%; N=1853) and graduate (0.1%; N=173) engineering programs.
- Advising and mentorship from those who identify as Native Americans are often considered important components for recruiting and retaining students in STEM fields.



Background and Rationale (cont)

- Few studies account for differences in Native American identity or provide a nuanced account of successful Native American STEM professional experiences (Page-Reeves et al., 2018).
- We present some findings from an exploratory study aimed at pinpointing the factors that influence Native American entry and persistence in engineering faculty positions.
- Research funded by a National Science Foundation (NSF) research grant (EEC1743329/1443572).



Our Research Project (Cont.)

- Interviews are complete and coding is in progress by a multi-disciplinary team, including career counselors, engineering educators, and Native Americans.
- Interviewed Native American engineering faculty and students.
- Due to small number of interviews, we acknowledge our findings are not generalizable, but hope they raise important questions for the audience.



Blended Theoretical Framework

Social Cognitive Career Theory [SCCT] SCCT recognizes the impact of individual and contextual influences on career development and attainment (Lent, Brown, & Hackett, 1994, 2000).

Bronfenbrenner's Ecological Systems Theory [EST] suggests that environmental aspects of people's lives are comprised of five systems.



Native American Faculty Participants

- 8 Faculty completed both the survey and interview
- 6 Tenured Faculty, 2 Contract/Term Faculty
- Gender = 6 Males and 2 Females
- Mean Age = 54 years
- Representing multiple tribes
- Represent 5 different branches of engineering
- Average time employed as engineering faculty=18 years



Findings: Survey Responses

Why did you choose to work at your university?

- 2/3 of respondents said to be close to family

Why do persist as a faculty member?

- Academic freedom and a sense that I am doing good in educating/inspiring young engineers (1)
- I love and enjoy my job (3)
- I am highly satisfied with my profession which allows me to do research and educate students (1)
- I have a good work environment, am challenged , and valued for my contributions by administrators (1)

Who are your primary supports?

- Professional colleagues, mentors, friends, parents, children, extended family, professional organizations, community members



NATIVE AMERICANS
ENGINEERING ASPIRATIONS

Faculty Survey Responses

Academic and Career Development Strengths leading to persistence:

- Career goals include being happy and satisfied
- Enjoying their work
- Committed to reaching career goals
- Committed to doing well in their work
- Get along well with people who are different
- Work well with others to solve problems and complete projects



Semi-structure Interview Protocol

- **Early experiences** contributed to skills, abilities, or interest in engineering today?
- **Decision to** get into the engineering field? To accept a faculty position?
- **Supports** in pursuing your interest in engineering? Who and how?
- **Barriers** faced in training and as a professional? How do to overcome them
- **Native American background influences** personal experiences in engineering?
- How have you **sustained your interest** over time



Findings: Becoming Engineering Faculty

- **Self-efficacy and outcome expectations** from
 - **Early experiences** seemed to relate to the participants' entry into faculty positions, as did
 - Desiring **work at a particular university**,
 - Be **near family or community**, and
 - **Opportunities** to apply for faculty positions.
- Most interviewees mentioned **faculty or mentors**, none of whom were Native American, who were **excellent teachers** or helped to **develop the love of research**.

Findings: Beginning Engineering Faculty

- Some interviewees suggested that “happenstance” was at work in their becoming faculty members (Krumboltz, 2009).
- No faculty participants had advised an Native American student who went on to become a faculty member.

Example:

Self-efficacy and Outcome Expectations

Entry Into faculty positions appears related to self-efficacy and outcome expectations from early experiences and the impact of the mesosystem (opportunities to apply for faculty position and desire to work at a particular university):

- *“I was helping people solve plumbing problems when I was a kid, and just naturally had a sort of a knack for assembling things”*
- *“... [giving a presentation] for very first time...was extremely nervous. When I was finished I had done this enough times that I felt very confident in front of a crowd of technical people”*
- *“... thought I would stay at the national lab level ... but I was married... wife wanted to move back to [home) to be closer to family... so I thought, what can I do with a materials science degree [there]?”*



Findings: Persistence as Engineering Faculty

- **Engagement with professional and academic groups** appeared to sustain interest in faculty positions over time, as did the influence of evolving opportunities to provide mentorship to Native American students.
- For some, **complex and ever-changing learning experiences** (e.g., research with people interested in the same problem and/or teaching) appeared to maintain faculty role interest, as did the ability to foster self-efficacy and interest in students).



Findings: Persistence as Engineering Faculty

- **Participants voiced hesitation to directly encourage students** to enter the faculty, preferring to provide learning experiences that increased student self-efficacy and attended to systemic (e.g., financial) demands on students.
- A few mentioned being able to **integrate their values or those learned from their families or ancestors** into their teaching or research.
- Other supports for persistence involved a **presence of Native Americans on campus**, including broader Native American community on campus and having Native American students to advise (not necessarily in engineering).
- **Obstacles to persistence** for some included tenure and/or promotion decisions, salaries, and being lonely as the only Native American faculty on campus.



Examples: Persistence as Faculty Members

- **Values instilled** via the exosystem (engagement with professional and academic groups) appeared to sustain interest in faculty positions over time as did the influence of evolving microsystems (opportunities to provide mentorship to Native American students and desires of family).
- **Complex and ever-changing learning experiences** (e.g., research and/or teaching) appeared to maintain faculty role interest, as did the ability to foster self-efficacy and interest in students.



Summary and Importance of Research

- **The complexity of Native American identity, geographic and tribal differences, and the historical context underlying participation in higher education** are prominent factors worthy of investigation across all STEM fields concerned with increased Native American representation and persistence among students and as faculty.
- More work is also needed to **explore the influence that the specific discipline and institution have on Native American students' decisions** to enter and persist in engineering faculty positions.



Questions

1. What stood out to you about this?
2. What do you think is most important about bringing Native Americans into engineering?
3. What practical applications do you see from these findings?
4. What directions do you think this research should go?

For further information contact:

Sue C. Jacobs, Oklahoma State University,
405-744-9441

sue.c.jacobs@okstate.edu

Sherri Turner, University of Minnesota-Twin Cities
612-624-1381

turne047@umn.edu