SYMPOSIUM ON EXTRAORDINARY ENGINEERING IMPACTS ON SOCIETY
AUGUST 18-19, 2022

NSF Projects that Fostered Extraordinary Impacts on Society
American Indian Science and Engineering Society (AISES)
Sarah EchoHawk, MNM
Pawnee Nation of Oklahoma
Chief Executive Officer

AISES Mission

Founded in 1977, AISES is a national Indigenous-led nonprofit organization focused on substantially increasing the representation of Indigenous peoples of North America and the Pacific Islands in science, technology, engineering, and math (STEM) studies and careers

Three Focus Areas

**Student Access and Success**

AISES works to ensure students have access to Indigenous designed STEM programming and vital services including scholarship and academic support as well as mentorship and guidance throughout their educational journey from PK-12 through undergraduate and graduate studies.

Career Support and Development

AISES works to ensure professionals are supported as they enter and progress in STEM careers by providing internships, fellowships, training, networking, and direct connection to the vast network of employers who partner closely with AISES to hire talent in the corporate, government, and public sectors.

Equitable and Inclusive Educational Institutions and Workspaces

AISES works closely with our vast network of partners of PK-12 schools, colleges and universities, and employers representing all sectors, to ensure that students and professionals have access to equitable and inclusive educational institutions and workspaces where they can successfully prosper throughout their educational and career journeys.
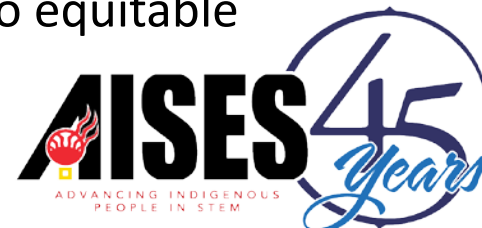
A Snapshot of AISES Today

6,000+ Individual Members

18 Professional Chapters
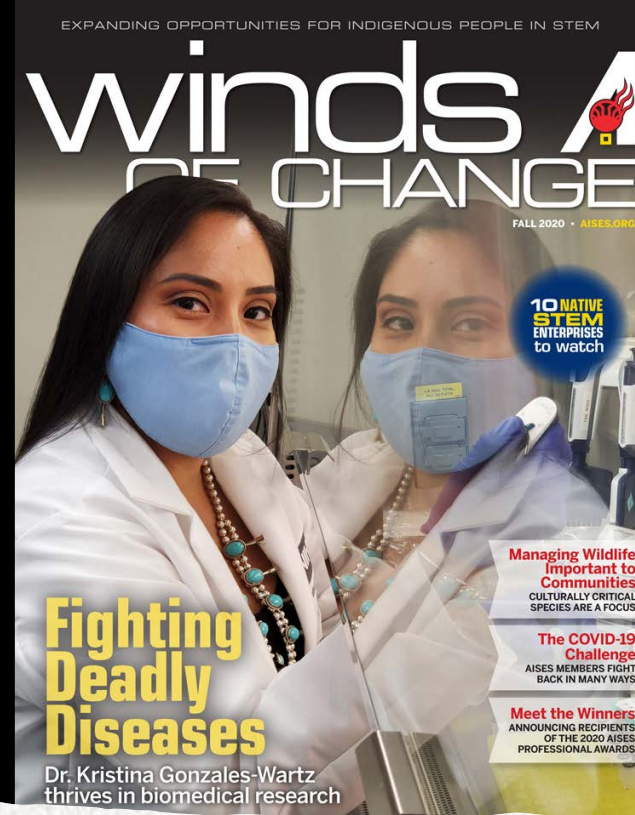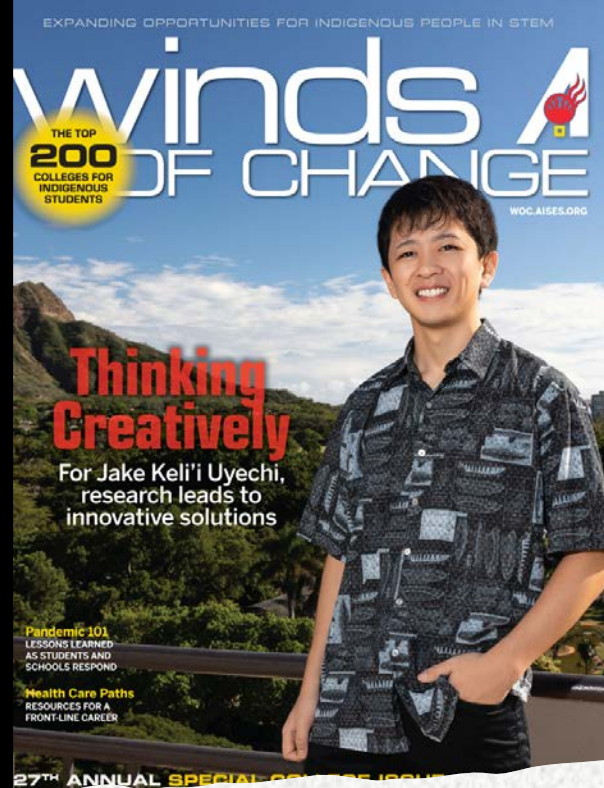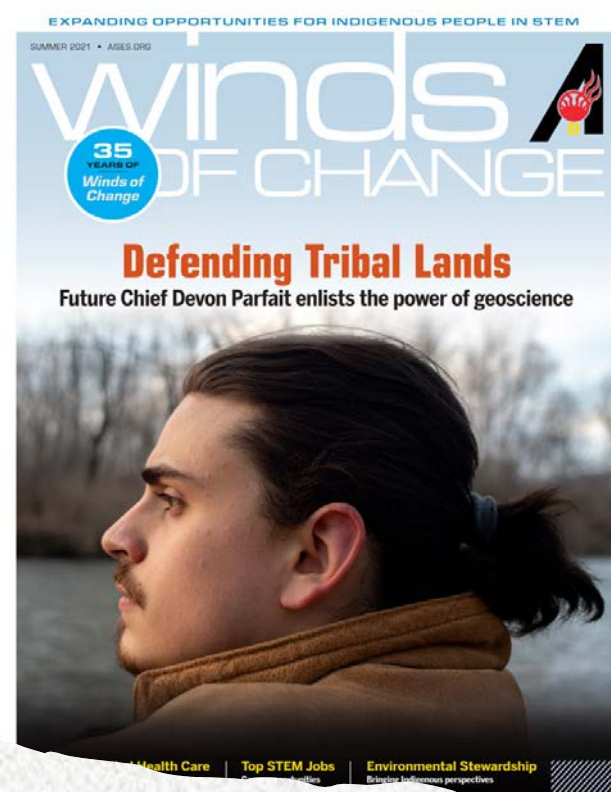
198 College/University Chapters

230 K-12 Affiliated Schools

3 Tribally Chartered Chapters

$13+ Million in Scholarships

$10+ Million Annual Budget

198
Chartered College and University Chapters Throughout the United States and Canada

3 Tribal Chapters

18 Professional Chapters

230 Affiliated Schools that Enroll More than 55,000 K-12 Native American Students

$13M+ Academic Scholarships

6,000+ Individual Members

Winds of Change Website

https://woc.aises.org/
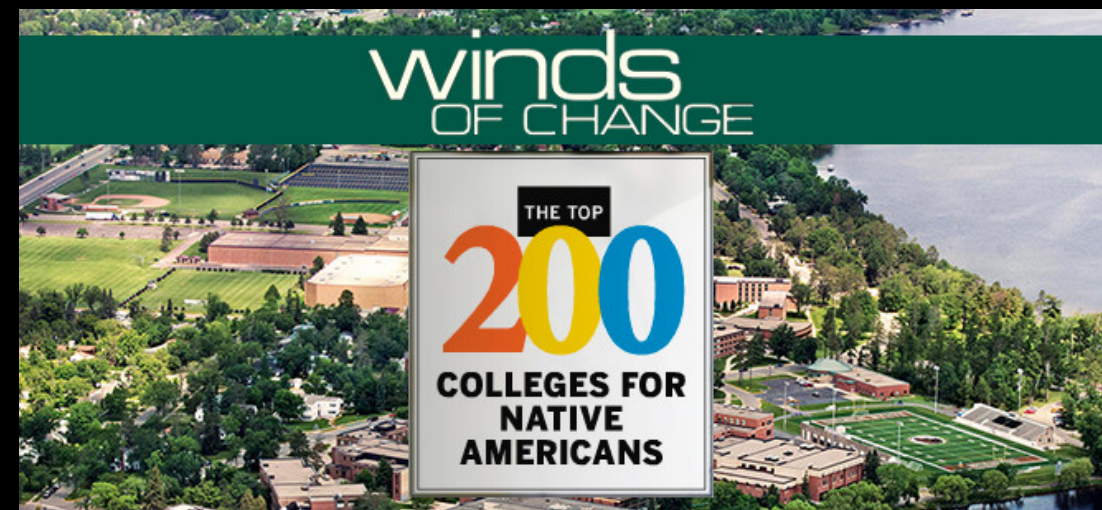
2022 AISES National Conference

45 Years of Advancing Indigenous People in STEM
October 6-8, 2022
Palm Springs, California

The Annual AISES National Conference is a unique, three-day event focusing on educational, professional, and workforce development for Indigenous peoples of North America and the Pacific Islands in science, technology, engineering, and math (STEM) studies and careers. Attendees include Indigenous high school and college students, educators, and professionals, including representatives from Tribal Nations, Tribal enterprises, and Indigenous-owned businesses. The conference also includes the LARGEST college and career fair in the U.S. for Indigenous students and professionals! Exhibitors at the College and Career fair represent a diverse range of corporations, educational institutions, government agencies, nonprofit organizations, Tribes, and Indigenous-owned businesses.
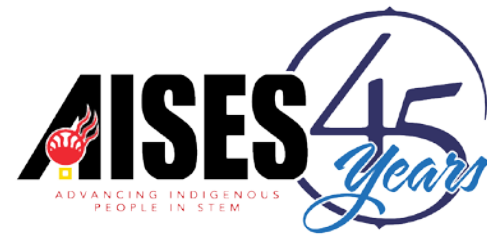
NSF Supported Research Projects

Generally, AISES is conducting primary and secondary research on what contributes to persistence and success among Indigenous scholars and professional in STEM

- 50k Coalition and Engineering Plus (ENG+)
- NSF ITEST – exploring the impact of culturally informed, girl-focused curriculum on engaging Indigenous girls in CS → CS higher ed and careers
- Literature Review: STEM education for Indigenous learners
- Lighting the Pathway – best practices for STEM academic career pathway
- Native STEM Portraits – understanding student and professional experiences to understand the supports they receive and how they change over time

50k Coalition & Engineering Plus
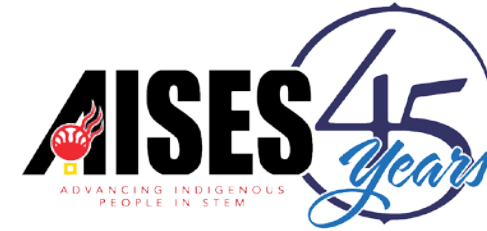
50k Coalition

- In 2016, NSF INCLUDES awarded $294,500 to the National Society of Black Engineers (NSBE) to support a 40-organization collaborative formed by the American Indian Science and Engineering Society (AISES), NSBE, the Society of Hispanic Professional Engineers (SHPE) and the Society of Women Engineers (SWE).

- Purpose: Designed to increase the representation of four groups in science, technology, engineering and math (STEM) education and careers: women; members of racial and ethnic groups that have been underrepresented in STEM.

- Goal: Increase the number of engineering bachelor's degrees awarded to women and underrepresented minorities in the U.S. from 30,000 annually to 50,000 annually by 2025 — a 66 percent increase.

- https://50kcoalition.org/

Engineering Plus

- NSF INCLUDES Alliance: Engineering PLUS (Partnerships Launching Underrepresented Students). Awarded $10,000,000 in 2021 to Northeastern University (Award Abstract # 2119930).

- Goals
  - To achieve a national target of 100,000/30,000 (BS/MS-PhD) degrees for underrepresented minorities and women by 2026 and establish a future growth rate that can substantially close the gap.
  - To achieve transformative, systemic and sustainable change that will dramatically increase the number of underrepresented minorities and women obtaining undergraduate and graduate engineering degrees. The Alliance will leverage the wealth of best practices for broadening participation in engineering that has emerged from research over the last several decades to provide the collaborative infrastructure needed to support sustainability and scale-up of successful strategies.

NSF ITEST
Exploring the impact of culturally informed, girl-focused curriculum on engaging Indigenous girls in CS and CS higher ed and careers

- Partner: Kapor Center

- Four-year, $1.4 million grant from the NSF Innovation Technology Experiences for Students and Teachers (ITEST) program

- The pilot year (2020-2021) was funded by *Reboot Represe*ntation with partnerships in eastern Oklahoma with Stilwell High School and in south central New Mexico with Mescalero Apache School

- Provides a sequence of three Tribe-specific and gender responsive culturally-relevant computer science courses to Native-serving high schools.
    - Despite the ubiquity of the technology sector in the United States and the growth in computer science enrollments across the country, there has been a decrease in degree completion among Native girls and only marginal gains in high school CS enrollment.

- Aims to increase interest, engagement, and participation in computing education (emphasis on Advanced Placement Computer Science participation and success) among Native high school students and girls.

- Will create a series of courses from introductory level to Advanced Placement (AP) Computer Science, developed to center traditional Native American knowledges and ways of knowing and aligned with tribal cultural values, vision, and goals for sovereignty.

Literature Review
STEM education for Indigenous learners

- NSF Education Core Research grant (Award: 1561768), titled Capacity building: understanding American Indian, Alaska Native, and Native Hawaiian student outcomes in the STEM education research literature.

- Purpose: To develop an understanding of the strategies known to improve the educational outcomes of Native students.

- Need: In STEM fields, AI/AN college students are severely underrepresented, leading to even more dramatic underrepresentation in the STEM workforce. This underrepresentation is due at least in part to the lack of development of interest in STEM disciplines during grade school and to a related lack of proficiency in STEM subjects.

- Focuses primarily on the primary and secondary education of Native students to include American Indian, Alaska Native, Native Hawaiian, First Nations, and other Indigenous peoples.

- Findings assist AISES in developing its own educational strategies and programmatic offering and build the capacity of AISES to serve as a source of knowledge and expertise in this field

- Concludes with recommendations for future directions in both instruction and research

- Available: https://www.aises.org/resource-center/publications

Lighting the Pathway to Faculty Careers for Natives in STEM

- The "LTP" program was originally awarded a five-year grant from NSF in 2014 (Award Abstract # 1444853). In 2019, the LTP program received a second five-year NSF grant to continue as LTP Phase II.

- Purpose: Increase the number of American Indian and Alaska Native (AI/AN) students who persist in science, technology, engineering and mathematics (STEM). The long-term goal is to increase the number of AI/AN individuals who pursue faculty positions in STEM disciplines at US colleges and universities.

- Need: The dearth of STEM faculty from the AI/AN group has been a long-standing problem. Many public and private entities have made investments to improve the representation of Natives in STEM fields -- including in faculty positions -- and these investments have not had a significant impact on the percentage of AI/AN students persisting in STEM.

- Recruits AI/AN students majoring in the biological sciences, mathematical and physical sciences, geosciences, computer and information science, and engineering -- at all academic levels (undergrad, graduate and postdoc). An average of 35 students participate in the program each year.

- Findings assist AISES in developing its own educational strategies and programmatic offering and build the capacity of AISES to serve as a source of knowledge and expertise in this field

- Community report is forthcoming in 2023 including data and recommendations.

Native STEM Portraits (NSP)

- A Longitudinal, Mixed-Methods Study of the Intersectional Experiences of Native Learners and Professionals in STEM awarded to TERC, Inc., in 2020 through NSF Education & Human Resources – Division of Human Resource Development (Award Abstract # 2000619). $1,500,000. 2020-2024.

- Purpose: Identify and make visible how [Native STEM students, faculty, and other professionals] encounter, navigate, respond to, and are changed by the cultures, systems, and processes that either support or hinder the persistence of Native individuals in STEM higher education.

- Primary Focus is on the fields of computer sciences and engineering; biological sciences; and mathematics, physics, and earth sciences.

- Need: Native students and professionals are severely underrepresented in all STEM degree programs and professions in the U.S. This underrepresentation is often overlooked in research and discussions of equity in STEM.

- Provides a nuanced understanding of the Native STEM experience and a deeper understanding of the challenges and supports specific to Native students and professionals in STEM. The project will inform areas for future research and help to identify promising practices that others can implement. Specifically, it allows the team to give research-based recommendations to colleges and universities on the recruitment and retention of Native students in STEM. Findings assist AISES in developing its own educational strategies and programmatic offering and build the capacity of AISES to serve as a source of knowledge and expertise in this field.

- https://www.terc.edu/projects/native-stem-portraits/

Contacts
Research / NSF Supported Projects

Dr. Kathy DeerInWater, Chief Program Officer
Email: kdeerinwater@aises.org
Bio: https://www.aises.org/about/staff/dr-kathy-deerinwater

Dr. Tiffany Smith, Director of Research
Email: tsmith@aises.org
Bio: https://www.aises.org/about/staff/dr-tiffany-smith