



**Mission Statement:** The mission of the Alliance of Indigenous Math Circles (AIMC) is to create mathematical opportunities for Indigenous students and to build community among math teachers of Indigenous students while respecting Indigenous culture.

**Vision:** To increase by an order of magnitude the number of Indigenous students who choose to pursue post-secondary STEM degrees.

For the past eight years, a group of teachers, mathematicians, parents, K-12 and higher education students have come together to build a movement. Those groups come together as part of an **Alliance** built on trust and commitment. Our earliest students, some now teaching in the schools they attended, some pursuing engineering and math degrees at schools like ASU and Stanford, keep in touch because we are part of a shared story of success. The heroes of our stories are the Indigenous students who rise above prejudice and what statistics might predict for their futures. Their successes humble us and rededicate us to our efforts to resolve persistent, large-scale problems that have served as systemic barriers to Indigenous students' success. These problems include:

**Indigenous people are underrepresented in STEM disciplines and especially in mathematics.**

Mathematics, like music and poetry, is the birthright of every human, and mathematical talent is spread uniformly among all people. Thus, underrepresentation suggests that Indigenous students' talents remain unrealized because of reasons beyond their control, and not because of a lack of capacity or interest.

**School mathematics hides mathematics' role as a cornerstone of human civilization, leading to student disinterest in the subject.**

Besides opening many doors to STEM and other professions, mathematics is the best tool for developing logical thinking and training analytical abilities. Not studying math deprives students of an excellent opportunity to build their "mental muscles."

**Schools serving large percentages of Indigenous students face high turnover among math teachers, making it difficult for students to build the kinds of connections with role models that sustain students' interests in pursuing mathematics.**

Building a community of math teachers' who have a network of connections to peers and mathematicians around the country provides professional and emotional support. Decreasing teacher turnover has a high return on investment and supports student persistence.

Mathematics' beauty is largely absent in K-16 mathematics curriculum. The idea that schools must choose between rushing to "cover material" and to prepare for standardized testing versus the authentic, joyful experience of "doing mathematics" with wonder and creativity—this is a false choice. The math circle model complements and reinforces mathematics skills while engaging students in authentic mathematical explorations through open-ended, playful problems under the guidance of a teacher or mathematician. Our teachers have adopted many of these strategies, making many classrooms in our service area places where students see the whole of mathematics.

The Alliance of Indigenous Math Circles partners with Indigenous communities to increase opportunities for students and teachers to participate in the beauty and power of mathematics through the math circle model. The Alliance's robust network of professional mathematicians facilitates math circle demonstrations, math festivals, teacher workshops, and summer math camps. A group of respected teacher-leaders from Indigenous-serving schools and organizations serve as **regional coordinators** and constitute a key part of the leadership team who provide a constant visible presence for the AIMC.

The AIMC also links the communities we serve with the larger mathematical community including professional societies like the Mathematical Association of America (MAA), the American Mathematical Society (AMS), and the American Indian Science and Engineering Society (AISES). We have presented AIMC sessions at annual meetings of all three organizations, and published articles in MAA and AMS magazines as well as an edited volume of math circle sessions under the AMS/MSRI aegis. We have sponsored AISES Sequoyah Fellowships for two Navajo students and will lead a demonstration math circle at the next AISES annual meeting by AISES request.

The Alliance acknowledges the long history of settler colonialism and its profound impact on Indigenous peoples. We work with tribal elders and other community members so that students see their Indigenous and mathematical identities as consistent with one another. Trust is our most valuable asset—we only go where we are invited, and we honor our commitments and relationships. In this way, our work aims to help develop the next generation of Indigenous mathematicians and to open doors for all young Native Americans to STEM and other professions.

There is never a cost to participate in our programs. While many of our events were disrupted by the Covid-19 pandemic, our work over the last two years includes:

- A six-day summer camp for Indigenous students at Navajo Prep in Farmington, NM with three Indigenous teachers from Oklahoma attending as observers.
- A one-week math teacher circle workshop held in Oklahoma City with about 50 K-16 teachers coordinated with the Oklahoma Department of Education.
- Visits by mathematicians to schools in the Navajo and Hopi Nations and at Taos Pueblo. Each visit consisted of math circle presentations and meetings with teachers and administrators.
- Professional development workshops in Tuba City (AZ), Santa Fe and Las Vegas (NM).
- A four-day immersive professional development workshop in Santa Fe with 20 teachers featuring math circle sessions and reflections on problem-solving strategies.
- Three virtual professional development workshops for teachers of Indigenous students featuring technologies for engaging students in online environments, strategies for helping students develop numerical literacy, and social justice issues in working with Indigenous students.
- Newsletters for students and families featuring mathematical games, puzzles, and trivia.

Our plan to sustain and expand programs in the Four Corners area includes offering a hybrid camp in Santa Fe that includes both students and teachers. This camp will introduce more teachers of Indigenous students to the math circle model as they observe and participate in our work with the student campers. We also plan to extend our network into Oklahoma. Our 2019 summer camp in Oklahoma City is serving as a foundation for future partnerships with teachers and other community leaders there.

Our impact is already being felt: The AIMC grew out of the Navajo Nation Math Circles project (NNMC), which launched in 2012. In 2017, a group of directors from the NNMC project recognized that, by applying the lessons learned, the model could be shared more broadly with other Indigenous communities, which led to adopting a new name that was more inclusive and representative of the mission. Since the time the NNMC was founded, the number of math majors at Diné College (the oldest tribal college in the US) has increased from 0 to about 20. Many students who participated in our summer camps have been accepted to and are successful students at colleges and universities, such as the University of New Mexico, Arizona State University, University of Arizona, and Stanford University. This year, Irivilinda Bahe became one of the rare female Navajo students majoring in mathematics at Colorado State University. Invariably, these students attribute their success to the confidence they developed through participation in our programs and interactions with professional mathematicians.