Both programs are grounded in Every curriculum unit must align to district, state, national, and either Apache-serving schools school on and bordering the Navajo Nation.

DINÉ: Diné Institute for Navajo Nation Educators – PD for K12 teachers in U.S.

approaches to STEM PD, curriculum development, and teacher practice professional development (PD) for STEM teachers, but very little of it has There is a long-established body of knowledge about effective approaches to STEM curriculum development, and teacher practice professional development (PD) for STEM teachers, but very little of it has There is a long-established body of knowledge about effective approaches to STEM curriculum development, and teacher practice professional development (PD) for STEM teachers, but very little of it has

Both programs are culturally responsive

∙ repository of culturally responsive resources for preK-12 schools among preK-12 educators, Elders, and NAU faculty/staff.

∙ produces a practice-oriented document

∙ impacts with educators. Both virtual and in person meetings.

∙ my curriculum unit is trying to make this connection between the mathematical reasoning of geometry and part of our Diné society. To most people, rug weaving

∙ is a complex and ancient craft, which is still

∙ learning their own abilities for the future.” (Middle School Teacher in DINÉ math seminar, 2021)

“research questions:

∙ To what extent and in what ways does the DINÉ/TLSI professional development model impact teachers’ STEM curriculum development and instructional practice in Native-serving schools?

∙ To what extent and in what ways are culturally responsive approaches to STEM curriculum development and instructional practice engaged by teachers in the DINÉ/TLSI?

Methodology:

∙ Collective case study (also called “multiple case design”): Multiple cases are studied in order to better understand an issue or phenomenon (Creswell 2012; Johnson and Christensen 2012; Stake 1995; Yin 2008). Within our case study design, each seminar cohort of each year is a case (i.e., unit of analysis).

∙ Critical Indigenous Research Methodologies (CIRM): Developed out of a long tradition of Native scholars and communities who have argued that research with Indigenous peoples must adhere to a set of guiding principles. These principles include fore-fronting the inherent sovereignty and self-determination of tribal nations, honoring and building on relationships within and between researchers and community members, and pursuing research questions that will advance community needs and interests (Brayboy, Gough, Leonard, Roehl, and Solyom, 2012; Smith, 1999; Wilson 2008).

Data Sources:

∙ Pre- and Post-program surveys with teachers.
∙ Teacher interviews.
∙ Faculty PD leader interviews.
∙ Curriculum units authored by teachers.
∙ Final presentations of curriculum units integrated into teacher classrooms.

Project Overview

There is a long-established body of knowledge about effective professional development (PD) for STEM teachers, but very little of it has been applied and studied in Indian Country. This project provides concrete examples and knowledge about the ways culturally responsive approaches to STEM PD, curriculum development, and teacher practice are taken up within two distinct rural, Native Nations in the southwestern U.S.

DINÉ: Diné Institute for Navajo Nation Educators – PD for K12 teachers in school on and bordering the Navajo Nation.

TLSI: Teacher Leadership Shiłghózhó Institute – PD for K12 teachers in Apache-serving schools

∙ Both programs are grounded in culturally responsive principles and what we know from the robust scholarly work on Indigenous education and Native Nation Building.

∙ Both programs are long-term (approx. 8 months) to ensure lasting impact with educators. Both virtual and in person meetings.

∙ Both programs intentionally cultivate collaborative relationships among preK-12 educators, Elders, and NAU faculty/staff.

∙ Each teacher produces a practice-oriented document. This makes their learning immediately useful for them, and it contributes to a growing repository of culturally responsive resources for preK-12 schools serving Navajo and Apache students. These are all published online in a free, searchable database.

∙ Every curriculum unit must align to district, state, national, and either Department of Diné Education standards or CRAIS Tool elements.

Participation in STEM PD Seminars

<table>
<thead>
<tr>
<th>Program</th>
<th>Year</th>
<th>Seminar Title/Topic</th>
<th>Number of Teachers</th>
</tr>
</thead>
<tbody>
<tr>
<td>DINÉ</td>
<td>2019</td>
<td>The Human Body: Marvels of Physics, Chemistry and Biology working together!</td>
<td>6</td>
</tr>
<tr>
<td>DINÉ</td>
<td>2019</td>
<td>Clean Air and Water on the Navajo Nation</td>
<td>7</td>
</tr>
<tr>
<td>DINÉ</td>
<td>2020</td>
<td>Unpacking Place Value</td>
<td>7</td>
</tr>
<tr>
<td>DINÉ</td>
<td>2021</td>
<td>Patterns, Relations, and Functions</td>
<td>5</td>
</tr>
<tr>
<td>DINÉ</td>
<td>2021</td>
<td>Forests and Climate Change</td>
<td>10</td>
</tr>
<tr>
<td>DINÉ</td>
<td>2022</td>
<td>Solving Problems Through Problem Solving</td>
<td>3</td>
</tr>
<tr>
<td>DINÉ</td>
<td>2022</td>
<td>Toxic Waste and Indigenous Environmental Justice</td>
<td>2</td>
</tr>
<tr>
<td>TLSI</td>
<td>2022</td>
<td>Stewardship of Trees and Forests for Environmental and Human Health</td>
<td>14</td>
</tr>
<tr>
<td>DINÉ</td>
<td>2023 (in progress)</td>
<td>Understanding Our World through Geometric Reasoning</td>
<td>4</td>
</tr>
<tr>
<td>DINÉ</td>
<td>2023 (in progress)</td>
<td>Quantum Technologies: Preparing students for the next technological revolution</td>
<td>10</td>
</tr>
<tr>
<td>TLSI</td>
<td>2023 (in progress)</td>
<td>Nature-based Learning</td>
<td>9</td>
</tr>
</tbody>
</table>

Acknowledgement & Contact Info

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Resources to Explore

Click on the QR code to find:

∙ CRAIS TOOL
∙ Teacher-authored curriculum units
∙ Institute for Native-serving Educators website
∙ Links to our related publications

Key Lessons Learned

Partnerships are never neutral

Wellbeing always matters

Native Nation (re)building should always be the goal

Publications

https://doi.org/10.26200/jrrr3604

https://doi.org/10.1080/15595692.2021.1956342

https://doi.org/10.1080/00489635.2021.1892287

https://dx.doi.org/10.18116/jiece.11(1).1-14

The eJournal of Indigenous Early-Childhood Education. 11(1), 1-14.
https://dx.doi.org/10.18116/jiece.11(1).1-14