Teaching Mathematics with Indigenous Languages and Cultural Lessons

Imparting Global Competencies for Student Success
47th AMATYC Annual Conference October 28 – 31, 2021

Sandra Wildfeuer, Associate Professor Mathematics
University of Alaska Fairbanks
sjwildfeuer@alaska.edu

Acknowledgment to Alaska EPSCoR NSF award #OIA-1757348 and the state of Alaska for funding.
Abstract

This presentation shares how a mathematics educator at the University of Alaska Fairbanks is preparing future certified elementary teachers to consider both the Alaska Math Standards and the Alaska Cultural Standards in the preparation and delivery of mathematics instruction. In cooperation with the university and a local school district, each pre-service educator participates in a year-long internship training in an elementary classroom, where they work with a mentor teacher. Indigenous place-based educators learn to teach mathematics in a way that is culturally responsive to their students. This includes translating materials into their Native language and modifying curriculum and delivery methods, when appropriate.
I acknowledge the Alaska Native nations upon whose ancestral lands I live and work.

In Fairbanks, our Troth Yeddha' Campus is located on the ancestral lands of the Dena people of the lower Tanana River.

I acknowledge the Indigenous peoples of what is now the state of Arizona and recognize that we are on the ancestral lands of the Akimel O’odham tribe and before that the Hohokam people.
There are 229 recognized sovereign Native entities in Alaska.

In 2019, the state’s population was 65% White, 16% Alaska Native, with an additional 8% represented by two or more races.

Outside of the two largest urban areas the population is 54% White, 31% Alaska Native, with 7% represented by two or more races (2020).

Both the Northern region and the Southwest region have populations that are near 70% Alaska Native.
Alaska Needs teachers

Teachers prepared in Alaska are more likely to stay in Alaska.

The state has to hire from the “lower 48” because not enough graduates in Alaska.

Teacher turnover is highest in rural, off the road system communities with higher percentages of minority students.

Teacher representation
About 25% of students are Alaska Native, and only about 5% of teachers.

(Hill & Hirshberg, 2013)
Preparing Culturally Responsive Elementary Teachers

Mission

The UAF School of Education is dedicated to culturally responsive, place-based teaching, counseling, research and service for Alaska's diverse communities.

- We offer hands-on and interactive degree programs.
- We work closely with local school districts to provide fieldwork experiences and a yearlong internship.

ED 478 ED 678 Math Methods and Curriculum Development

Elementary Interns (pre-service teachers) are placed in an elementary classroom with a mentor teacher in a school district. Simultaneously, the intern is enrolled in university coursework with content specific instructors. In Math Methods, interns are responsible for learning how to teach the Alaska Mathematics Standards and the Alaska Cultural Standards. Interns develop content rich lesson plans and gradually assume more responsibility in the classroom.
### Alaska Cultural Standards adopted by the state in 1998

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A.</strong> Culturally-responsive educators incorporate local ways of knowing and teaching in their work.</td>
<td></td>
</tr>
<tr>
<td><strong>B.</strong> Culturally-responsive educators use the local environment and community resources on a regular basis to link what they are teaching to the everyday lives of the students.</td>
<td></td>
</tr>
<tr>
<td><strong>C.</strong> Culturally-responsive educators participate in community events and activities in appropriate and supportive ways.</td>
<td></td>
</tr>
<tr>
<td><strong>D.</strong> Culturally-responsive educators work closely with parents to achieve a high level of complementary educational expectations between home and school.</td>
<td></td>
</tr>
<tr>
<td><strong>E.</strong> Culturally-responsive educators recognize the full educational potential of each student and provide the challenges necessary for them to achieve that potential.</td>
<td></td>
</tr>
</tbody>
</table>
Culturally Responsive Teacher Competencies are evaluated in addition to content and process standards

From the Week of Teaching Mathematics Detailed Lesson Planning Assignment Rubric:

3-1  Develop and teach a variety of units or lessons that meaningfully incorporate characteristics of the student’s and local community culture into instructional strategies that support student learning

4-5  Connect content in a teaching activity to students’ prior knowledge and to practical “real-life” situations encountered outside the school (especially in the students’ community)

5-1  Recognize the differences in cultural, linguistic and geographic backgrounds of students and demonstrate the ability to build upon the diversity within the classroom in their teaching responsibilities (e.g., lesson and unit development, assignments, assessments, classroom structure and management)
Prioritize policies and practices that position multilingual learners so that they can access, engage, and thrive in mathematics education.

- The use of students’ first language is a human right, and should be promoted in the mathematics classroom.
- Race, class, culture, language and their intersections play key roles in the teaching and learning of mathematics.
- Multilingual learners should be viewed as students who possess knowledge, strengths, and resources.
- Leaders and teachers from mathematics and second-language acquisition should work collaboratively to accomplish this work.
Indigenous languages in Alaska

**History**  Native language and dance were banned in schools, and students were abused and punished.

- Scars remain, where some elders still won’t speak because of how badly they were treated.
- For many communities, this led to a divide between local knowledge and the school and a loss of the local language.

In 2014, the state officially recognized 20 Alaska Native languages as official.

The bill names the Inupiaq, Siberian Yupik, Central Alaskan Yup'ik, Alutiiq, Unangax, Dena'ina, Deg Xinag, Holikachuk, Koyukon, Upper Kuskokwim, Gwich'in, Tanana, Upper Tanana, Tanacross, Hän, Ahtna, Eyak, Tlingit, Haida, and Tsimshian as official languages, along with English.

Currently, the Alaska Native Student Success Initiative is calling for a College of Alaska Native Language to span the University of Alaska system.

- Oral and written
Developing Models

Working with Elders

Immersion schools

Language gatherings

Our Mission Statement

Ayaprung Elitnaurvivmi elluarrluta Yugtun qaneryaram tunginun elitnauriciqukut: ellaturivkarluki, taikanivkarluki Yugtun piciryaraput, qaneryaraput, yuuyarput-llu.

We, the community of Ayaprung Elitnaurvik, will strive to provide a high quality Yugtun immersion education: empowering our diverse students by strengthening their knowledge, use, and understanding of Yup’ik core values, language, and culture.
Indigenous language and mathematics instruction for interns

- For indigenous interns, some have lived in a rural community and some have not.
- Some are fluent in their Native language, and others are not.
- Some communities have a high percentage of residents that speak in a local language, and others do not.

Interns teach counting in a Native language, or invite an Elder to speak

Translanguaging - the ability to communicate in between languages to facilitate meaning making

- Fluent Native speakers often switch between English and the Native language to explain concepts to students, or to translate what the curriculum is stating.
References

Alaska Population Overview 2019 Estimates (December 2020) ISSN 1063-3790, Department of Labor and Workforce Development, Research and Analysis Section


Alaska Native Language Center. https://www.uaf.edu/anlc/languages.php


Ayaprun Elitnaurvik. https://ayaprun.lksd.org/

Bureau of Indian Affairs, Indian Entities Recognized and Eligible To Receive Services From the United States Bureau of Indian Affairs, Bureau of Indian Affairs Federal Register / Vol. 82, No. 10 / Tuesday, January 17, 2017

Guide to Implementing the Alaska Cultural Standards for Educators. 2012. Alaska Department of Education & Early Development

