



Developing a Place-based STEM Education Model for Cultural Connections to Alaska Science (CCAS)

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STATEWIDE SNAPSHOT

This initial project year is dedicated to the first five stages of the CCPM.



Interior Alaska: Team Building is underway in the Gwich'in Athabaskan community of Fort Yukon. Meetings with Tribe, school district, and community members have occurred. Potential STEM topics have been explored. Including knowledge bearers from other communities within the region on the CCAS Team is important to Fort Yukon. CCAS team members have joined community events, regional meetings and conferences.



Northwest Arctic: The Inupiaq CCAS Team in Kotzebue has selected caribou as the first topic to cover in this region. Caribou are a key subsistence resource nutritionally and culturally. Relevant themes may address the health, lifestyle and habitat of these animals as well as responsible harvest, use and stewardship. Local content has been collected and the Draft Stage has begun. Initial CCPM training with the school district team has occurred to support the district's own science curriculum development agenda.



Southcentral Alaska: The Kodiak CCAS Team is in the Development Stage with a focus on the topic of reading the ocean. Resources will address how to interpret visual and physical clues from the ocean, weather and geography to support navigation and water safety. Fishing is an important local industry and raising ocean-literate youth is critical. An expanded Sugstun lexicon is possible for this area due to deep language expertise on the team. Meetings with Tribes and other local partners have occurred. Local interviews and footage for product development will be collected in July.



Southeast Alaska: Metlakatla's CCAS Team of Tsimshian knowledge bearers has selected currents and tides as the focus of their first video and lesson. Strong currents and rapid tide shifts, as well as currents driven by high winds in some seasons are characteristic here. Local youth are divers, fishers, harvesters and recreators in this dynamic context. The education materials are currently in the Draft Stage and aim to increase safety in local careers and cultural practices, as well as building a foundation for future innovation. In addition to development, this CCAS Team has taken it upon themselves to identify the cultural values important to address during CCAS videos and lessons.

OVERVIEW

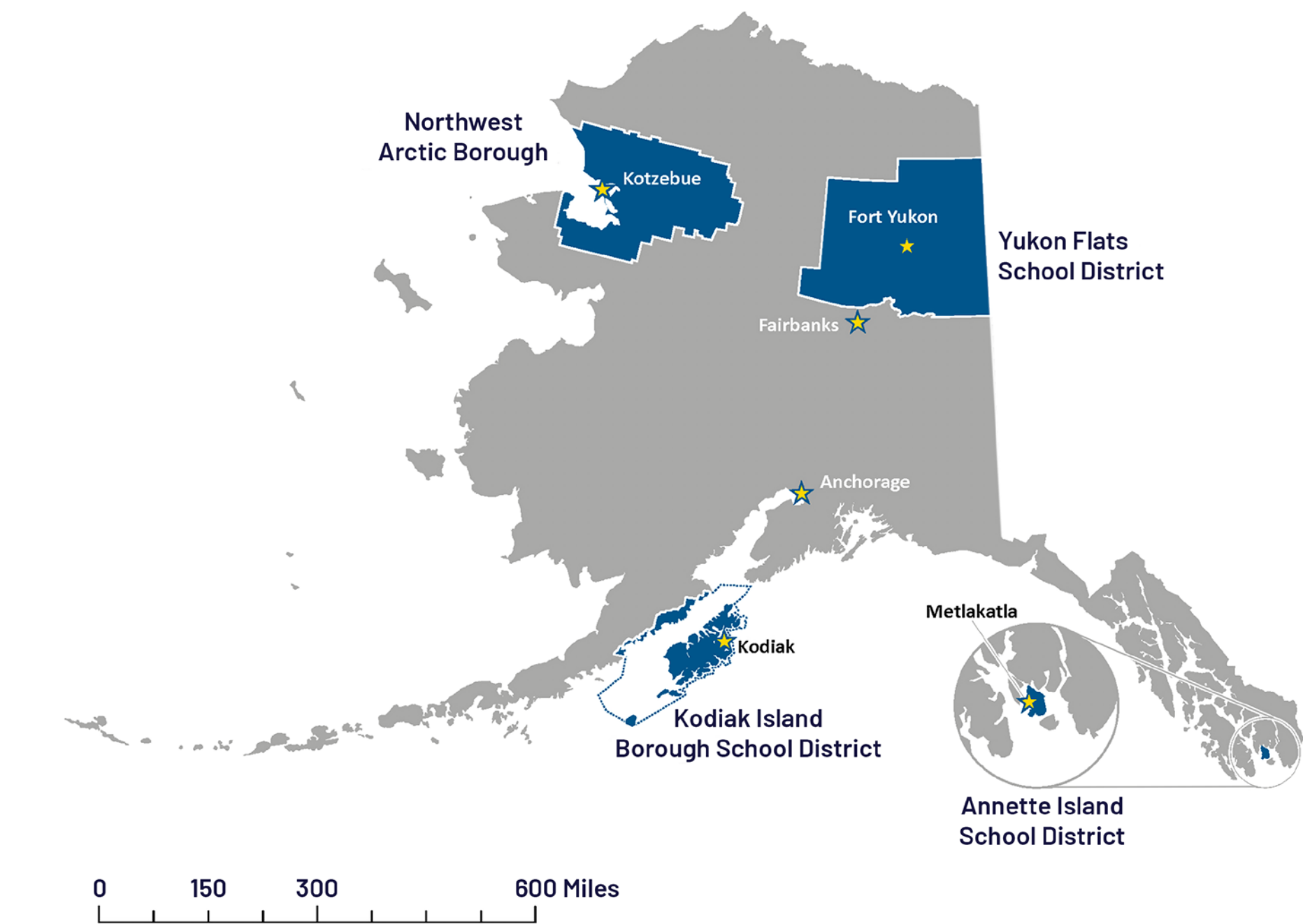
Project research scaffolds upon prior work (NSF-DRK-12: 1812888) to explore the effectiveness of the Cultural Connections Process Model (CCPM). The model supports institutional + Indigenous co-production of place-based K-12 STEM education resources. The research is conducted by an Alaska Native researcher. Prior research tested the model in one rural Alaska school district (Northwest Arctic Borough) and grade level (middle school). This project applies the model to a different grade level (high school), four geographic regions of Alaska (northwest, interior, southcentral, southeast), and four Indigenous cultures (Inupiaq, Gwich'in, Tsimshian, Sugpiaq).



Metlakatla community member Matthew Bergtold shares knowledge of currents and tides for the CCAS education resources.

HYPOTHESIS

CCPM implementation with a larger and more diverse group of Alaska Native communities will result in place-based education products that will broaden participation in STEM by successfully engaging underserved and disadvantaged Alaska Native students within and outside the communities where the resources were co-produced.



PROJECT PLAN

- » Form regional CCAS Teams in 4 corners of Alaska.
- » Co-produce with the CCPM (see below) 10 videos + 10 lessons.
- » Test new resources locally, then broadly.
- » Collect data on CCPM and resource transferability, adaptability, sustainability.
- » Publish findings and education products.
- » Train school districts to use the CCPM.
- » Provide teacher professional development.
- » Create training videos.

Cultural Connections Process Model for Co-Production of STEM Education Resources



OUTCOMES

Short Term Outcomes: Increased use of CCPM and awareness of Alaska-based teaching tools – Increased community engagement in education design and development – Partnerships among Alaska Native organizations, school districts, UAF – Project website makes Alaska-based CCPM resources freely accessible to educators – CCPM-based resources and science research are enriched by diverse perspectives and generational wisdom – Improved student attitudes and engagement in science

Mid-term Outcomes: Alaska educators use video-based training – Training increases awareness/use of Alaska-based resources to contextualize science teaching – As CCPM and resources are used across the state, Native student science engagement increases – Project research data are analyzed and published – CCPM established as transferable, adaptable, sustainable co-production model

Long Term Outcomes: Organizational and institutional support sustains the work of regional and/or statewide CCAS Teams – Collection of Alaska-based resources grows – Peer-reviewed articles inform science and Indigenous education communities nationally, worldwide – Place-based education becomes accessible for rural Alaska Indigenous students – PBE becomes the norm in Alaska science classrooms, increases Alaska Native student engagement – Alaska Native participation in science increases

RESEARCH QUESTIONS

Explore the transferability, adaptability and sustainability of the CCPM and the resources developed using this approach.

- 1 How can the CCPM be implemented effectively with a more culturally and geographically diverse CCAS Team?
- 2 With a broad selection of Alaska schools, how effectively do the CCPM-based resources: a) increase student engagement; b) help students contextualize science concepts to place; and c) engage culture bearers in the learning process?
- 3 To what extent do CCPM-based products complement Indigenous theoretical frameworks?
- 4 Which training methods and resources are most useful in preparing school district staff members to use the CCPM?

PRODUCTS

10 Alaska science **education videos** featuring local knowledge bearers

- » Everyone speaks for themselves
- » No cross-cultural validation necessary
- » Open and close with Indigenous knowledge bearers
- » Credit and compensate contributors
- » Place-based footage
- » Modern place-based illustrations, animations and data visualizations
- » Indigenous language inclusion

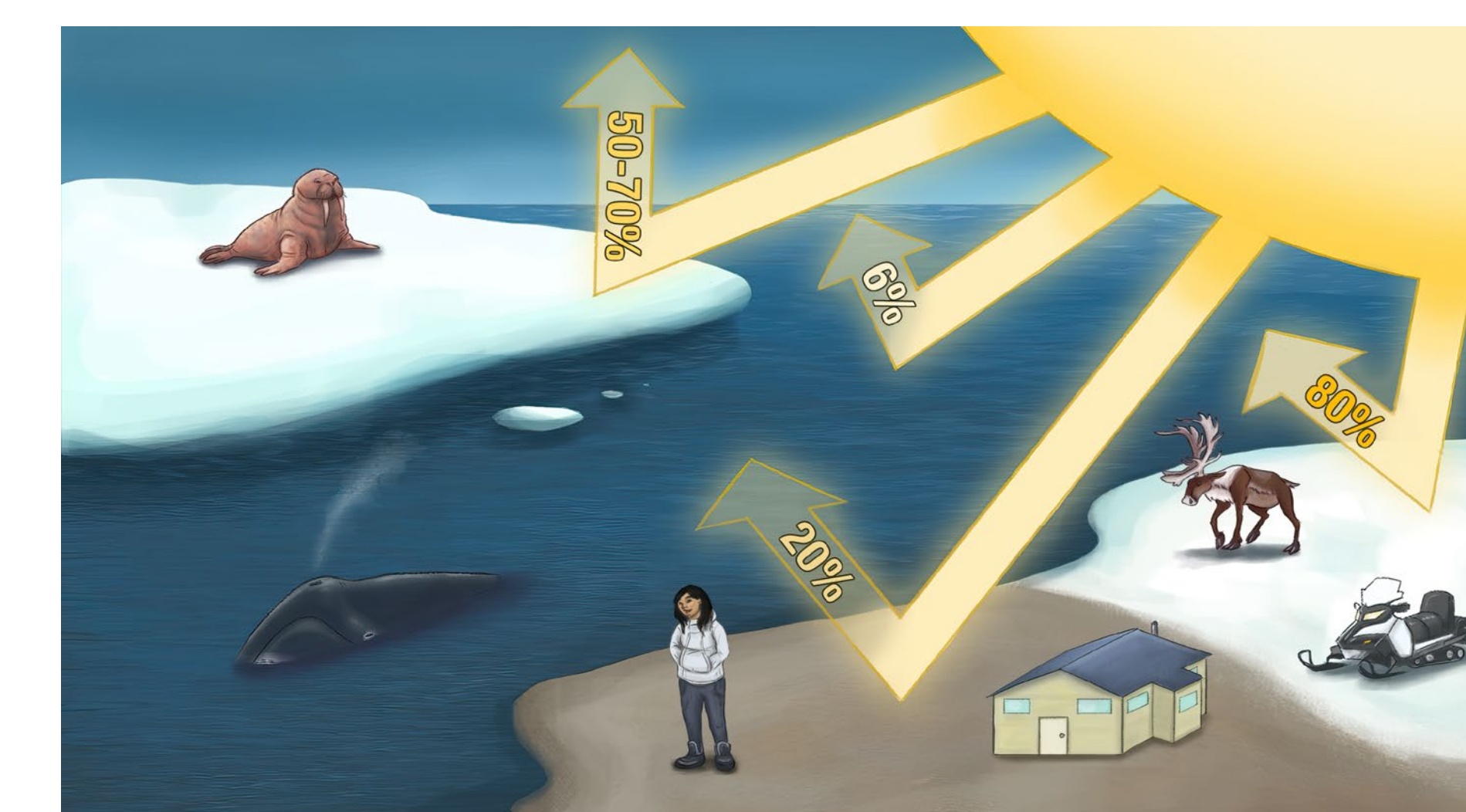
10 hands-on **high school lessons** linking videos to standardized curriculum

- » Visually rich
- » Indigenous language inclusion
- » Critical thinking questions throughout
- » Place-based photos, illustrations, data
- » Quotes from local knowledge bearers
- » Hands-on
- » Collaborative learning
- » Alaska Native Value inclusion
- » Consensus-based
- » Contributors credited and compensated
- » Student and teacher versions of the lesson plans

Teaching kits with classroom supplies for all 10 activities

Professional Development **training videos**

- » Using the Cultural Connections Process Model
- » Using the CCAS educational resources



Snow reflection lesson graphic from the Qannisquq Student Guide.

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Research co-PI Topkok's methodology for researching with Indigenous participants uses the Katimarugut, formalized in his dissertation with help from Inupiaq participants (Topkok, 2015). The project's research methods align with: Guidelines for Respecting Cultural Knowledge (ANKN, 2000); Coolangatta Statement on Indigenous

Rights in Education (Read, 2006); United Nations Declaration on the Rights of Indigenous Peoples (UN, 2007); "Mapququt Inuuniaiqniymi" (Our Blanket of Life, NSBSD, 2010); the Inupiat Ilitqisat (cultural values) of the Inupiat people of Northwest Alaska (ANKN, n.d.); the "Kheegwadadhaaka" (We Just Keep the Fire Going) Framework (Fisher, 2018); "Liitukut Sugpiatstun" (We Are Learning How To Be Real People, Drabek, 2012); and Raven Bloodlines: Tsimshian Identity: An Autoethnographic Account of Tsimshian Wil'naat'at, Politics, Pedagogy, and Law. (Greening, 2017).

The project relies on Community-Based Participatory Research (Barnhardt, 2005a; Castagno & Brayboy, 2008; Israel et al., 2008; U.S., 2013) and builds upon previous work testing the CCPM in the community of Kotzebue, Alaska in collaboration with Hannah Paniyavluk Loon, Lena Suuyuk Hanna, Lance Qaluraq Kramer, and Macy Kikiktagrak Kenworthy.