



Watersheds as Place

Integrating Biocultural Awareness and Experiential Place-based Professional Development

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Abstract

Project CuRRENT (Culturally Relevant River Education for Nature-based Teaching) established a professional development program that offers experiences and resources to assist educators with integrating interdisciplinary STEAM curriculum and Indigenized instruction with place-based, culturally relevant, local watershed education. By highlighting the significance of arts-based and hands-on immersive experiences within science learning and exploring the reciprocal relationship we have with nature, this project aims to increase teachers' knowledge of and self-efficacy with connecting to biocultural place and embedding place-based and Indigenous Knowledge into STEAM.

Keywords

STEAM education, Arts-Based Education, place-based education, watersheds, Indigenized learning, Biocultural Relationships, [North Dakota Native American Essential Understandings \(NDNAEU\)](#)

Framing

Project CuRRENT professional development, as our colleagues have [described elsewhere in this issue](#), focuses on building teachers' biocultural knowledge and strengthening their self-efficacy with implementing culturally relevant, place-based pedagogical approaches within science education. Connecting culturally relevant pedagogy with curricula focused on identity, presence, and intentionality makes science education engaging, empowering, and personally relevant (Walker, 2019). In this approach, both teacher and student develop greater awareness of their own identity, identities of others, and the connections between them. So, too, for the non-human world. Place-and nature-based learning encourages us to consider how biocultural diversity—that is, the relationship between biological and human communities—influences connections among humans and their environment (Cocks, 2010). Nature-based learning boosts academic learning, personal development, and environmental stewardship, while fostering an emotional connection to place (Kuo, Barnes, & Jordan, 2019). Our work with teachers in Project CuRRENT supports these assertions.

Project CuRRENT's three-year study included seven online learning modules facilitated through the University of North Dakota's (UND) Blackboard learning site. Each module centered on one of the seven [North Dakota Native American Essential Understandings \(NDNAEU\)](#) and contained instructional tools to Indigenize the [Next Generation Science Standards \(NGSS\)](#). The modules incorporated a diversity of learning resources with content that accommodated different learning styles and encouraged self-reflection and interaction among participants. To support teachers' learning experience, we offered four online synchronous debrief sessions over Zoom to allow opportunity to ask questions face-to-face. We held in-person interactions at UND. We also offered two summer workshops, one each summer, each consisting of two full-day agendas focused on place-based integrated STEAM and the International Water Institute's River of Dreams program, which reinforced the learning modules.

The workshops allowed teachers to experience hands-on learning in activities that they could use in their own classrooms. This created a collaborative learning environment for teachers across different grade levels and vastly different school demographics. Building on the content provided in the modules and at the workshops, teachers created lesson plans by personalizing the material to relate it to their grade level, geographic location, and different educational concepts linked to local biocultural history. These lessons were later implemented in their own classrooms and observed by a project member.

Arts-based Experiences Within Science Learning

We all see the world from a unique perspective. Our own meaning of things is influenced by our cultural backgrounds, personal attributes, and past experiences. Acknowledging this is fundamental to pluralistic and arts-based forms of science learning that honor diverse forms of awareness. As one participant stated, “artwork is one way for us to communicate how we feel and what we want to say.” Others discussed how they perceived their own emplaced story, why they felt drawn to using certain materials, and how their identity influenced their experience and became embedded into the materials from nature. This same idea pertains to all learning experiences. Through workshops, we found that teachers tied their identities and lived experiences to place and materials found in the watershed. This deepened their awareness of biocultural relationships and prompted them to learn and share with others. Science education is often perceived as objective, without cultural or subjective context, but our experience accentuates the opposite. Through the expression of personal and cultural funds of knowledge, teachers in our program developed a stronger sense of self-efficacy in teaching across STEAM fields, employing an expressive, relational framework.

Participants used found natural objects in the creation of unique pieces of art. As one person shared, “the artwork that we made ... is one way for us to really communicate what we feel, communicate what we want to say, because when you look at a picture, when you look at the whole picture alone, it’s not just the outside, there is something inside the art... a story that you want to tell.” Making the connection between nature-based art and their own stories extended to their notions of working with students. Such projects, another participant explained “let your students find ways to tell stories and get to know them more... for me, my artwork was a connection to my hometown.”

When exposed to lesson content revolving around the topic of the beaver, some participants pointed out how they had never seen a beaver before in real life. This prompted discussion about how lessons can include more concrete, locally situated content, or learning experiences that require more abstract thinking if there is limited possibility of exposure to a certain topic in one’s immediate environment. Both scenarios can involve engaging material that will aid in a deeper understanding of the content, such as in the classroom setting at one of our summer workshops, teachers worked together to create miniature beaver dams using materials from nature. Learning from these different lenses stimulated awareness of oneself, other beings, and the natural world. It also increased appreciation for the similarities and differences that were discovered in those cultural exchanges.

The lack of ecological awareness was a unique challenge for workshop facilitators. We had a strong cohort of international teachers working in rural schools who had no experience with wildlife, though they had tremendous knowledge of their own biocultural history. This forced us to reckon with what funds of knowledge teachers bring to their lessons and how we might foster a greater level of engagement by providing deeper accounts of local biocultural history.

The Importance of Hands-on Immersive Experiences

Hands-on, immersive experiences in the outdoors allows for intimate exposure that deepens understanding of the biocultural context in which it is being taught. What is learned from a book is just an approximation of the natural world. There is significant importance in being emplaced outside of the classroom; direct relationships stimulate our emotions and observational skills and therefore strengthen our ability to learn and remember. As stated by a participant after time spent outdoors, “it makes the connection more relevant.” Learning by doing helps us connect new and previous knowledge more easily. After walking around campus, gathering nature items for an art project, participants discussed how connecting things to emotions makes them more memorable. Besides offering new hands-on ways to step out of their comfort zone, the workshop helped participants recognize the diversity of beings and environments around them.

The workshops also offered time for in-person learning and collaboration. A full day’s-worth of experiences provoked conversations, exchange of ideas and feedback. Meeting in person each summer supported networking and offered teachers time to create and critique lessons in a supportive hands-on setting. The elementary teachers were able to learn from and alongside each other as they worked to adjust Indigenized STEAM lesson content to meet different ages’ needs. The workshops consisted of a blend of indoor and outdoor activities both on UND’s campus and elsewhere in the community. On campus, time was spent at UND’s museum of art integrating art practices into STEAM and walking around campus to observe nature that goes unnoticed in our day-to-day lives. At the education building time was allocated to place-based instruction, brainstorming, and planning, as well as activities such as small group stations showcasing ways to integrate Indigenous learnings into STEAM. Exploring nature elsewhere in the community included adventures such as a wondering walk at a park on the Red River, followed by activity packets with watershed maps to color, as well as the option to paddle on the river.

The seven online modules, each aligning to one of the NDNAEUs, consisted of video interviews of Indigenous Elders and other educational content about Indigenous

history, values, and beliefs. They included activities such as discussion boards, readings, journal prompts, guided observations in nature, and additional resources. The variety of educational material and delivery emphasized that hands-on, immersive experiences can be facilitated through both online and in-person settings as well as in a variety of forms.

Our Reciprocal Relationship with Nature

One project goal is to promote a greater awareness of Indigenized forms of learning within STEAM education. A central value is the significance of the reciprocal relationships between humans and nature. Participants explored this through workshops and online modules, translating their learnings into lesson material to use in their classrooms. They learned strategies for incorporating nature-based learning activities both inside the classroom and while physically out in nature.

Through direct experiences, developing awareness of biocultural systems, and growing their own sense of place, participants learned self-discovery while connecting to others and the environment. We see this as an extension of David Sobel's famous notion that "what's important is that children have an opportunity to bond with the natural world, to learn to love it and feel comfortable in it, before being asked to heal its wounds" (1996;9). This sentiment was exhibited at a park along the Red River, when participants pointed out how this workshop has taught them to be more mindful of the connection, purpose, and value of things around them and the importance of showing respect for things that may be particularly meaningful to another individual or community. While taking on a "one with nature" mindset, participants reflected on their gratitude for our relations with the natural world; how nature gives us things and how we have a role to protect and care for nature in return.

Throughout the workshop, we found that immersive and place-based experiences helped foster the connections between teachers and nature. The materials we used included online sources that centered on Indigenous perspectives such as [Teachings of Our Elders](#) and [Nanabush and the Giant Beaver](#), along with the books [We are Water Protectors](#) by Carole Lindstrom and Michaela Goade and Monika Vaicenavičienė's *What is a River?* Interactive and cooperative role-playing games that built awareness and nurture reciprocity between people and nature were likewise impactful. Games such as Owl and Mouse and Be a Beaver encouraged participants to become another creature, while considering their adaptations to place and how their natural histories intertwine with other creatures and human society. Lastly, other suggestions pertaining to Indigenous studies include the books *The Water Walker* by

Joanne Robertson and Julie Flett's *We All Play*, both of which emphasize the role of nature-based learning.

Conclusion

The workshop encouraged growth of culturally relevant learning by supporting teachers' self-efficacy with implementing those learnings into STEAM instruction. Nature-based teaching presents teachers and students with meaningful, immersive learning experiences that challenge them intellectually, enhance their awareness of the natural world, and encourage their personal development. Through arts- and place-based approaches, the workshops emphasized recognizing and appreciating biocultural relationships and the value in their diversity and interconnectedness. The lessons and activities involved helped advance care for the relationships that will sprout curiosity to continue to learn, grow, and make a positive impact on others and the environment.

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