

## Living in Relations

### Background

The long-term goal of the Living in Relations project is to improve science learning and school achievement for Native American children. Data from our project's studies of children's understandings of biology indicate that Native American children begin school with an advanced understanding of biology compared to their non-Native peers. This finding is also supported by early positive performance on standardized tests. However, this early overachievement is not sustained and leads to significant under-representation of Native American students in STEM fields. Understanding why and how this happens is a central purpose of our research. To do this, we explore the ways in which culture, cognition, and development are intertwined and impact teaching and learning, particularly at the epistemological level. In partnership with local Native American communities, our research team develops innovative science learning environments that build on students' cultural ways of knowing to develop robust, engaging, and empowering learning environments for Native American students. While our work explores these issues in Native American communities specifically, our findings are applicable to other non-dominant students.

### Documented Results

We have demonstrated a wide range of converging cross-cultural differences in knowledge, knowledge organization, and impacts on reasoning and sense making. For example, our studies have shown that Native American children are more likely to reason along ecological lines closer to that of complex systems than non-Native American youth. Further, when learning environments recognize these strengths, complex forms of inquiry are accessible in previously unengaged ways. We have also shown that when science learning environments incorporate the following design characteristics, Native American students' learning is significantly impacted. The design characteristics are: (1) use local, place-based instruction and hands-on experiences; (2) link community participation and practices with classroom learning; (3) premise on the idea that nature is not an externality, apart from humans, but rather that humans are a part of nature; (4) motivate and organize around a big idea, in our case the idea that everything is related and has a role to play in the universe (systems level or ecosystems thinking); (5) place science in an inter-disciplinary or holistic context and invite the learner to view phenomena from multiple perspectives and highlight the need for participation and leadership; (6) include community values, needs, language and experiences; (7) engage phenomena from a seasonal/cyclical perspective; and (8) actively explore and address relationships and tensions between Native American science and Western science.

### Potential Applications

There are far reaching applications of our work particularly in the development of curricula and in teaching practice. Further, our research practices have had significant impacts on building local Native community capacity and increasing the number of Native people pursuing advanced degrees in disciplines related to our research.

### For More Information

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