

A close-up photograph of a hand holding a vibrant red, spiky flower. The flower has many thin, radiating stamens. The background is dark and out of focus.

# Jointly Negotiated Research in a Community-Based Setting

## Summary

In this paper, the authors describe a conceptual framework addressing culturally-based ways of knowing, and provide a summary description of their efforts to develop a community-based summer science program with a Native American tribe using this framework. To address the call to attract culturally diverse students to STEM fields, the authors advocate supporting students in their' navigation of multiple and perhaps conflicting epistemologies, and using them as resources to be built upon, rather than aiming to have students replace their personal epistemologies with canonical scientific ones. More than an example of the development of a summer camp curriculum, the authors provide examples of how they drew on Native students' knowledge and community practices to impact student learning.

## Research Brief

The authors' approach was to remove implicit valuing of Western modern scientific ways of knowing over others, and to recognize that Native science also embodies values and ways of knowing about the natural world. As an example of these differing orientations, the biological principle of "alive" shifted for urban Indian middle-school students depending on the context: given a sorting task of 16 pictures (animals, plants, water, sun, rocks, artifacts) they were asked what a science teacher and an elder would say is alive. Generally, the students said an elder but not a science teacher would say that rocks and water are alive. This research documents how students are aware of the differences between the epistemological contexts of school and community and points to a need to help students negotiate or coordinate these differences.

The summer program was designed with the involvement of community members (elders, parents, teachers, content experts, youth and interested others) and the explicit use of Native ways of knowing and valuing (See Bang et al. for more on the design) in the lessons. For example, learning about plant ecology was named "remaking relatives" based on a community-epistemology in which plants are relatives; students were in a medicinal garden that included plants that had been used for physical and ceremonial purposes for millennia; the students were asked to "visit" their relative plant daily, make observations and collect data such as

measuring growth and soil pH. Rather than setting up a division between Native and Western science, the researchers tried to take the perspective of the children who were moving between, in, and through multiple ways of knowing about the world in their curriculum, implementation and evaluation.

## RELATED RESOURCES

Bang, M., Medin, D., Washinawatok, K., & Chapman, S. (2010). Innovations in culturally based science education through partnerships and community. In M. Khine & I. Saleh (Eds.), *New science of learning: Cognition, computers and collaboration in education*. New York: Springer.

## SOURCE ARTICLE

Bang, M., & Medin, D. (2010). Cultural processes in science education: Supporting the navigation of multiple epistemologies. *Science Education*, 94(6), 1009-1026.

<http://dx.doi.org/10.1002/sce.20392>

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