Place-Based Earth Science Teaching

Steve Semken, ASU SESE • ESNO
When we envision, name, explore, inhabit, or in any other way experience a locality, we make it a place.
When we envision, name, explore, inhabit, or in any other way experience a locality, we make it a **place**.

What begins as undifferentiated space becomes *place* as we get to know it better and endow it with value. *Yi-Fu Tuan, Space and Place (1977)*
Places populate the **cultural landscape** just as landforms, water, and biota comprise the physical landscape.

[Landscape] may be defined as an area made up of a distinct association of forms, both physical and cultural. *Carl Sauer, The Morphology of Landscape* (1925)

Map of *Diné bikéyah*—homeland of the Navajo people—and adjoining lands

Rock Point Community School (1982)
We teach and learn about the Earth by means of places, whether in situ or by proxy.

Our access to space and time is how they happen in a given place.

Edward Casey, philosopher
People are naturally connected to places. **Sense of place** allows us to leverage this connection in our teaching.

*Sense of place* is the set of all meanings and attachments held by an individual or a group for any given place.

Both can be measured, whether *quantitatively* (surveys) or *qualitatively* (interviews, observations, analyses of artifacts) 

*e.g.*, Williams & Vaske, 2003; Williams & Semken, 2011

---

People imbue places with diverse meanings

People form attachments to meaningful places

---

*e.g.*, Brandenburg & Carroll, 1995
The power of place as an organizing theme for contextualized teaching has long been understood and utilized.

Indigenous (e.g., Native American) philosophies of education are place-based: prioritizing and transmitting locally situated knowledge for long-term sustainability (e.g., Cajete, 1994).

John Dewey (1916): Learning should be experiential and active, and situated in the learner’s immediate physical and cultural surroundings.

Río Tanama, Puerto Rico
Place-based teaching is fully situated in place. Typical characteristics of the approach include:

- **Experiential learning** in the field, environment, neighborhood (or online??).
- Use of *local examples and cases*: focus on Earth-system features and processes that occur or occurred locally or regionally.
- Integration of *artistic, humanistic, cross-cultural, and cross-lingual place knowledge* as relevant context for scientific inquiry and interpretation.
- Engagement with *relevant environmental and cultural issues and case studies* of local or regional significance.
- **Service-learning or creative projects** that offer return to the community.
- Teaching to promote *environmental and cultural sustainability* of places studied.
- Leveraging and enhancing *sense of place* to motivate learners and instructor alike.
Native American geological knowledge informs place-based teaching in Native American schools and communities. For example: a comparison of traditional Diné (Navajo) ideas of Earth as a system with the global Earth system science model reveals many similarities.

Semken & Morgan, J. Geosci. Ed. (1997)
Tsé na’alkaah 101: Indigenous Geology at Diné College

Yádihil: Sky

- Tsé na’alkaah: Geological inquiry
- So’ naalts’id: Impact cratering
- Diné bikéyah: A geological sense of place

Náháhtsáah: Dryland climates and climate change in the Southwest

- Ník’ashbaah: Processes of plate tectonics
- Tsé: Interpreting local rocks
- Tó be’iina: Ground and surface water resources
- Yízhosh: Surface processes and hazards on the Plateau
- ‘Alnáozt’i: Sedimentary rocks and ancient environments of the Plateau

Nohosdzáán: Earth

Earth Science in Arizona and the Southwest

at ASU

Semken, In the Trenches (2011)
Whatever and wherever you teach, situate it in your place... and leverage your sense of place!

semken.asu.edu
semken.asu.edu/bibliography