The Sense of Place as a Factor in Geoscience Learning

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We teach Earth, environmental, and ecological sciences in and about *places*.

- imbued with diverse *meanings* through human experience,
- and to which people develop strong emotional *attachments*.

The sense of place encapsulates our connection to places.

Sense of place = the set of all meanings and attachments a person or a group invests in a place

[Brandenburg & Carroll 1995, Williams & Stewart 1998]

Round Rock, Navajo Nation, Arizona
Sense of place has been well-characterized in environmental psychology and cultural geography.

Place meaning*
Cognitive, affective; Environmentally, socially constructed
[Young 1999, Stedman 2003a]

[Brandenburg & Carroll 1995, Stedman 2003a]

Place attachment
Affective


Place identity*
Emotional attachment: place as a repository for emotions and relationships

[Stedman 2003b]

Place dependence*
Functional attachment: capacity of a place to support goals or activities

*Validated psychometric instruments exist for these components, allowing for their characterization and measurement in different groups.
American Indian and long-rooted Mexican-American communities in the Southwest possess rich, culturally-mediated senses of place.

[Basso 1996; Cajete 1997, 2000; Alarcón 2002]

In spite of deep place attachment and familiarity with Earth systems... they have long been underrepresented in geoscience and other natural sciences

[e.g., Riggs & Semken 2001, NSF 2006]

Does teaching that contradicts or minimizes their senses of place help deter these students from scientific study and careers?

Globalization, careerism, standards-based teaching, entertainment media, pop culture, etc., divert people from meaningful engagement with places.

...with consequences [Relph 1976]

Misunderstanding, fear, avoidance of nature [Sobel 1996]

Possible harm to physical and mental health [Louv 2005]

Obliviousness to the aesthetic, cultural, ecological value of the local [e.g., Orr 1992]

Acquiescence in environmental and social degradation of surroundings [Orr 1992, Meyrowitz 1985]

Disinterest in geoscience and other natural science studies and careers? [Levine et al. 2007]
Place offers context and theme for meaningful teaching and learning.

Wisdom sits in places....You must remember everything about them.
      You must learn their names.
      You must remember what happened at them long ago.
      You must think about it and keep thinking about it.
Dudley Patterson, late Ndee (Western Apache) elder, in Wisdom Sits in Places (Basso 1996)

[Experiences in places are] profoundly pedagogical [in] nature.
Gruenewald 2003, Foundations of Place-Conscious Education

Place supplies the context; disciplines the tools.
Ault (in press), Achieving Querencia
In place-based teaching, sense of place defines the curriculum.

Local: focused on surrounding natural and cultural environments

Experiential: inquiry in field and lab with local features and materials

Trans-disciplinary: synthesizes geology, geography, climatology, hydrology, ecology, anthropology, history, art

Cross-cultural (sometimes multilingual): Incorporates or acknowledges different cultural perspectives on places and processes under study

Promotes environmental and cultural sustainability

[Gruenewald 2003; Sobel 2004; Semken 2005]
Authentically place-based teaching is experiential and trans-disciplinary.

It needs access to the outdoors and the community, and enough time for synthesis of ideas.

Classical natural history = model for P-B science

[Gruenewald 2003]

Places are (by definition) human as well as natural.

Infuse scientific and humanistic meanings and inquiry into the curriculum

Students of all backgrounds must be empowered to find meanings and form attachments.

Nobody should be marginalized by choice of place

Enrichment of the senses of place of students and teachers should be a learning outcome along with enriched content knowledge and skills.

[Semken 2005, Semken & Butler Freeman 2008]
Tsé na’alkaah 101: Indigenous place-based geology

Bilingual; organized according to concepts of Diné ethnogeology and attributes of Colorado Plateau geology

[Yádilhil: Sky]

Tsé na’alkaah: Geological inquiry

So’ naalts’id: Impact cratering

Diné bikéyah: A geological sense of place

Nohosdzáán dóó Yádilhil: Interactions of the Earth and Sky

Náháltsááh: Dryland climates and climate change in the Southwest

Dzil: Building the sacred mountains

Nik’ashbaah: Processes of plate tectonics

Tsé: Interpreting local rocks

‘Alnáozt’i’: Sedimentary rocks and ancient environments of the Plateau

Tó be’iina: Ground and surface water resources

Yizhosh: Surface processes and hazards on the Plateau

Tsézhin: Volcanoes and igneous rocks of the Plateau

[Semken & Morgan 1997, Semken 2005]
To engage a larger and more diverse student population.
Arizona: not presented as a politically defined state, but a complexly evolved and ruggedly beautiful desert-mountain **physical landscape** and a multicultural, historic, rapidly urbanizing **cultural landscape** in the midst of the Southwest USA.

- **Field work** when possible
- **Google Earth** when not

**Local** specimens, maps, images

**Geology and SW arts**

**Environmental and economic** exercises and case studies

**Southwestern writings**

**Capstone curriculum or service projects**
**Quantitative assessment of place-based learning**
Responses on Likert scale = place attachment and meaning *scores*

<table>
<thead>
<tr>
<th>Place Attachment Inventory (PAI) [Williams &amp; Vaske 2003, Semken &amp; Butler Freeman 2008]</th>
<th>Young’s Place Meaning Survey (YPMS) [Young 1999, Semken &amp; Butler Freeman 2008]</th>
</tr>
</thead>
<tbody>
<tr>
<td>This place is a part of me.</td>
<td>Ecologically important</td>
</tr>
<tr>
<td>This place is the best place for what I like to do.</td>
<td>Exotic</td>
</tr>
<tr>
<td>This place is very special to me.</td>
<td>Important to preserve</td>
</tr>
<tr>
<td>No other place can compare to this place.</td>
<td>Remote</td>
</tr>
<tr>
<td>I identify strongly with this place.</td>
<td>Educational</td>
</tr>
<tr>
<td>I get more satisfaction out of being at this place than at any other.</td>
<td>Unspoiled</td>
</tr>
<tr>
<td>I am very attached to this place.</td>
<td>Unique</td>
</tr>
<tr>
<td>Doing what I do at this place is more important to me than doing it in any other place.</td>
<td>Authentic</td>
</tr>
<tr>
<td>Being at this place says a lot about who I am.</td>
<td>Scientifically important</td>
</tr>
<tr>
<td>I wouldn’t substitute any area for doing the types of things I do at this place.</td>
<td>Adventurous</td>
</tr>
<tr>
<td>This place means a lot to me.</td>
<td>Fragile</td>
</tr>
<tr>
<td>The things I do at this place I would enjoy doing just as much at a similar site (reverse scored).</td>
<td>Unusual</td>
</tr>
</tbody>
</table>

Also content knowledge instrument: **Geoscience Content Inventory (GCI) [Libarkin & Anderson 2005]**
Qualitative assessment of place-based learning

Video- and audio-recorded classroom and field activities

Artifacts such as assignments, essays, and concept sketches

Semi-structured exit interviews

[Johnson & Reynolds 2005]
Humans make **places** by imbuing them with meaning. One can organize meaningful introductory geoscience curricula around places, not simply teach in or about them.

Places are **humanistic** as well as **scientific**. The **sense of place** (meaning + attachment) encapsulates the human connection to places, engaging both cognition and affect.

**Place-based teaching** should engage and leverage sense of place. Place-based teaching promotes **local sustainability** through understanding and service. Enriched sense of place is a **learning outcome** of place-based teaching.

Sense of place can be **characterized** and **measured** for assessment purposes.

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The first way of thinking and knowing has to do with one’s physical place…where one physically lives.

*One has to know one’s home, one’s village, and then the land, the earth upon which one lives.*

*These are the hills, canyons, valleys, forests, mountains, streams, rivers, plains, deserts, lakes, and seas—the place where you live….*

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*Gregory Cajete (Tewa), Indigenous science educator*