Place, place knowledge, and sense of place as themes for cross-cultural science curriculum

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Teaching and learning in the Earth, environmental, and ecological sciences occurs in and about places, which are localities imbued with meaning through human experience [Relph 1976, Tuan 1977].

Places populate the cultural landscape, just as landforms and biota make up the physical landscape.

A map showing the traditional boundaries of Dine biiyááh, homeland of the Diné or Navajo people. (Rock Point Community School, 1982).

Two views of the high-desert Colorado Plateau province of the Southwest USA.
An example of how a locality is made a place: Tsé bii’ ndzisgaii (‘Clearing Among the Rocks’) Monument Valley, Navajo Nation, Arizona-Utah, USA

Here are a few of the meanings of this place.

A home to indigenous families for millennia.

A unique geological landscape interpreted by Earth scientists.

A popular tourist destination.

But Navajos appeared only as extras in John Ford’s movies.

People and groups develop emotional attachments to meaningful places.
The sense of place encapsulates our connection to places.

Sense of place is the set of all meanings and attachments a person or a group invests in a place [Brandenburg & Carroll 1995, Williams & Stewart 1998]

Indigenous and historically long-rooted communities possess rich, culturally defined senses of place [e.g., Native Americans and Mexican Americans in the Southwest USA: Cajete 2000, Bonfil Batalla, 1996]

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, Huntoon & Lane 2007]

Does teaching that contradicts or minimizes their senses of place help deter these students from scientific study and careers? [Kawagley et al. 1999, Aikenhead & Jegede 1999, Riggs 2005, Semken 2005]
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 Earth science 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 2008, Achieving Querencia
In place-based teaching, curriculum is fully situated in place:

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

Authentically place-based teaching is experiential and trans-disciplinary.

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

... Classical natural history has been proposed as a model for place-based science curriculum [Gruenewald 2003].

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

... Therefore one must infuse both 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 the 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]
How does one leverage sense of place?

1. Draw examples and case studies from the surroundings


How does one leverage sense of place?

2. Integrate relevant and culturally diverse ways of understanding Earth systems.

   A comparison of indigenous Diné (Navajo) and mainstream models for the operation of internal and external processes on landscapes (Semken & Morgan 1997); Both models are used in the Indigenous Geology curriculum at Diné College.
How does one leverage sense of place?

3. Use indigenous place names and terms for natural processes and phenomena.

A schematic geologic cross-section of the Colorado Plateau province labeled with English and Diné terms.

How does one leverage sense of place?

4. Draw on Native and local artists and writers to infuse humanistic ideas about Earth.
How does one leverage sense of place?
5. Use place-conscious design elements in presentations and handouts.

How does one leverage sense of place?
5. Teach as much as possible in the outdoors and the community.
Conduct service-learning projects for local benefit.
How does one leverage sense of place?

6. Engage students in local and regional issues of sustainability.

Graphic syllabus for course Tsé na’alkaah 101: Indigenous place-based geology

Organized according to concepts of Diné (Navajo) ethnogeology and attributes of Colorado Plateau geology; Taught at Diné College.
Sense of place can be characterized, both quantitatively and qualitatively, in order to evaluate the effectiveness of a place-based curriculum.

[Semken & Butler Freeman 2008; Williams & Semken 2011]

- **Surveys** to characterize SoP and measure pre-post changes.

- **Ethnography:** Direct behavioral observations in classroom and field, and student interviews. Verbal, textual, content analyses and ethograms applied to data.

- Analysis of student-produced artifacts such as concept sketches [Johnson & Reynolds 2005] and essays

A 12-item survey of place attachment (one component of sense of place; Williams & Vaske 2003) administered to students

<table>
<thead>
<tr>
<th>Statement</th>
<th>Sample Question</th>
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<tbody>
<tr>
<td>This place is a part of me.</td>
<td></td>
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<tr>
<td>This place is the best place for what I like to do.</td>
<td></td>
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<tr>
<td>This place is very special to me.</td>
<td></td>
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<tr>
<td>No other place can compare to this place.</td>
<td></td>
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<tr>
<td>I identify strongly with this place.</td>
<td></td>
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<tr>
<td>I get more satisfaction out of being at this place than at any other.</td>
<td></td>
</tr>
<tr>
<td>I am very attached to this place.</td>
<td></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></td>
</tr>
<tr>
<td>Being at this place says a lot about who I am.</td>
<td></td>
</tr>
<tr>
<td>I wouldn't substitute any area for doing the types of things I do at this place.</td>
<td></td>
</tr>
<tr>
<td>This place means a lot to me.</td>
<td></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>
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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….  

Gregory Cajete (Tewa), Indigenous science educator (Cajete, 1994)
REFERENCES


