Teaching “spatially” with Web GIS

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http://www.ei.lehigh.edu/eli

Environmental Literacy and Inquiry Group
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Matt Diltz – Computer Science and Web interactivities
Jeff Remling and Scott Rutzmoyer – Web GIS
Farah Vallera – Data management
Middle school science teachers
ELI middle school curriculum

- Align instructional materials and assessments with science literacy learning goals.
- Use geospatial technology as a tool for learners to explore and investigate problems.
- Contextualize the learning of key ideas in real-world problems.
- Support teachers in adopting and implementing GIT and inquiry-based activities.
- Iterative stages of development: Prototype, pilot test, and field test with diverse 8th grade urban classrooms.

http://www.ei.lehigh.edu/eli/energy/
Where is the best place to locate a new wind farm?

http://gisweb.cc.lehigh.edu/energy/

ArcGIS viewer for Flex

Support Materials

- Online reference content for teachers
- Instructional Web GIS handouts: teacher guide, student handout, investigation sheet, assessment information
- Web GIS video tutorials

http://www.el.lehigh.edu/eli/energy/support
Energy Culminating Investigation: Island of Navitas

http://gisweb.cc.lehigh.edu/navitas/  ArcGIS viewer for Flex
## Findings

Geospatial technology integrated curriculum increases student’s knowledge of Energy concepts and spatial reasoning skills.

**Energy achievement and achievement by subscale for pre/post test.**

<table>
<thead>
<tr>
<th></th>
<th>Pre-test Mean (SD)</th>
<th>Post-test Mean (SD)</th>
<th>Gain (SD)</th>
<th>Standard Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entire Assessment</td>
<td>15.16 (5.10)</td>
<td>22.10 (7.18)</td>
<td>6.94 (6.04)</td>
<td>1.36***</td>
</tr>
<tr>
<td>(n=38)</td>
<td></td>
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<tr>
<td>Content Subscale</td>
<td>10.80 (3.83)</td>
<td>16.09 (5.48)</td>
<td>5.29 (4.81)</td>
<td>1.38***</td>
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<tr>
<td>(n=27)</td>
<td></td>
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<tr>
<td>Spatial Reasoning</td>
<td>4.36 (1.97)</td>
<td>6.01 (2.28)</td>
<td>1.65 (2.38)</td>
<td>.84***</td>
</tr>
<tr>
<td>Subscale (n=11)</td>
<td></td>
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***p<0.001
N=928

http://www.ei.lehigh.edu/eli/research/pubs

## Current Project: Tectonics

ArcGIS viewer for Flex
How do we recognize plate boundaries?

Tectonics Investigations

1: How do we recognize plate boundaries?

2: How does thermal energy move around heating and cooling objects and places?

3: What drives plate tectonics?

4: What happens when tectonic plates pull apart?

5: What happens when plates collide?

6: What happens when plates move sideways past each other?

7: Tectonics and Me – Where is the nearest plate boundary? What are the geologic hazards near my area?
Conclusions

- Geospatial technologies are more effective than “business as usual” methods at promoting spatial thinking and mastery of content.
- Web GIS is accessible in today’s classrooms.
  - User-friendly interfaces
- Effective Instructional design model for learning with geospatial technologies (Kulo, 2011).
- Embedded content and pedagogical supports for teachers are essential for classroom enactment.

http://www.ei.lehigh.edu/eli

Curriculum, support materials, and papers available at the Web address above

To access assessments, use:

Login: eliteacher
Password: 87dja92