Teaching "spatially" with Web GIS

Alec Bodzin, Denise Bressler, Farah Vallera, and Tamara Peffer
Lehigh University

DRL-1118677

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

Environmental Literacy and Inquiry Group

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

Alec Bodzin - Science and Environmental Education, Instructional Design
David Anastasio – Earth and Environmental Science
Dork Sahagian - Earth and Environmental Science
Violet Kulo – Instructional Design
Lori Cirruci – Lead classroom science teacher
Allison Teletzke - GIS; Earth and Environmental Science
Denise Bressler – Science Education
Tamara Peffer – Environmental Education
Christopher Dempsey – GIS; Earth and Environmental Science
Ryan McKeon – GIS; Earth and Environmental Science
Laura Turner – Instructional Design and Web Development
Matt Bennett – GIS; Earth and Environmental Science
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.

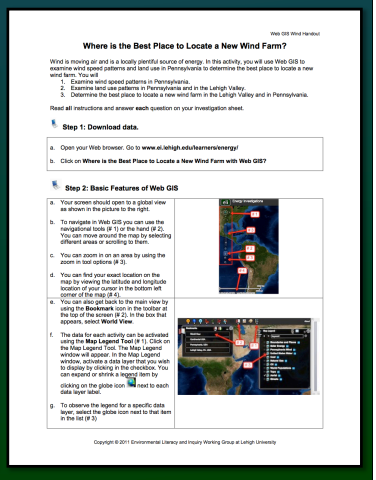
http://www.ei.lehigh.edu/eli/energy/

Where is the best place to locate a new wind farm?

http://gisweb.cc.lehigh.edu/energy/ ArcGIS viewer for Flex

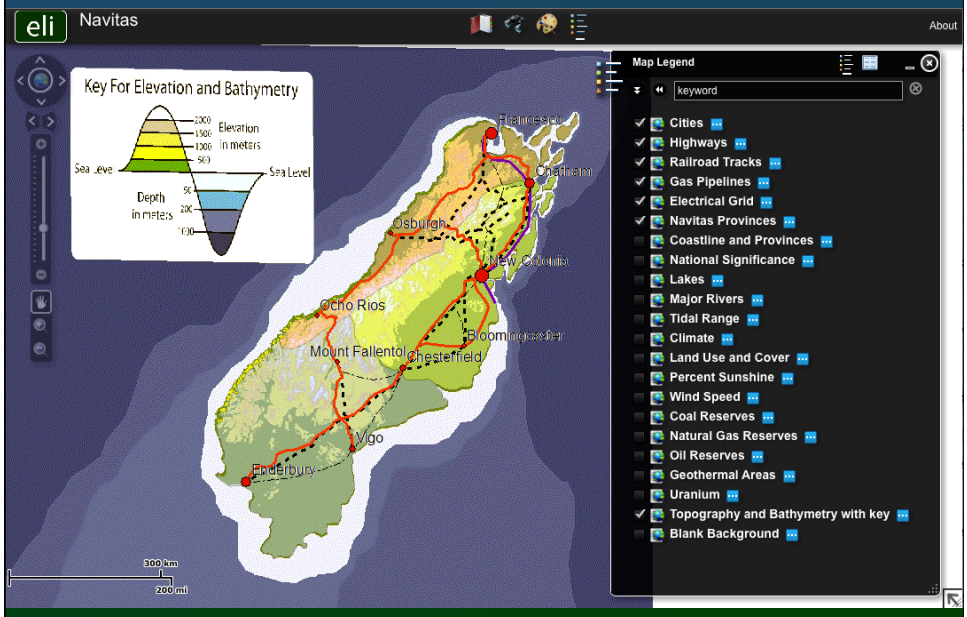
Support Materials

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

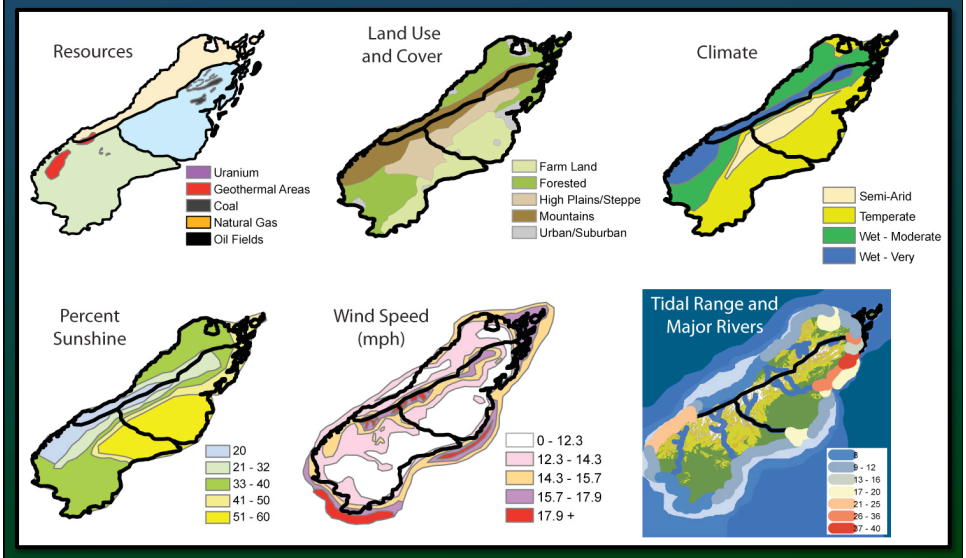


http://www.ei.lehigh.edu/eli/energy/support

Energy Culminating Investigation: Island of Navitas



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



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

Findings

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

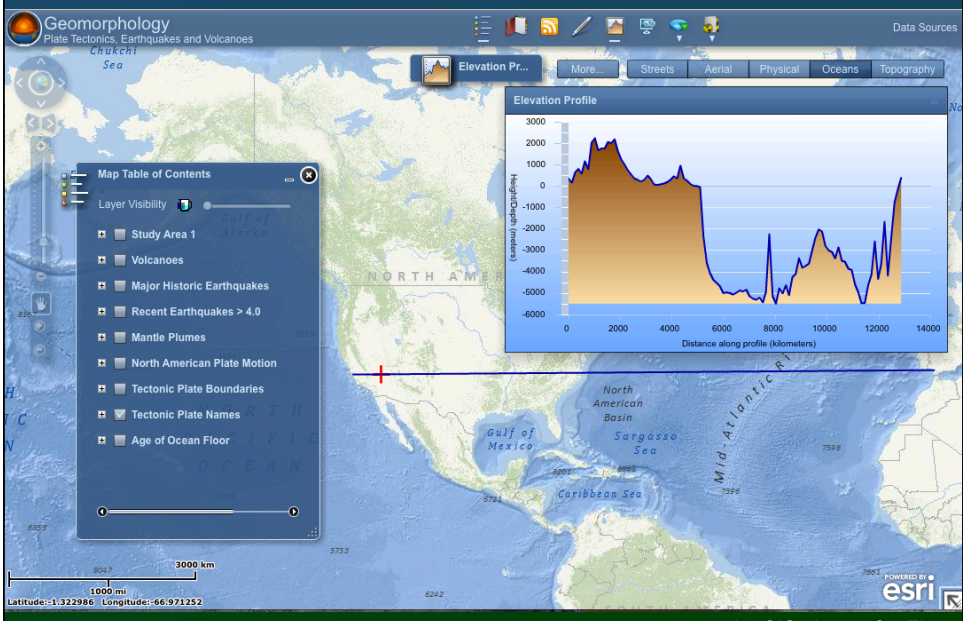
Energy achievement and achievement by subscale for pre/post test.

	Pre-test Mean (SD)	Post-test Mean (SD)	Gain (SD)	Standard Effect
Entire Assessment (n=38)	15.16 (5.10)	22.10 (7.18)	6.94 (6.04	1.36***
Content Subscale (n=27)	10.80 (3.83)	16.09 (5.48)	5.29 (4.81)	1.38***
Spatial Reasoning Subscale (n=11)	4.36 (1.97)	6.01 (2.28)	1.65 (2.38)	.84***

****p<0.001*
N=928

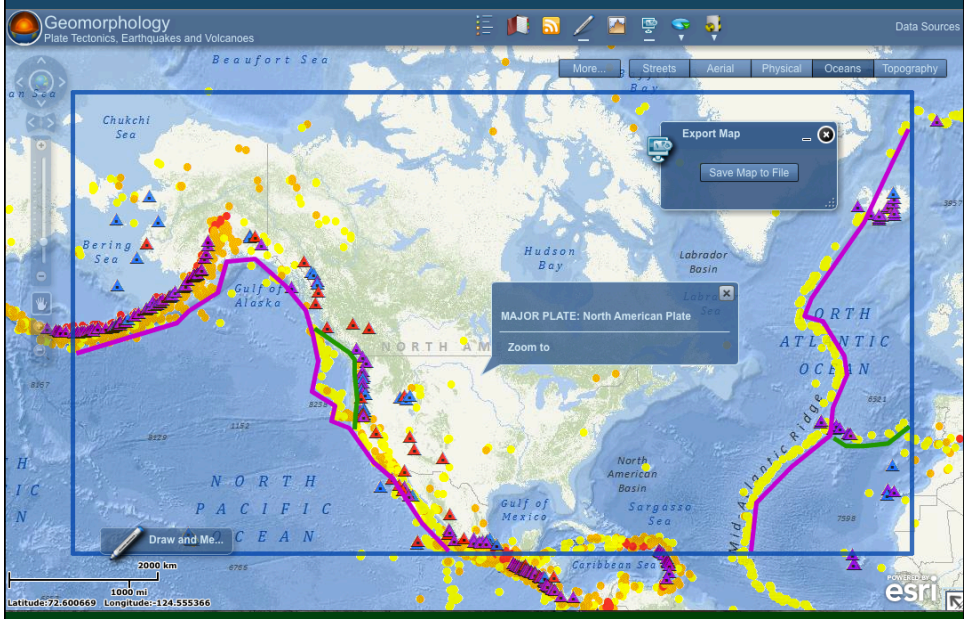
http://www.ei.lehigh.edu/eli/research/pubs

Current Project: Tectonics



ArcGIS viewer for Flex

How do we recognize plate boundaries?



ArcGIS viewer for Flex

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