Virtual Fieldwork and Teacher Professional Development

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ABSTRACT:

Fieldwork is crucial to geology education, yet in 2006, 24% of Earth science teachers were not Earth science certified (CCSSO, 2009). Is it reasonable to expect teachers who have not had field experience themselves to lead meaningful fieldwork for their students? Fieldwork is a core activity for applying inquiry to real-world scenarios. How can we support teachers in using local and regional geology to teach Earth science in an inquiry-based way?

Through *Enhanced Earth System Teaching through Regional and Local (ReaL) Earth Inquiry*, a professional development (PD) and curriculum materials development project funded by the National Science Foundation (NSF DRL 0733303), we are developing a nationwide series of *Teacher-Friendly Guides* for teaching about regional and local geology and we are creating PD programs with teachers in each region. Teachers are gaining field experience, making virtual fieldwork experiences (VFEs) and taking students into the field.

The PD program begins with a face-to-face workshop involving fieldwork at geologically interesting sites. This provides a brief, mentored introduction to fieldwork. As teachers work in the field and classroom, they also collaboratively create a VFE of the field sites for use in their classrooms.

The program continues post-workshop through virtual study groups in which the teachers complete the VFE they began during the workshop and support each other as they create VFEs of sites near their schools. Through the collaborative process of creating a VFE of the workshop field sites, teachers learn the skills needed to create a VFE of their local site.

As teachers work to create VFEs, they must consider their local environment as a classroom. VFE creation requires close study of field sites with considerations of what would be relevant to a scientist in the field. This is explicitly intended to be a step towards actual fieldwork with students.

As the project continues, a database of VFEs grows creating a resource not only for teachers in the program but for any teacher or interested learner. When the database becomes large enough, users will be able to easily compare local sites to others that are progressively different or by changing different characteristics, e.g., comparing sites with similar bedrock geology but different climate characteristics.

See virtualfieldwork.org.

Question Driven:

Why does this place look the way it does?

The Problem: How to foster place-based inquiry-oriented Earth science teaching?

Three Pronged Approach:

- Teacher Friendly Guides
- Teacher Professional Development
- Virtual Fieldwork

Teacher Friendly Guides —are→ Seven regional guides covering the entire US offering accessible information about geoscience and how to teach it.

Teacher Friendly Guides —online at→ teacherfriendlyguide.org

Teacher Friendly Guides —informs→ Teacher Professional Development

Teacher Professional Development —is→ Creating Virtual Fieldwork

Creating Virtual Fieldwork —Begun at→ Face-to-face workshops

Face-to-face workshops —provides→ Pedagogical Support, Geological Support

Face-to-face workshops —requires→ Close study of the local environment

Creating Virtual Fieldwork —facilitated through→ Virtual Study Groups (via Skype)

Virtual Study Groups (via Skype) —Characterized by→ PD program offers & integrates...

PD program offers & integrates... —which contributes to→ Virtual Study Groups (via Skype)

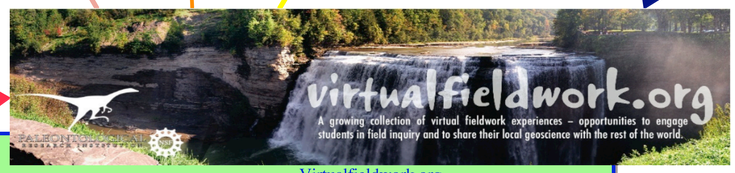
PD program offers & integrates...

- Pedagogical Support
- Technological Support
- Geological Support
- Professional Networking

Pedagogical Support | **Geological Support**

Technological Support | **Professional Networking**

Websites offer...

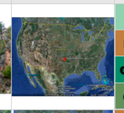
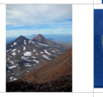
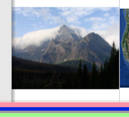
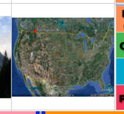


Virtualfieldwork.org

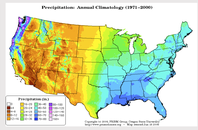
Performing inquiry at a distance (remote sensing).
Teacher-created resources for teaching local Earth systems science.
Using the local to understand the global.
Encouraging systems approaches & in depth study
Leads to *actual fieldwork*.

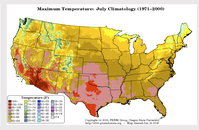
Database in DRAFT form -- input encouraged!

Virtual Fieldwork Experience Database

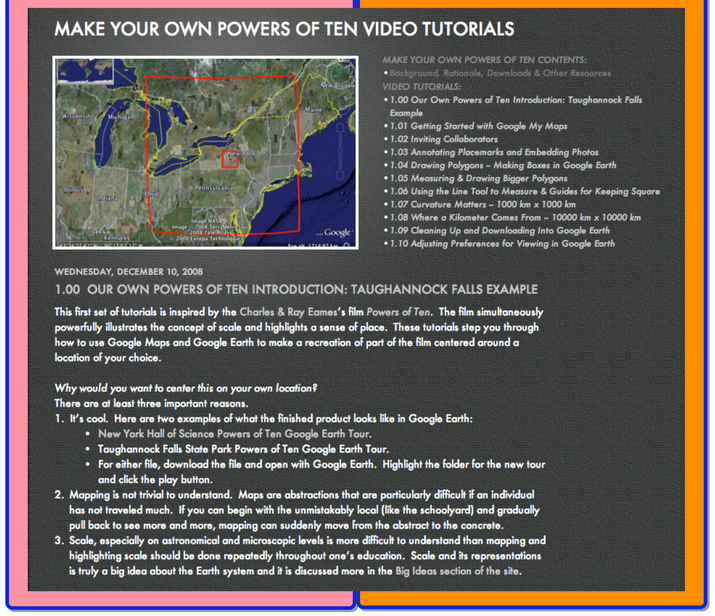
Pedagogical Support			Technological Support			Geological Support				Professional Networking		
Place name (hyperlinked to teacher page)	Iconic Image	Map (sortable by latitude)	Rock Age (ISC Chart)	Landscape Type	Biome (biome map)	Rock Type (Igneous, metamorphic, sedimentary)	Minimum Elevation (m) (elevation map)	Peak Elevation (m) (elevation map)	Average January Temp (°F) (Jan. temp. map)	Average July Temp (°F) (July temp. map)	Average Annual Precip (in) (precip map)
Arbuckle Mountains, OK			Silurian, Devonian, Ordovician, Cambrian	Folded Mountains	Prairie (wetter, taller grass) and Steppe	Sedimentary, Igneous	281	374	37.8	82.2	40.66
Taughannock Falls, NY			Devonian	Plateau	Temperate Deciduous Forest	Sedimentary	116	251	19.8	66.9	36.71
Adirondack High Peaks, NY			Proterozoic	Domed Mountains	Taiga & Tundra	Metamorphic	616	1629	16.3	65.5	39.83
Cascade Mountains, OR			Quaternary, Neogene (Tertiary), Paleogene (Tertiary)	Volcanic Mountains	Tundra	Igneous	980	1500	29.6	62.6	14.19
Glacier National Park, MT			Paleogene (Tertiary), Cretaceous, Jurassic, Proterozoic	Syncline	Tundra	Sedimentary, Metamorphic, Igneous	900	3000	19.4	58.90	28.26

Color coding schemes drawn from common maps & charts, like these:





Pedagogical Support | **Technological Support**



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