On The Cutting Edge Emerging Theme Workshops: A Pathway for Geoeducation Innovation

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OTCE Emerging Theme workshops were designed to catalyze rapid forward motion on high-priority topics for geoscience education.

Emerging Theme Workshops

Geoscience education is in the midst of rapid change as research on learning provides new guidance for how we teach, as the revolution in understanding the Earth system changes what we teach, and as information technology provides new opportunities for teaching and research. Emerging theme workshops move important new topics from an initial stage of early activity by isolated leaders in the field toward widespread implementation in undergraduate geoscience courses. Topics are chosen where 1) it is clear that incorporation of the emerging topic into geoscience courses is important and will significantly enhance student understanding about the Earth and 2) a case can be made that a workshop will have a substantial impact in moving the content or pedagogy into broader use by geoscience faculty. Geoscientists and educators are invited to recommend topics.
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Workshops were both in person and online
Emerging Theme Workshops moved fields toward widespread implementation within undergraduate geoscience courses.
This synergy helped develop a leadership community, and workshops led to online collections that support wide dissemination.
Example: Several participants in a workshop on the role of the *affective domain in teaching* moved forward a successful study of introductory courses.

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**Student Motivations and Attitudes: The Role of the Affective Domain in Geoscience Learning**

**The Affective Domain in the Classroom**

As science faculty, we naturally emphasize the cognitive domain in our teaching. After all, students think and learn with their brains (we hope!). Yet the affective domain can significantly enhance, inhibit or even prevent student learning. The affective domain includes factors such as student motivation, attitudes, perceptions and values. Teachers can increase their effectiveness by considering the affective domain in planning courses, delivering lectures and activities, and assessing student learning.

Resources for learning more about the affective domain

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*Image by Karin Kirk, SERC*
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Student Learning About Critical Earth Issues Through the Use of Large Online Digital Data Sets

May (6, 13, 20, 27) and June (17, 24), 2015
Virtual Workshop

One of the best ways for students to understand the critical Earth issues facing humanity is through the analysis and interpretation of actual data. Fortunately, there are now many organizations that not only monitor many geophysical and geochemical properties of the earth but provide the data in user-friendly ways. Whether it is through maps, images, animations, or raw data, these data can be mined and interpreted by undergraduates in ways that allow them to develop an understanding of both the relevant critical Earth issues and of issues related to the reliability, errors, and significance associated with scientific conclusions and assertions.

This workshop aims to help instructors of undergraduate classes develop classroom activities, demonstrations, and research opportunities on topics of current societal relevance and interest using new online resources of geoscience data. These activities will be added to the extensive Cutting Edge online teaching activities collection.
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Designing and Using Videos in Undergraduate Geoscience Education

Feb 7, March 7, April 4, May 2 – 2014 Virtual Workshop

Video-based educational resources are well suited to explaining the dynamic nature of geosciences, specifically processes that challenge students to think both temporally and spatially. Sample topics that can be better visualized through video include coastal erosion, the development of disconformities, the retreat of a glacier, and the formation of a dune. In addition, online educational resources and the shift toward digital courseware available through free online academies are testaments to the increasing integration of instructional videos into college educational resources. In this workshop, through a series of four monthly sessions, we will explore the best practices for designing and using videos, review the existing technology (hardware and software), share resources, develop new ones, and discuss the challenges and opportunities. We are especially interested in building a community to develop and share resources and research on using short, self-produced videos to strengthen geoscience teaching and learning.
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Content workshops involved topics such as the **Deep Earth**, the Early Earth, Biocomplexity, Geologic Time, Geology and Human Health, Visualizing Seismic Waves, and Seismic Tomography.
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**Workshop: Teaching About Time**

February 26–28, 2012

Arizona State University

Note: This workshop has already taken place. See the workshop program for links to presentations, discussions, and other material from the workshop, and the workshop synthesis for a summary of key ideas.

Time and temporal concepts are critically important in a wide range of disciplines, from geoscience and other natural sciences to history and archaeology. Students struggle with rates and scales of processes that are beyond their personal experiences, with the complex interactions of slow processes over long time scales, and with the enormous numbers involved in Deep Time. A sophisticated understanding of these temporal concepts is an essential foundation for unraveling the complex histories of the Universe, solar system, and Earth; of species; and of civilizations. It is also key for contextualizing the natural and anthropogenic changes occurring on our planet today.

Join us for a workshop that will bring together faculty teaching about time with researchers studying temporal learning to

1. Understand current best practice in teaching about time,
2. Bring forward ideas from education and cognitive psychology that can inform improved practice, and
3. Work together in ways that support improved teaching about time.
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**Seismic Tomography for Teaching and Research**

An online virtual workshop; Six 2-hour virtual sessions in April (3, 10, 17, 24) and May (22, 29), 2013

Registration for this workshop is Closed.

Seismic Tomography plays a vital role in conveying information about the structure, composition, and state of Earth's interior. The images produced by seismic tomography, however, are difficult to construct and complex to interpret. This workshop will follow upon two previous solid-Earth geophysics workshops (the Understanding Deep Earth workshop in 2010, and the Visualizing Seismic Waves workshop in 2011) to help faculty member bring geophysics into their classroom and labs; in this case, in the area of the construction and interpretation of seismic tomographic images, or "tomograms."

During April–May, 2013, a virtual workshop will be held in six 2-hour sessions (Wednesday, 12–2 pm Central Time) to help the geoscience community identify, develop, and organize a comprehensive collection of activities that will facilitate learning about seismic tomographic images, the information they convey, and how they are used for a wide variety of geoscience applications. The first four of
Workshop outputs include presentations, classroom activities, publications, course syllabi, reference lists, tutorials, etc., and are available on the *Teach the Earth* website.
New teaching activities can still be added by community members, and discussion lists remain available to support interaction among interested parties.

Contribute an Activity to Teach the Earth

Have you developed your own activity that has worked well in your own classroom or in the field? We are always looking for activities to share with our community and beyond. If you have an Earth education teaching activity that you would like to share with other educators, use this form to tell us about it. The information you provide here will be used to create a web page describing your activity. Activities go through review on an annual basis, and you will be recognized for passing the review process and contributing an exemplary activity.

Before you start, explore the collection. To see the best examples of the kinds of activities that have been contributed, explore the exemplary collection to see if an activity like yours already exists in our collections. This is especially important if you are contributing an activity that is based on another person's activity or that others may use in their course. If your activity is very similar to one that is already in our collections, please email SERC for options on how to proceed.