

Web-Based Inquiry

Dave Anastasio, Lehigh University, Bethlehem, PA

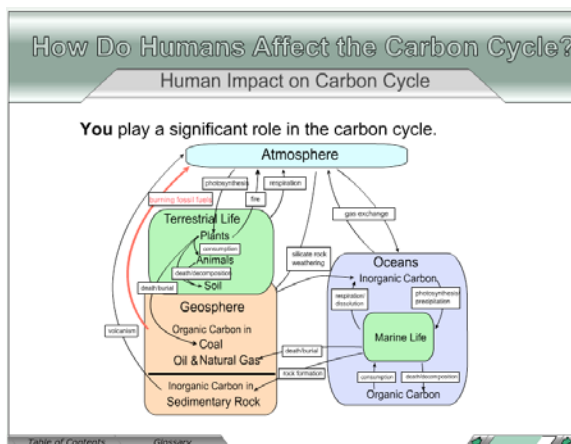
Well-designed inquiries can help students come to appreciate the richness and complexity of scientific problems.



I have always been impressed with the professors who could engage students on the fly and coax recognition and understanding from them by strategically asking questions and dribbling subtle hints of information. From my own experience in training geologists to read the history of the Earth from rock outcrops, I know how difficult this approach is: If you are generous with clues, the answer becomes obvious and the students disengage; if you provide too little information, the resulting interrogation is frustrating to students and professor alike. The knack of teaching science with driving questions (inquiry) is different than using the Socratic method for subjects like philosophy, where skills of argument and logic, not empirical data and natural processes, are the goals. The challenge of inquiry-based

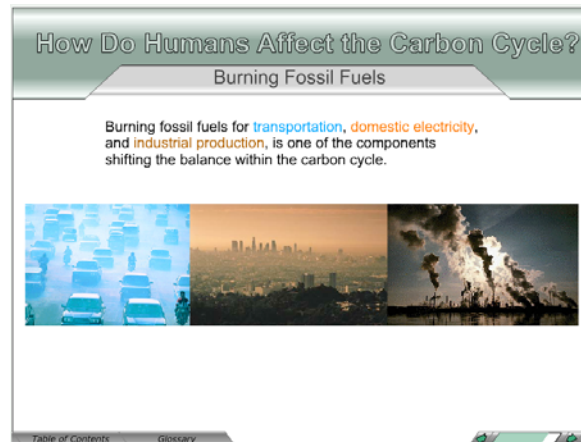
lessons eludes most college faculty, yet science educators, like my colleague Alec Bodzin, note that scientific inquiry is an essential skill for scientists and engineers. It involves critical thinking and reasoning—the skills it engenders support student thinking across all disciplines.

The goal of Lehigh University's ESSE module is to develop portable, Web-based, inquiry driven educational modules to help students understand Earth System Science by acquiring the habits of mind that scientists employ. Our Carbon Cycle and Remote Sensing modules address realistic problems scientists encounter, allow students to work with real data in authentic contexts. They call for students to draw and justify conclusions using the same kind of reasoning scientists use, and lead them to examine and develop alternate viewpoints and interpretations, and then interact with the larger community to justify and defend conclusions and test findings against the views and beliefs of others. In short, students will learn Earth system science by becoming Earth system scientists.



Well-designed inquiries can help students come to appreciate the richness and complexity of scientific problems. This is especially important in Earth System Science Education. For citizens facing modern scientific challenges such as global climate change, regional sprawl, and ecosystems that need to be managed if they are to persist, learning within the confines of traditional disciplinary boundaries is counterproductive.

Inquiry-based Earth system science activities that are grounded in authentic contexts and include examples that are relevant and topical, promote active learning, enabling students to develop their own understandings. Our goal is to develop lifelong learners and scientifically literate citizens possessing agility in solving problems, rather than simply a knowledge of facts that may soon become obsolete. Web-based inquiries hold great promise for helping students conduct scientific inquiries. The Web provides access to rich dynamic content, including Geographic Information System coverages, animations, model simulations, and internet exchanged real time data. Web hosting also makes the educational modules portable and scalable for different educational settings.



ESS at Lehigh University

http://esse21.usra.edu/ESSE21/esse21_lehigh.html

Lehigh ESS Learning Modules

<http://www.ei.lehigh.edu/esse/>