

Engaging high school students in soil science inquiry

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High school earth science student, Victoria Feria-Ortiz, observes soil properties in preparation for developing a research question. Credit: Photo by Bianca Moebius-Clune

In April 2007, teacher Irka Elsevier and then-graduate student Bianca Moebius-Clune began their second inquiry unit designed to enable high school students to better understand soil science concepts through their own research and experiments. Moebius-Clune was an NSF fellow in the Cornell Science Inquiry Partnerships (CSIP) program, which allowed the pair to develop inquiry curriculum to guide students through the process of doing research themselves.

Soil is fundamental to life and relevant to some of today's most pressing global issues, such as climate change and demand for energy and water. As soil's importance to our future becomes evident, educating younger generations on the subject is a necessary task. However, soil science content in K-12 science classes is rarely covered. "I didn't even know that [soil science](#) existed until I was looking at the majors available as an incoming college student," said Moebius-Clune, extension associate at Cornell University.

Elsevier's classroom is messy. Benches are covered with soil, and water is on the floor. But the students are engaged, paying close attention to the experiment they designed to assess how soil characteristics affect runoff and infiltration. Later, the students present their findings to their peers.

The National Science Education Standards require K-12 students to learn inquiry skills such as critical and independent thinking, effective communication, and collaboration. Schools struggle to meet these requirements, partly because inquiry curriculum materials that address these standards are limited. This motivated Elsevier and Moebius-Clune to create their inquiry curriculum, which has been revised based on student feedback, and is available online. You can read more about their unit in the 2011 issue of the *Journal of Natural Resources and [Life Sciences Education](#)*.

Unit pre and post tests, mostly made up of standardized test questions, confirmed that students learned a significant amount of content during the soil inquiry unit. However, there was no relationship between how well students did on their standardized test questions compared to their final project. The project required higher-level understanding, critical thinking, reasoning, and other skills essential in the work place and society. Many students had low test scores, but higher project scores than their peers. This implies that the current high-stakes testing environment in schools may misrepresent student skills relevant in the

work place.

"All of this goes to suggest that inquiry-based, student-centered approaches like this should be more commonly used in science classrooms," says Moebius-Clune. This teaching style appears to stimulate student interest, enable [students](#) to learn how to think critically, and be engaged in real-life tasks. These skills just may prepare them to solve society's most pressing issues.

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