

UC SANTA BARBARA

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UCSB Brings New Type of Science Education to Local Schools

On a sunny fall day at La Patera School in Goleta, MaryAnn Wright's second grade classroom fills with energetic students returning from recess. The children seem very excited about the appearance of another group of students -- from UC Santa Barbara -- who have just arrived wearing lab coats and carrying basic scientific equipment.

Six UCSB students disperse around the room -- with at least one per table of kids -- and the magic begins: Second graders create their own scientific experiments, effectively learning the process of science a little bit at a time. This is no one-shot-deal; the UCSB students bring this program, called SciTrek, into the classroom at least five times over a two-week period, spending more than an hour with the children during each visit.

Today, the lessons in Wright's classroom involve concepts related to soil water retention. The students will learn that different types of soils retain different amounts of water, and they will learn how to read and use a graduated cylinder. Based on their experience, they will be able to list at least three observations and identify the difference between an observation and an inference. They will also be able to list at least two ways in which they behaved like scientists.

This visit is something of a homecoming. SciTrek was born in this particular classroom in 2010, brought by Norbert Reich, professor in UCSB's Department of

Chemistry and Biochemistry. Wright explained that SciTrek is very helpful in bringing the resources and infrastructure to her classroom to help her students learn the scientific process. She has an undergraduate degree in science, and is pleased that SciTrek began in her classroom, and that she was able to help Reich get it started.

"Human beings just have to experience it," Reich said, of teaching the scientific process. "There is an 'aha' moment when you say, 'is that a good question?'" Reich wants to help students learn, at an early age, how science works, so they will have the skills to evaluate scientific information -- no matter if it is about vitamins, global warming, or something else entirely.

The program is not about teaching children to become scientists, explained Reich, but rather about educating all children in the scientific process. SciTrek has grown from its beginning in Wright's classroom, to 20 classrooms this school year, including one in Santa Ynez. And teachers from Goleta to Carpinteria are clamoring to have the project expanded to their classrooms. Programs are now geared for second-, third-, and fifth-grade classrooms, with plans to include more levels.

Recognizing SciTrek as a valuable interdisciplinary opportunity, Jane Close Conoley, dean of UCSB's Gevirtz Graduate School of Education, suggested Darby Feldwinn, a UCSB lecturer in both education and chemistry, meet with Reich to discuss the program. Feldwinn has been involved with SciTrek almost since its inception, overseeing the entire program and devising the curricula. Feldwinn and Reich are evaluating SciTrek and will write up the results. Reich provides orientation for the undergraduates participating in SciTrek, and oversees funding.

"I think there are a lot of programs out there that get students excited about science, but they don't necessarily allow them to go through the process," said Feldwinn. "There are a lot of college-aged students who don't even understand, 'What does the process mean? What does it mean that we only change one variable?' They know the words, but they don't know what that actually means, or what it looks like. This is where the disconnect is. In order to understand the process, you have to go through it yourself. And you have to go through it several times."

Feldwinn calls this "scientific literacy," which is not only important for scientists, but also for the general public. "Without doing things like this, I don't know how you are going to get scientific literacy," she said.

Feldwinn explained that teaching science at the elementary school level is particularly challenging because teachers usually do not have degrees in science. So they are often not familiar with it, nor confident enough to give their students the freedom to create scientific experiments -- and to generate questions that they, the teachers, might not be able to answer.

"I think this is how science has to be taught if you want people to understand what it means to do science," said Feldwinn. "I think that's important for many reasons. Even if you are not going to be a scientist, you are going to have to vote on issues that have science in them. You are going to need to be able to tell when it's actually the research that's backing it up, or when it's some politician who is telling you something, and which one of those two things is actually science. And right now, I don't think a lot of people can do that."

Feldwinn said that bringing creativity back into teaching science is of great importance to SciTrek programs. She explained that the students who excel at school are not always at the top of the class in SciTrek. Students have lots of questions at the beginning, such as "Is this the right question I've written down? Is this the right observation I've made?" She said that it takes the kids awhile to realize that there isn't always a right or wrong, and that there can be many answers.

At the end of the SciTrek program, the students make a poster presentation showing their results. "This is what we do as scientists," said Feldwinn. "We go to conferences and we do this all the time." This process allows the students to question their classmates about their results, she explained.

Currently, the program is funded by an award of \$42,000 for the 2012-2013 school year from UCSB's Office of the Executive Vice Chancellor and the deans of the College of Letters and Science, the Gevirtz Graduate School of Education, the College of Engineering, and the College of Creative Studies. Reich is looking for increased funding to expand SciTrek.

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