

Kimberly D. Tanner

Relevant news has a way of seeking out Kimberly Tanner. So when the biology department at San Francisco State University (SFSU) posted the tenure-track opening for a biology education researcher in late 2003, half a dozen colleagues and friends independently forwarded the job description with a note saying that this sounded like her sort of position.

Tanner was a trained bench scientist with a 1997 Ph.D. in neuroscience from the University of California, San Francisco (UCSF), where she had worked in the lab of Jon D. Levine. She studied the mechanisms of pain and hyperalgesia associated with nerve injury. She was also an educator, working as an academic coordinator for UCSF's pioneering public school outreach program, the Science & Health Education Partnership (SEP). But Tanner was something even more exotic—a biology education researcher. Through a National Science Foundation (NSF)–funded postdoctoral research fellowship, Tanner had investigated the effect on 35 research scientists of their SEP volunteer work. (Of course, Tanner had gotten wind of the NSF fellowship through half a dozen emails forwarded by friends.)

Hiring a biology education researcher was controversial within the SFSU biology department, recalls Michael Goldman. He is now the department chair but was then on the faculty development committee that recommended hiring Tanner. Colleagues grumbled that such a position really belonged in the SFSU College of Education. How could biologists evaluate Tanner's education research? And what would this new researcher do in her lab? Goldman confesses that he wasn't entirely sure himself. "Kimberly said to me, 'I think I know what I want from this position more than you know what you want.' And that turned out to be true," says Goldman, adding that four years later he couldn't be more pleased.

A Two-Way Street

Tanner wanted a lab at SFSU to probe what goes on in scientist–teacher partnerships. She also wanted to investigate what people of all ages think about biology and, in particular, what common misconceptions they hold. So with NSF funds and a small cadre of master's degree students, Tanner set up SEPAL, which is both a play on words and the Science Education Partnership and Assessment Laboratory. Research at SEPAL has confirmed Tanner's earlier data that researchers in scientist–teacher partnerships benefit as much if not more from the experience than the students or the science teachers do. This conclusion contradicts assumptions about altruistic scientists reaching out to the K–12 community to “fix” schools. Tanner sees the scientist–teacher partnership as a two-way street. “It's not just service or outreach,” Tanner explains. “It should be part of the training of all scientists so that they learn how to communicate what they do to the community.”

Yet most scientists in training get no training in how to communicate beyond the lab or how to function in a classroom, Tanner points out. “Somehow we think if you go to a university and get a diploma, you automatically change into an expert in your field and can go teach your stuff. So at the undergraduate level, we have fabulously trained researchers who are doing a job for which they are not trained at all—teaching. We would not let that happen in the first grade or at any level in K–12, but undergraduate teaching is the last great untrained profession.”

There is quite a bit of scholarly literature on how to teach science effectively, says Tanner, and bringing the best of these evidence-based methods to cell biology is critical. Since 2002, Tanner has collaborated with Deborah Allen of the University of Delaware on a regular column for the ASCB's online journal *CBE—Life Sciences*

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Education. The column, now called “Approaches to Biology Teaching and Learning,” explores the “scholarship of translation,” applying the research literature on effective science teaching to cell biology. Tanner has a special talent for it, according to Allen. “I’m good at setting out general ideas, but right from the beginning Kimberly would come up with clever and creative connections to particular areas of cell biology. I think we’re a good team,” says Allen. “Kimberly is just a pleasure to work with. She’s so high energy and interested in everything.”

Greatest Hit

A Tanner and Allen column about assessment rubrics currently holds the journal’s record for the most hits, according to *CBE—Life Sciences Education* Editor-in-Chief William B. Wood. Since its publication in September 2006, the rubrics article has been accessed more than 18,000 times and has racked up almost 14,000 PDF downloads. “They are having some impact,” Wood contends about Tanner and Allen.

Given the urgent need to reform undergraduate biology instruction, Wood expects to see more biology departments opening tenure-track faculty positions for science education researchers like Tanner. “This has been going on for years in physics,” says Wood. “There are all sorts of physics communicators and physics education researchers in those departments. I think we’re going to see a lot more of it in biology now.”

Tanner, who calls herself a “border walker” between research biology and science education, hails from the mountain state of Tennessee and the town of Madison, just outside Nashville. Her parents were x-ray technicians—and nonscientists, or so Tanner thought for years until she realized how her parents quietly supported her scientific interests without pushing her. The pushing came from teachers, says Tanner, starting in high school with Peggy Welch and Charlotte McBee, who team-taught her AP Biology course. “We purified DNA, did our own experiments on the effects of temperature on cockroaches, and investigated plant hormones,” Tanner recalls.

Joining the Lab

When Tanner went to Rice University in Houston, though, she started out as a classically

undecided student; she majored at various times in biochemistry, comparative religion, and German. The clincher for science was a summer job back home in Nashville. She had written to every biology lab at Vanderbilt University, offering her services for free. Graham Carpenter, a biochemist studying epidermal growth factor and cyclic AMP, wrote back with an offer to pay her. For the next two summers, a patient Carpenter treated her as a regular lab member. Tanner remembers sitting in his office one

summer afternoon, outlining to Carpenter her theories of what was really happening in the cell cycle. “Looking back, I think how naïve I was, but Graham’s lab was what got me hooked on research,” she laughs.

Back at Rice, her professors said that if she was serious about a research career, she needed to go directly to graduate school and from there straight into postgraduate bench work. Tanner was accepted into the UCSF neuroscience program in 1991. Influencing her choice of schools were the sheer number of graduate schools in the Bay Area and her growing

relationship with Henry Mahncke, a Rice neurobiology student one year behind her. Their plan was for Tanner to start at UCSF and for Mahncke to follow along a year later somewhere nearby.

The plan worked. Mahncke came west to enroll in neuroscience at UCSF. Today the couple live what Tanner calls the “total city life,” with their children, Jasper, 8, and Ivy, 2. Their home is four blocks from Tanner’s office at SFSU. Her husband rides the Muni downtown to his job as vice president for research and outcomes at Posit Science, a neuroscience startup of his UCSF mentor, Michael Merzenich.

Border Walking

Tanner’s first year alone at UCSF tipped her career toward border walking. Her roommate was a medical student who had just signed up for the SEP outreach program. Tanner went along out of curiosity. The SEP experience opened a door in Tanner’s mind to questions about learning and education that she’d always had but never explored, Tanner explains. She loved her research at the bench, recording action potential firing patterns in response to

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neural injury in rats, but the SEP classrooms were equally enthralling. "So I ended up leading a parallel life in grad school," Tanner confesses. "Fortunately, Jon Levine was very supportive, even about things like my leaving in the middle of the day, lugging a vat of frogs for dissection."

SEP was the brainchild in 1987 of Bruce Alberts, then chair of biochemistry and biophysics at UCSF. (Among other things, Alberts has since served as president of the National Academy of Sciences; been the president of ASCB; and, most recently, taken on the editorship of the journal *Science*.) Alberts forged the "City Science" alliance between UCSF's medical and science faculties and the San Francisco public schools. By the time Tanner joined in the early 1990s, City Science had morphed into SEP, with hundreds of scientist volunteers racking up tens of thousands of hours in public school classrooms. Running SEP from 1994 until 2003 was Liesl Chatman, who now directs teacher education at the Science Museum of Minnesota. Chatman recalls that Tanner stood out immediately for her enthusiasm, her 100-plus hours a semester volunteering at SEP, and her scientific rigor. As an official "Ace" volunteer at SEP, Tanner

was invited to help with a new gender equity program to set up girls-only science clubs. Chatman remembers, "Kimberly came to me and said, 'I don't think girls need special environments like that. I think we should have coed science clubs.' So we had this very vigorous debate."

Chatman continues, "Kimberly left saying that she was going to do the experiment. A few weeks later, she came back and said, 'You were right.' She'd done the experiment." Males in a coed science club had dominated the discussions and the hands-on materials. "That's what makes Kimberly so different," says Chatman. "She thinks things through but gives priority to evidence. Her results lead her."

Tanner's growing interests in gender equity and in scientist-teacher partnerships led to the NSF research fellowship at SEP. When Tanner's postdoc ended, Chatman snapped her up for the regular SEP staff. Then came Tanner's dream job at SFSU in a biology department with her own lab plus research and outreach programs that have so far attracted \$3.4 million in NSF, National Institutes of Health, and other grant support. "Kimberly has just had this spectacular career trajectory," says Chatman. ■

—John Fleischman

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