Each cell found in an organism needs a mitochondria to provide energy and a nucleus to store information. In the same manner, Dr. Kimberly Tanner, director of the Science Education Partnership and Assessment Laboratory (SEPAL) at San Francisco State University, is the program’s nucleus, mitochondria, and more. Through her, SEPAL has undertaken the enormous task of dissecting, testing, and improving biology education. SEPAL’s staff, students, and faculty conduct research into new tools, techniques, and teaching methods that bring real-world scientific practices into classrooms—from kindergarten to graduate school. “We have fieldtrips of kids coming through here,” says Trisha de Vera, SEPAL administrator and resource center manager, “and we have lab coats waiting for them at each chair so they can actually feel like scientists when they come on to the campus.” Methods like this encourage children to ask questions and take an active role in their learning process. SEPAL aims to promote discovery, expand diversity within the sciences, and reduce the difficulty for both students and educators. With passion and dynamism, Kimberly Tanner guides it all.
One spring afternoon this reporter walked down Hensall Hall’s brightly colored, locker-lined hallway and entered the SEPAL Laboratory. Tanner’s greeting was welcoming and her eyes peered out from behind thin black glasses, the frames better that used various flash cards containing different biology problems. She and her co-investigators asked non-majors and biology experts to sort the flash cards into different biological strata. Her study found a difference between the two groups organize information. “What’s really interesting, if you ask a non-major [to sort the cards], they put all the plant problems together, they put the human problems together, and they put the microorganism problems together. So they represent biology based on organism type. If you ask faculty or expert scientists to do that same kind of sorting, they will say, ‘Oh, these are all about energy and matter, this is how we deal with energy and matter in living systems. Oh, these are all about information flow in genetics and how you copy cells. Oh, this is really all about evolution...’

Thus, the sorting used by experts allows them to group large sets of similar information into more manageable groups. Educators call this method “chunking,” and it allows for easier access and use of learned information. Tanner and colleagues are now applying discoveries like this sorting dichotomy in classrooms to help teach science understanding.

As Tanner finished discussing the last of SEPAL’s three missions, her eyes seemed lit from within and her hand gestures became even more animated. At times, she reached out as if painting a ship on the horizon. Her obvious excitement made me wonder and ask about, what motivates her passionate approach to science education. “I have been at San Francisco State for 10 years,” she told me, “and depending on how you count, I have worked with about 2,000 people in one way or another.” As if seeing this group, like the assembled population of a small college, her eyes misted with tears. “The people here at San Francisco State are phenomenal people.” She excused herself to grab a tissue, smiling, but with tears now welling up and spilling over. Then she went on. “The students, faculty and staff at San Francisco State are phenomenal. I would put our students up against students at any university: Harvard, Stanford or Yale.” She continued, sounding both emotional and emphatic. “It’s a fabulous SEPAL army who are out changing the world, and they are at the California Academy of Sciences. They are my son’s eighth grade teacher. They’re in my daughter’s elementary school. I see them in the ER. They are my dental assistants. And they are not just biology majors; they are people from all over. And I think they are really phenomenal people.”

Her study found a difference between how non-biology majors and biology experts think about life science. She gave the example of the test that uses various flash cards containing different biology problems. She and her co-investigators asked non-majors and biology experts to sort the flash cards into different biological strata. Her study found a difference between the two groups organize information. “What’s really interesting, if you ask a non-major [to sort the cards], they put all the plant problems together, they put the human problems together, and they put the microorganism problems together. So they represent biology based on organism type. If you ask faculty or expert scientists to do that same kind of sorting, they will say, ‘Oh, these are all about energy and matter, this is how we deal with energy and matter in living systems. Oh, these are all about information flow in genetics and how you copy cells. Oh, this is really all about evolution...’

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Tanner's professional passion is clearly intertwined with SEPAL's successful history. In April 2014, SEPAL celebrated its 10-year anniversary. Tanner and her staff both created and developed the center's numerous programs and research projects. Trisha de Vera, SEPAL's administrator and resource center manager, has been with the educational laboratory since its inception. I sat with de Vera, an enthusiastic administrator, to ask more about SEPAL's sources of momentum and success. Without hesitation, de Vera answered, “Kimberly Tanner! It's her drive, and I really mean that to the letter, D-R-I-V-E.” She spoke with eyes wide and index finger pointing as if she were selecting each letter from a suspended touch screen. “She has the drive to do everything and anything. It's her drive and her passion for science education that has made this program very successful.”

Asked about her favorite among Tanner's personal traits, de Vera again answered immediately. “She knows all of her students by name,” she said. “If there are students that need a little extra help, she is always willing to go the extra mile; her door is always open.” Tanner's availability has made her a respected resource among staff, students, and faculty that extends far beyond SF State. When asked which of Tanner's accomplishments since starting SEPAL has had the greatest impact, de Vera responded decisively: Receiving a huge Howard Hughes Medical Institute grant to support one of SEPAL's innovative programs, Biology Faculty Explorations in Scientific Teaching. Tanner received this invitation-only grant in 2012 for the maximum stipend of $1.5 million. Tanner's award represents the first time a faculty member at SF State has received this prestigious recognition and funding.

Curious to seek out her students' perspective, this reporter returned to the SEPAL laboratory on a bright breezy spring morning, and found a pair of students willing to share their opinions on Tanner and the program. Second year graduate student Stephanie Malmgren explained how her experiences with Tanner have impacted her education and aspirations. “She is one of the most driven and focused people I have ever met. I think she is a pillar in this department in terms of the type of work that she's doing and making broad changes with the biology department. Seeing her in action has helped me form the mental picture of the type of teacher that I want to be. She is someone to live up to in terms of what she does and how she does it. She is a rock star scientist!”

First year graduate student Ellen Young also shared SEPAL's impact on her academic development. Studying in the program has “deeply impacted who I am,” she said. “Coming to SEPAL has helped me put into words how much I do value community and want to cultivate it in a biology classroom. It has also provided alternative ways of teaching biology that I see as more effective and are supported by evidence.” It excites her, Young continued, “to be a part of something that feels transformative.” Casually sipping from a black mug filled with coffee, Young outlined some of Tanner's qualities that she most admires. “Her skill set is really diverse. She is a really skilled biologist and scientific thinker, really bright and an astounding scientist.” As Young talked, her hands moved as if she was stitching a quilt. Occasionally her expression bore the upturned, awestruck look of a girl watching fireworks. She ended by saying that Tanner was “a connecter.” She has this really amazing ability to bring people together. I think,” she ended by saying that “she brings out the best in a lot of people... She has taught me so much about being a professional, demanding that I rise to being a colleague rather than treating me as a student. I feel like I'm in the process of rising and I think that’s because of her expectations.”

Tanner is clearly an instrumental and dynamic force in science education and her impact and accomplishments through SEPAL are evident. During our interview, Tanner shared these final thoughts. “What's fabulous about SEPAL is that we really represent a large number of people who are going out and changing the world. We have more people that understand that we need to change the way that we are teaching and we need to think very carefully about who were teaching and how to engage them and make it relevant to their home communities ... [in a way] that makes sense.” Tanner concludes: “If you had asked me 10 years ago if we would have so many people out changing the world, I would not have ever predicted what a powerful set of alums we [would] send out into the world every year.” Graduation time is “a very special time of year, because we are fledging all these fabulous advocates for social justice out in to the world that you know are going to make it a much better place for the next generation.”