

## **Statement of Personal Contributions to Diversity**

My first experience teaching a classroom of students whose backgrounds were very different from mine came when I was twenty-one. I wrote a grant proposal for funding to live in a small town in El Salvador to teach science, math, and English to the teachers in that community. The grant made it possible to work on my own for a year with the group of sixteen- to twenty-three-year-old teachers. All of them were farmers or homemakers when they weren't teaching; many of them had been guerrilla fighters in the recently ended civil war.

I taught classes nightly in one of the classrooms by the light of a Coleman lantern. We covered mostly pre-algebra and basic physics, as well as English for those who were interested. In the afternoons, I taught chemistry to some of the clinic workers. We had no textbooks or supplies, so we worked with what came to hand – I vividly remember illustrating the Pauli exclusion principle with a pair of flip-flops. I got very good at the imperfect subjunctive in Spanish (“If this were a four, the answer would be...”). I also learned a lot about what works and what doesn't work when you're trying to bridge cultural, technological, and educational gaps to communicate ideas in science and math.

The most important lesson I learned was the importance of demonstrating respect for my students. Many of them felt intimidated by the material, and there were cultural and language barriers as well. Listening carefully was vital, both to what was said and what was left unsaid. I learned to ask questions rather than make even seemingly obvious assumptions because my assumptions were often wrong. Like many nontraditional students at UCSD, my students in El Salvador were part-time students and full-time adults, with life responsibilities like childcare and working to support themselves. I learned to teach in a way that accommodated the competing demands on their time and energy.

I also learned the importance of getting students to “own” the material; without a genuine feeling of investment and competence, they lacked the confidence to participate or ask questions. This was particularly evident with the women in the math class. They would mumble or giggle when I asked them questions and refuse to come up to the blackboard. I knew their reticence was keeping them from engaging with the material and therefore from learning. I tried various approaches to build their confidence, but nothing worked well. What finally broke the barrier was, surprisingly, simple repetition. We spent a few evenings calculating square roots by hand, with the more confident students working problem after problem on the board. At each step I asked the students to say what they should do next. We went over the steps so many times that even the women hiding at the back of the classroom learned the method by heart. Only then, when they were sure they were correct, did they feel confident enough that they tentatively began to volunteer answers and comments. At that point, I was able to get the first woman to come to the board to work a problem on her own, and I had her friends coach her from the back of the room. When she succeeded, the others were willing to try, and by the end of that lesson everyone was laughing and challenging each other to do better. That single episode changed the whole dynamic of the class. After that, everyone

was much more willing to offer answers and ideas because they felt that the material in the classroom was something they could master and even have fun with. The women discovered that math was something they could do and that this class was a place they belonged intellectually as well as socially. As a result, they engaged with the subject matter, asked questions when they were confused, and learned much more rapidly. I learned that helping students completely master a small skill can give them the confidence to tackle the rest of the material. I have since applied that lesson by using peer teaching in discussion sections: I give each student a small topic to study and then teach the class, which confers a sense of ownership and mastery. It also helps build a classroom in which students support each other because they know they too will be presenting soon.

Teaching in Spanish gave me another window into the experience of many of my future students: negotiating a language barrier. My Spanish rapidly improved beyond the conversational level I arrived with, but it was sometimes frustrating to be unable to express subtler and more complicated ideas. Teaching in another country taught me humility and respect for students from other backgrounds. It taught me to be patient with people who struggle to express their thoughts, whether because of disabilities, unfamiliarity with the language, or simple shyness. There are often interesting ideas inside those minds if I can be understanding and creative enough to help them emerge.

This time in El Salvador was my first substantive teaching experience. Since then, I have added other techniques to my repertoire that have been shown to help engage students with varied learning styles, different levels of preparedness, and a mix of backgrounds. These techniques include small-group work, peer instruction, a mix of assessment methods (writing, speaking, varied formats of exam questions, etc.), encouraging metacognition through formative assessments, hands-on exercises, and soliciting student questions via nonthreatening means such as having them write down one confusing point at the end of each lecture. Peer teaching activities are a particularly good way of using the diversity of the classroom as an asset, since students can learn from one another's different perspectives and understanding of the material. Active learning methods such as these help reach and engage students of all abilities and experiences.

Other techniques that I use for creating an inclusive classroom include maintaining and communicating high standards for all students (which helps defuse stereotype threat), making the requirements for success very explicit by sharing rubrics and learning goals with students (which particularly helps first-generation students), and using a variety of analogies that connect with students' experiences. I also bring in examples of women and underrepresented minority scientists wherever possible. I particularly like to tell the story of Christiane Nüsslein-Volhard, who discovered many of the genes involved in fruit fly development. The European Molecular Biology Laboratory refused to give her a job until she applied jointly with Eric Wieschaus because they did not believe she could run a laboratory on her own. She, Wieschaus, and Edward Lewis later won the Nobel Prize.

Beyond my own classrooms, I have worked actively to promote underrepresented minority and first-generation students in STEM fields. For several years, I co-led a group of UCSD staff and faculty that reads the education

research literature and discusses how innovative teaching and institutional support can help serve those populations. I am also involved in an ongoing workshop teaching UCSD TAs to create an inclusive classroom.

I am an IRACDA postdoctoral fellow. IRACDA is an NIH training program intended to promote diversity and teaching skills in future biology faculty. At UCSD, IRACDA combines traditional postdoctoral research experience with the development of teaching skills through mentored assignments at our partner minority serving institutions (SDSU and San Diego City College). Through the IRACDA program, I have been trained in teaching a diverse classroom, and teaching at SDSU and City College for five semesters has given me more experience. I have contributed to professional development training for underrepresented students at UCSD and SDSU via the Minority Access to Research Careers (MARC) and preMARC programs.

My future plans for promoting diversity and inclusion in the context of a Teaching Professor position include:

Research:

- Publishing the results of the “Creating an Inclusive Classroom” TA training workshops.
- Studying and publishing the effects of study group interventions in BILD 3 (see Research Statement).

Teaching:

- Employing the teaching methods described above to ensure equity and inclusion in my classrooms.

Service:

- Continuing my involvement with organizations that promote diversity in STEM fields: Association for Women in Science (AWIS), IRACDA, and the UCSD MARC program).
- Continuing to foster relationships between UCSD and local minority serving institutions such as City College.
- Engaging in community outreach by teaching Student Tech K-12 workshops.
- Helping recruit underrepresented minority students for UCSD graduate programs by contributing to the SACNAS conference.

I have taught many subjects in biology, to adults and teenagers, to single mothers and Ivy League first-year students, in small seminars and large classrooms. Still, my approach to teaching is grounded in the perspective I gained during my first year as a teacher in El Salvador and the lessons I learned there: Make the subject fun. Show your students you care about their learning. Be creative and try different techniques until you reach the students who don't sit at the front of the class. Understand that your experience is different from that of your students. Be explicit about the criteria for success. Show respect and work hard, and expect respect and hard work in return.

Above all, share your enthusiasm for your subject and for learning. That message crosses all boundaries.