

Diversity Matters

How Establishing a Postbaccalaureate Research Education Program Can Address Your Mid-Life Crisis

By Daniel A. Starr



The 2019–2020 PREP@UC Davis cohort. From left to right: Amy Leslie, Celena Lozano, Maribel Anguiano, Carlos Estrada, Colton Baumler, Nashley Fuentes-Sanabria, and Alyssa Paparella. Photo courtesy of Hemang Patel.

The mid-life crisis is a rite of passage for privileged white men. The classic response is to buy a red sports car. Or, more fittingly for this audience, a new super-resolution microscope. Yet material responses to a mid-life crisis rarely address the underlying issues contributing to the crisis in the first place. Inevitably, someone down the hall gets a cooler, fancier microscope, and your crisis rushes back to the forefront. I took a more nontraditional approach for my mid-life crisis. I wrote a proposal for a new training program, which

turned into the most rewarding experience of my career.

I am the very definition of privileged. I am a white, straight male who grew up in upper-middle class suburbia with educated parents. I never had to worry about where my next meal would come from or where I'd sleep at night, and I have never directly experienced racism or sexism. By hiding in the ivory tower of academia my whole life, I have successfully avoided the real world. My mid-life crisis involved admitting and accepting that I am a successful academic and scientist,



Daniel Starr and Carole Hom. Photo courtesy of Hemang Patel.

in large part due to the privilege into which I was born. I have therefore dedicated substantial efforts in the second half of my professional career to help provide some small amount of privilege to young scientists who often lack the background and support to attend graduate school.

I am proud to be a professor at the University of California, Davis (UC Davis), one of the top ten public universities in the country. UC Davis is a diverse institution in a diverse state. We are working toward a federal designation as a Hispanic-Serving Institution and our undergraduate student body is made of ~40% first-generation college students. However, we have a lot of work to do to ensure all students have equal opportunities. Many UC Davis students have to work close to full time to pay their bills. These students lack the time and support to dedicate 15 hours per week as a volunteer researcher to gain valuable lab experience necessary for admittance to graduate programs. The problem is even more apparent at regional universities where there are limited research opportunities. Thus, students lacking privilege struggle to get accepted into graduate school where admissions are largely based

on research experiences. This is a major loss to science. Scientists from nontraditional backgrounds are intelligent, industrious, and bring innovative ideas and new approaches to science. We need to patch the pipeline to provide this vulnerable population of young scientists with great potential an opportunity to succeed in graduate programs.

The National Institute of General Medical Sciences (NIGMS) at the National Institutes of Health (NIH) currently funds 36 PREP (Postbaccalaureate Research Education Program) programs (www.nigms.nih.gov/training/PREP). The PREP mission is to keep recent postbaccalaureate scholars from diverse and disadvantaged backgrounds in the biomedical science pipeline. Its ultimate goal is to increase diversity at the highest levels of biomedical research. NIH provides funds for about 200 PREP scholars annually to focus on a year of laboratory research, coupled with career development and training in professional skills. This year of valuable experience greatly increases the odds of both getting into PhD programs and the chances of successful completion of PhDs in the biomedical sciences. There are many more qualified candidates for PREP than there are national slots at present. Moreover, there are many excellent institutions (perhaps your own?) that could easily host an excellent PREP program. It just takes one person (you!) to get the ball rolling at your institution.

We designed PREP@UCD (<https://prep.ucdavis.edu>) with three objectives. First, we aim to provide a research and mentoring environment where PREP@UCD scholars can self-identify as scientists. Most incoming PREP scholars lack self-confidence and consider themselves students, not scientists. We focus our activities on helping our scholars realize their potential and the unique contributions they can make to science. Second, we train the scholars in experimental skills needed for them to succeed in graduate school and a career in biomedical research. Most of our incoming PREP scholars have limited experiences in the lab.

Usually the scholars had to spend considerable time working to pay tuition or help their families. Since laboratory experience is the most trusted criterion for admission into graduate school, PREP provides this vulnerable population with a critical opportunity to immerse themselves in research for a year. Third, we strive to empower PREP@UCD scholars with strong professional skills. We focus on reading primary literature, time management, communicating science, critical thinking, and writing statements of purpose and research proposals.

We offer a variety of activities for the PREP@UCD scholars. Each scholar is matched based on interest and mentoring styles with an NIH-funded faculty mentor in whose lab they spend 75% effort (approximately 30 hours per week) performing research. Scholars are paid as employees (over \$30,000 for the year plus full benefits), which allows them to focus on research. In addition, each scholar commits 25% effort toward career development activities. In the summer at the start of the program, faculty present a “Future of Biology” journal club that exposes the scholars to primary literature and cutting-edge techniques. Scholars also participate in a series of workshops designed to help with time management, how to give a three-minute “elevator” talk, and rigor and reproducibility. In the fall quarter, they participate in a three-credit course focused on science communication that we designed and teach specifically for PREP scholars. Activities include spending six weeks writing and peer reviewing proposals for NSF Graduate Research Fellowships, attending a departmental retreat near Lake Tahoe, preparing abstracts and posters to present at the national Annual Biomedical Research Conference for Minority Students, applying to graduate school, and a mock interview.

In the winter quarter, the scholars visit universities to interview for graduate school, learn how to give a chalk talk on their research, and take an upper level or graduate course at UC Davis. In the spring quarter,

they take an additional course, present a journal club, and end the year with a formal research presentation. Throughout the year, we meet weekly with the cohort to discuss anything on their minds. In sum, the scholars are provided a plethora of activities designed to help them succeed as biomedical scientists.

In our first three years, PREP@UCD has sponsored a total of 14 scholars. They held bachelor’s degrees from small liberal arts colleges (4), regional universities (4), or R1 institutions (6). Six of the scholars came from outside California, as far away as Baltimore, New York, and Puerto Rico. Many of the scholars had applied to graduate school the year before but didn’t get in. Others lacked the self-confidence or laboratory experiences to even apply.

Our program works. Twelve of our 14 scholars obtained admissions to excellent biomedical PhD programs including UC Davis (5); the University of California at San Francisco (2), Los Angeles, and Irvine; Baylor College of Medicine; Scripps Research Institution; and Johns Hopkins University. Moreover, four of these scholars received National Science Foundation Graduate Research Fellowships to fund three years of their graduate training while four others received honorable mentions. The other two scholars are still pursuing careers in science. Thus, PREP@UCD helped move vulnerable scientists past a major leak in the pipeline and provided them with a foundation to excel in graduate school. Watching PREP scholars move on and succeed as scientists will keep me full of pride for years to come.

It takes a community to run PREP@UCD. I am indebted to Carole Hom, who serves as the academic coordinator and is an active partner in every aspect of the program. We also have an outstanding group of about 40 faculty and dozens of graduate students and postdocs who help mentor our PREP scholars. We thank many administrators, including the deans of seven colleges at UC Davis (most significantly, ASCB Fellow and Dean Mark Winey of the College of Biological

Sciences), for funds and support. Most importantly, we thank the NIGMS at the NIH and taxpayers across America for the major support of this program.

Five years after my mid-life crisis, our PREP training program is thriving. In spite of all the time and hard work, I have discovered that running a training program to help others is far more rewarding than a fancy microscope. I am now happy to be privileged. Not the type of privilege that I was born into, but a more rewarding privilege. I am privileged to be able to work closely with the PREP Scholars. I am privileged to watch them develop and grow. I encourage other professors to spend less effort directed toward glossy

manuscripts, big grants, and awards. Instead, spend a significant part of your focus on helping those who lack the privilege from which you so benefited.

In simpler terms, pay it forward. I have found my efforts at paying my privilege forward to be fulfilling. In fact, running PREP@UC Davis has been the single most rewarding experience of my scientific career.

About the Author

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