

Case Study

Reshaping expectations about gender and race in a STEM field by taking stock of existing diversity efforts and setting a course for continued effort and innovation.

A Plan of Action Measured

AS CHAIR OF BERKELEY'S Electrical Engineering and Computer Sciences (EECS) department, Professor Tsu-Jae King Liu and her colleagues are seeking to change the norms around diversity in a discipline long challenged by racial and gender disparities. EECS is one of Berkeley's largest and fastest-growing departments, with approximately 2,900 students, more than 100 faculty, and over 50 full-time staff. At a time when the technology sector is under fire for a lack of diversity in its workforce and many science, technology, engineering, and mathematics (STEM) fields are struggling to recruit and retain women and underrepresented minorities, Liu and her colleagues — including faculty, staff, and students — have been looking at the department's demographics and history, assessing their successes, identifying weaknesses, and pursuing new possibilities for a more inclusive future.

When Liu joined the department as an assistant professor in 1996, she was one of only five women faculty in a department of 75. Although intentions were good, and people were very supportive, the culture was still largely male-centric. The low percentage of women tended to reproduce itself due to limited role models and critical mass. Despite strong and longstanding efforts to increase departmental diversity — in terms of both gender and ethnicity — through 2010, the department's faculty and student populations of women ranged from only 10–15 percent, with less than five percent of the department coming from underrepresented groups (African American, Chicano/Latino, and Native American/Alaska Native).

In 2011, the department partnered with Berkeley's Division of Equity & Inclusion on a new strategic planning initiative to improve these numbers and to create a more welcoming and inclusive environment. Today, with Liu's support and leader-

ship, EECS is alive with programs and activities to change the face of the department and shape expectations about who will comprise the next generation of scholars and tech leaders.

Over the past four years, as a result of these efforts, the percentage of undergraduate women in EECS has grown more than twice as fast as the growth of the student population overall, and the percentage of underrepresented minority students has grown four times as fast. For graduate students, the proportionate increase in women and underrepresented minorities has been three to five times the overall rate, and faculty diversity has increased as well.

To Liu, this is just the sort of departmental transformation that students and others should seek out and anticipate as normal. "In engineering, people have to work together in teams to succeed, and when our students think about collaboration, they should expect it to be natural that there's diversity," she said. "Society is diverse, so you should expect the people you deal with here to be diverse. And if we make it clear that we all have shared goals to make a difference in this world and that we're all part of a diverse community... we'll be better able to serve a diverse society."

The Planning Process

Berkeley's departmental strategic planning initiative for equity, inclusion, and diversity began in 2011, and now supports all academic and administrative units in bringing to life the core principles at the heart of the university's 2009 Strategic Plan for Equity, Inclusion, and Diversity. As part of this initiative, each unit conducts its own strategic planning process, drawing on data support, self-assessment tools, and goal-setting assistance from the Division of Equity & Inclusion. In the EECS



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department, Diversity Director Sheila Humphreys (now emerita) led the planning process, incorporating the participation of a wide range of faculty and students, as well as the department's then chair, associate chair, and faculty equity advisors.

The team's first step was looking at data. In addition to analyzing the racial/ethnic and gender composition of faculty, graduate students, and undergraduates, the department conducted student surveys about departmental climate and reviewed information about outreach, admission, yield, and hiring trends.

As a complement to its data review, the planning team looked to other units on campus, peer institutions, and the broader STEM field for best practices on mentoring, advising, faculty searches, student recruitment, scholarship funding, and online communications. They also reviewed the work of student diversity and leadership groups within EECS and Berkeley's College of Engineering and took stock of the department's many undergraduate, graduate, and K-12 outreach efforts to see which were most — and least — effective. Throughout the team's

deliberations, they sought to identify successful approaches, ongoing concerns, and future strategic directions. Key priorities that emerged included undergraduate diversity, expanded graduate outreach, faculty recruitment and hiring, and departmental climate.

Shared Values and Goals

The EECS planning process resulted in a shared vision for promoting equity, inclusion, and diversity within the department, with a focus on:

- » Increasing diversity at all levels: undergraduate students, graduate students, and faculty
- » Fostering an inclusive environment that supports the success and well-being of each member of the community
- » Collaboration among faculty, students, and staff under the leadership of the department chair

The process also generated a comprehensive set of strategies in several key areas. These included:

- » **Expanding faculty diversity** by implementing known best practices for recruitment and hiring and connecting with outstanding diverse Ph.D. candidates and post-doctoral researchers at the top institutions for electrical engineering and computer science. As a prime example, EECS has attended the annual “Rising Stars in EECS” workshop, which features the top female graduate students and post-doctoral researchers in EECS. In the fall of 2014, EECS hosted this workshop to give outstanding women the opportunity to present their research and to become well acquainted with the faculty and the supportive environment at Berkeley. In turn, this outreach effort showcased Berkeley’s interest in attracting more women to apply for EECS faculty positions at the university. Notably, each of the three new women faculty who joined the department in 2015-16 is a past participant of this selective workshop.
 - » **Improving climate** by regularly gathering student input, working with Berkeley’s Multicultural Education Program on diversity in the classroom, and supporting diverse student organizations, both within and outside EECS, including through financial support.
 - » **Increasing the recruitment and admission of diverse graduate students** by hosting summer research experiences for undergraduates from underrepresented groups to enhance their chances of applying to and being admitted into the EECS graduate program at Berkeley, maintaining and enhancing visibility at conferences for women and underrepresented minorities (including supporting the participation of current graduate students), and fully engaging the faculty in recruitment and yield activities once admissions decisions have been made.
 - » **Increasing undergraduate diversity** by creating the CS (Computer Science) Kickstart program, an onboarding program for incoming freshmen women who are new to computer science, launching the CS Scholars program to provide extra seminars and tutoring in lower-division CS courses to cohorts of students who had limited access to resources in high school, and improving informational brochures and web presence for prospective diverse students.
- The CS Kickstart program started in the summer of 2011, and the project has shown early success in supporting the recruitment and retention of women undergraduates. This student-led program provides a one-week introduction to computer science and is designed for entering undergraduate women with no prior programming experience. The goal is to show participants the creativity and power of computer science, to give them a hands-on experience in programming, and to offer a network of support. Each year, 30 incoming female students participate, and more than 40 continuing students help run the program. Initial evaluation data suggest that, as a result of the program, 96 percent of participants felt more prepared to take their first CS course at Berkeley, and 95 percent had a greater motivation to pursue computer science. Microsoft has provided a grant to enable the department to expand this program to 60 students in the summer of 2015. The department is also looking to raise additional funds for a program endowment.
 - To complement CS Kickstart, EECS launched the CS Scholars program in the fall of 2013. CS Scholars helps create an academic “home” for diverse students interested in computer science by offering a year-long cohort-based experience for the first three lower-division computer science courses. The program supports students from underserved backgrounds who might not have had access to resources that prepare them to succeed in computer related fields. It provides targeted lab and discussion sections; supplemental lectures and hands-on assistance from a top-rated graduate student instructor (GSI); weekly academic and career development seminars; specialized tutoring; and peer mentoring.
- To date, approximately 90 students have participated in CS Scholars and thanks to support from Microsoft, even more are anticipated to join the program in the coming year. A survey of students who completed the first CS course

during the spring 2015 semester showed that the average grade point average (GPA) in this course was nearly 0.3 higher for CS Scholars vs. non-scholars among students who voluntarily self-identified as “having no skill at programming” or as “terrible programmers” before the course. Even more notably, 59 percent of these self-identified students are women, for whom the difference in GPA was close to 0.5. The department is hoping to create an endowment for CS Scholars.

- » **Enhancing K-12 outreach** by assessing the department’s many pre-collegiate programs and expanding best practices. Attendance at the EECS Department’s largest pre-college event, CS Education Day, has shifted in the last two years from high schools with AP Computer Science programs to schools that serve educationally disadvantaged students through the MESA Program (Math, Engineering, Science Achievement). Through this partnership, there have been increasing numbers of underserved and underrepresented students matriculating to Berkeley.
- » **Pursuing external funding sources** to support diversity, equity, and inclusion efforts within the department. For example, Microsoft has recently committed funding to support the CS KickStart and CS Scholars programs.

New Efforts and Impact

Liu found the strategic planning process a helpful foundation for her own leadership on promoting and increasing diversity in the department. “It forced the department to take stock of where they’re at, what has worked, what hasn’t worked as well, and why — and to learn from that,” she said. “We need to have some institutional memory to learn from the past so that we can move forward and improve things for the future.” In her tenure as chair, Liu has both drawn on the formal planning document and moved beyond it, updating the plan with new strategies and projects to keep it current and innovative. All of this has helped transform how the department does business. It has also increased diversity among EECS undergraduate students, graduate students, and faculty.

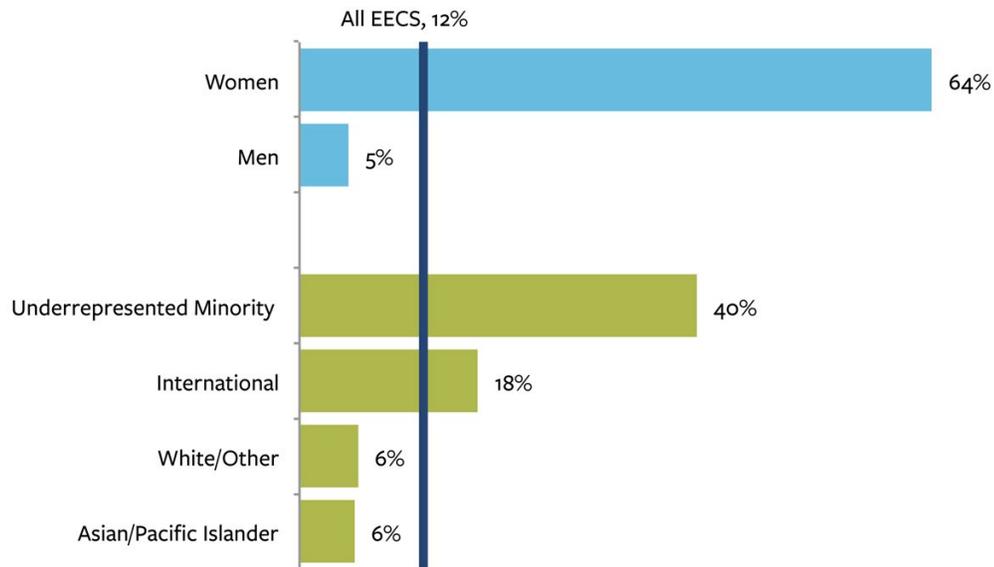
In addition to improving academic success for underrepresented groups, EECS efforts have helped create a climate of deeper inclusion and support within the department. As one student said, “It’s a great feeling to know that there are people here to support me, along with a community to go through this journey with.” In recent years, the department has also seen a general increase in visibility and leadership among women students, with many serving as peer advisers, mentors, and tutors for other students, both male and female.

Along with a transformation in programming and climate, over the past several years the EECS department has begun to see a shift in its undergraduate diversity numbers. From 2009-2014, while the total number of students majoring in EECS or computer science (through the College of Letters & Science CS Program) grew by 80 percent, the number of underrepresented minority students more than doubled, and the number of women almost tripled. In the fall 2015 semester, record high percentages of women and underrepresented minority students entered the EECS major program.

Graduate student diversity and climate have also improved, largely as a result of outreach, retention, and mentoring initiatives. Key efforts include partnering with Berkeley EDGE, a campus conference that encourages competitively eligible underrepresented minority students in the science, technology, math, and engineering fields to apply to Berkeley Ph.D. programs, as well as several summer research experiences for undergraduates, such as SUPERB — Information Technology for Sustainability — and undergraduate research opportunities through the Team for Research in Ubiquitous Secure Technology (TRUST) and the Center for Energy Efficient Electronics Science (E3S). As noted in Figure 1, over the past five years, the proportion of women and underrepresented minority graduate students in EECS has grown at a significantly higher rate than the department’s overall graduate population.

Finally, the past few hiring cycles have yielded a significant number of diverse new faculty members. Counting the new hires in 2015-16, there have been six new women (out of a group of 21 new

FIGURE 1
Overall increase in EECS Graduate Student Population
by Gender and Race/Ethnicity, 2010-2015



SOURCE: CAL ANSWERS

hires) added to the EECS faculty since 2010, thanks in large part to an effort to actively identify and contact diverse rising stars in EECS and to follow best practices in recruitment and hiring. While there is certainly room for further growth in diversity, the statistics in Figure 2 show a picture of success. In addition to the five-year numbers on these charts, three additional women, and one additional Latino man joined the EECS faculty in 2015-16.

Looking forward, the department will continue its proactive work to increase diversity at all levels and to encourage a culture of respect and support for all EECS members. In addition, the department's strategic plan is seen as an inspirational model by other departments across the Berkeley campus, many of which use it to spark their own ideas and strategies.

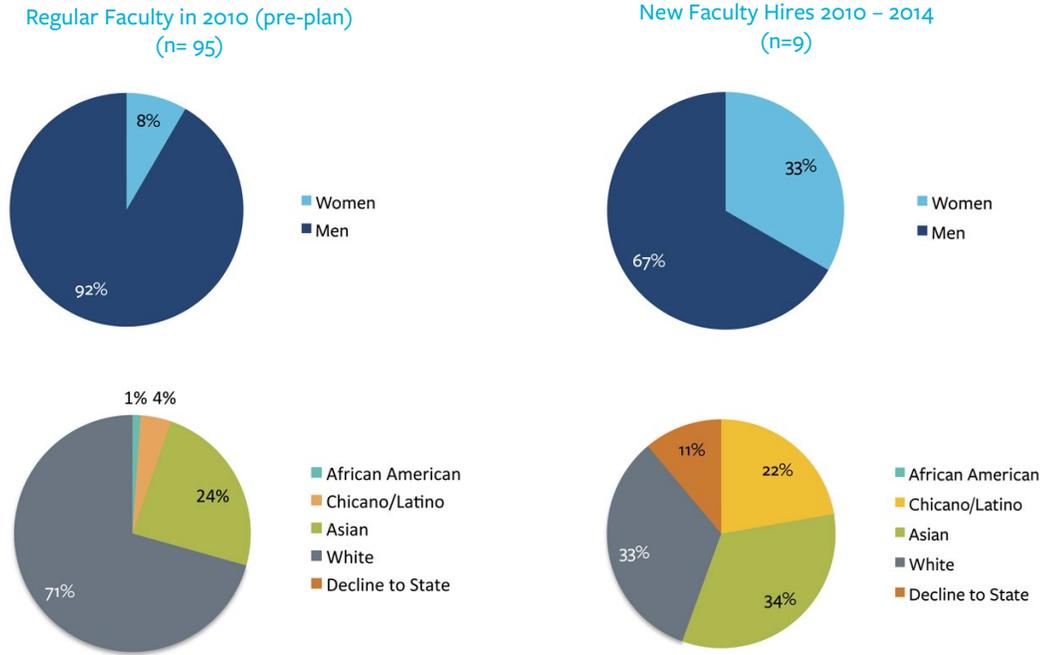
The Catalyst Moment

The Electrical Engineering and Computer Sciences department partnered with the Division of Equity & Inclusion to take stock of their existing diversity efforts and to create a strategic plan that sets a course for continued effort and innovation on these issues.

Best Practices

- » Engage a broad range of departmental stakeholders in the planning process and implementation of diversity efforts.
- » Ensure leadership from the department chair and other leaders.
- » Ground the department's goal-setting process in a thorough review of existing data and approaches.

FIGURE 2
Comparing New Faculty Hires to Existing Demographics



SOURCE: CAL ANSWERS

- » Leave room for innovation and revision as implementation of the strategic plan unfolds.

Lessons Learned

- » Ensure that departmental diversity planning is a collaborative effort and that it does not get seen as only the purview of those who already have expertise or official roles in these areas.
- » Departments that are most successful with their diversity plans are those that, like EECS, look broadly at mission, curriculum, research, outreach, climate, mentoring, and administrative practices, as well as at faculty, student, and staff demographics. For some, taking this broader view can be challenging, particularly at the outset of the planning process.

- » Concrete goal-setting and new strategy development are crucial parts of the planning process. For most departments, simply identifying priority concerns and aspirations at a general level is not enough to ensure meaningful change.

What's Next

- » The EECS department will continue to implement and expand its diversity efforts, including developing new initiatives supporting leadership for women in technology. At a campuswide level, the Division of Equity & Inclusion will further support all academic and administrative units in creating strategic plans for equity, inclusion, and diversity.