

## Gender bias still strong in science, engineering fields; parity at University of Arizona proves elusive

Parity for women in STEM fields at the University of Arizona an elusive goal



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Advanced degrees and professional success haven't spared Leslie Tolbert from gender bias in the scientific world.

She holds the University of Arizona's top research administrative position, is an accomplished neuroscientist and has a Ph.D. from Harvard University.

But she has sat through meetings where her ideas were ignored until they were echoed by a man, who then received credit for them.

It's frustrating, she said, but also motivating.

"You do wonder what it is about you that makes you invisible or inaudible," said Tolbert, the UA's senior vice president for research.

Tolbert heads up a program to change the climate toward women in science. She is the co-principal investigator of the UA Advance grant from the National Science Foundation.

The grants are awarded to universities throughout the country with the goal of increasing the representation and retention of women in academic science, engineering, technology and mathematics - or STEM - positions. The focus is the often-unconscious assumption that men are more competent when it comes to science and research.

### Equality stops at Bachelor's

Both locally and nationally, women continue to be a minority in top STEM faculty positions.

Men outnumbered women 258 to 69 in tenure-track faculty positions in the UA College of Science as of fall 2012, statistics from the UA Office of Institutional Research and Planning Support show. In the College of Engineering, it was 99 to 13.

Nationwide, women earn about half of all science and engineering bachelor's degrees, though they lag in engineering, computer science and physics, National Science Foundation statistics show. In 2009, almost half of science and engineering graduate students were women.

But the equality stops there. In 2008, only 26.8 percent of full-time senior faculty positions in science, engineering and health were filled by women.

### **Success hard to prove**

The UA has seen minimal gains since 2006, when it was awarded the Advance grant and started its push to recruit and retain more women. The grant is in its final year.

Female representation varies greatly by field. In 2011, for instance, women outnumbered men in nutritional sciences, pathology, and epidemiology and biostatistics.

The success of the grant is hard to prove numerically, Tolbert said. The university has had freezes on most hiring over the past several years and is down faculty overall.

Improving the representation of women is tricky, said Andrew Comrie, senior vice president for academic affairs and provost at the UA. The university cannot hire based on race or gender, and women are still underrepresented in the "pipeline" of STEM fields, he said.

"These are not simple issues to disentangle," Comrie said.

Several new "superstar" female researchers have joined the faculty since the grant began, and the culture is changing in some areas, Tolbert said.

Members of hiring committees now undergo training on unconscious bias against women and how to develop search criteria that draw broad pools of candidates.

The university has also started tracking salary offers to promote equity between male and female hires, said Allison Vaillancourt, vice president of human resources at the UA and co-investigator of the Advance grant.

"Just the process of having to document it sends the message to the department that it must be fair," Vaillancourt said.

### **Factors keeping women out**

It's not always bias or lack of effort that keep women out, said Mary Poulton, head of the UA Department of Mining and Geological Engineering. It can be challenging to find women who are qualified and want the position.

Poulton would know. Hired in 1989, she is the first and only woman to ever work in the department.

Her interest in geology started after her father, a middle-school teacher, brought home a bag of rocks when she was 4 years old.

At first, she said, she wanted to pursue lunar geology but was told women couldn't go into space. Oil exploration? Women should not travel to the Middle East. Mining? Forget it - it's bad luck to have women in mines.

A high school guidance counselor helped Poulton find a summer engineering program for

women. That sealed her interest in the subject, she said.

Her experience as a minority began in college. She was one of only two women in her engineering classes. Professors learned their names and called on them more frequently.

"We were always singled out and not in a pleasant way," Poulton said. "We ended up having to be better than everyone else."

She's been at the UA since the middle of her undergraduate education and became the first female department head in the College of Engineering in 2000.

At the undergraduate level, the 75-student department is about 17 percent women, Poulton said. Women with Ph.Ds in the field are a rarity and are difficult to attract to academia, she said.

"I make the call and reach out and try to twist arms," she said. "The salaries just can't compete with industry."

### **Tenure a big investment**

The same challenge is present throughout the college, said Dean Jeffrey Goldberg. The College of Engineering had 13 female tenure-track faculty members last fall compared with 14 in 2006. The number of male faculty is down from 100 to 99 during the same time period.

His hiring committees know they need to look at all candidates, he said, but the tenure process is a big investment. Faculty are responsible for getting grants and publishing papers.

You have to invest in the best candidate regardless of gender, he said.

Diversity is important, though. Engineers need to come from a variety of backgrounds to bring different perspectives to problem-solving, Goldberg said.

"It's not a fairness thing for me," he said. "It's a quality issue."

Several female faculty members have left the college over the past several years for various reasons including marriage, the desire to work at a faith-based school and receiving better offers elsewhere.

The college has hired and supported several new women over the same time period, he said. Goldberg called one of them, Erica Corral, a "rare occurrence."

Corral, an assistant professor whose research focuses on ceramics and materials that can survive high temperatures, has received several awards for her teaching and research since being hired in 2008.

She is one of three women in her department and followed an early interest in math and science to a career in engineering. She finds female students try to make a connection with her early on.

"You do need role models to point to and say, 'It can be done,'" she said.

Talking to other women who have faced discrimination has helped her learn from their experiences, she said.

"I tend not to see myself like that," Corral said. "It's about what I do technically and what I do for students in the classroom."

Corral, a new mother, said raising her 5-month-old baby girl is a family effort. Her husband is a UA professor of immunobiology, and the two juggle work schedules that often top more than 40 hours a week.

"It's a lifestyle," Corral said.

Maternity leave helps, but professors and researchers have some responsibilities that are non-negotiable, Corral said.

"Proposal deadlines don't care you just had a baby," she said.

### **Some things easier now**

Life is easier for female engineers than when Poulton entered the field.

For starters, she is no longer the only woman in the room at professional conferences. Fellow engineers no longer assume she's a graduate student.

"Things have changed so much and gotten so much better that it's hard to look back to how things were," she said.

That change came late to some departments.

Ina Sarcevic was the first woman hired as a tenure-track faculty member in the UA Department of Physics 25 years ago. She was quickly promoted based on her grants and research.

A change in leadership a few years later brought problems for some female students who complained about gender discrimination, said Sarcevic, who is also a professor in the Department of Astronomy. Many of them ended up in her office with complaints.

A committee of the American Physical Society was invited to visit the department in 2004 to assess the climate toward women.

The changes it recommended, which are confidential, were implemented, and Sarcevic has not heard of similar issues, she said. She is one of two women in the department and tries to encourage female students to stay in the field, she said.

### **Recruitment tactics**

The ratio of female-to-male faculty in the Department of Physics hasn't improved in recent years - but it's not for a lack of trying, said department head Sumit Mazumdar.

Female candidates have often been the department's top choice for open positions since he

became head in 2009. They have all received better or quicker offers elsewhere.

Several colleges and departments reach out to women long before they've earned a Ph.D. - or even committed to a career in science. The College of Engineering, for example, recruits young women before they enter college with activities including a sleepover camp on campus.

"If we didn't recruit, no one would show up," said Goldberg.

But they are showing up: The college has about 5 percent more women at the undergraduate level than the national average.

The UA's Women in Science and Engineering program serves 5,000 people a year from junior high to professionals in the field, said November Papaleo, director of the program and a Ph.D candidate in gender and women's studies. Initiatives include a mentoring program, biannual conferences and a specialized dorm wing for women in STEM majors.

### **Role of female mentors**

The program provides female students with a community of peers and mentors, said Lupita de los Santos, a freshman in electrical and computer engineering and an intern with the program.

She was introduced to engineering during a summer camp at the UA and was one of three girls in a dual-enrollment engineering course at her high school.

Women in Science and Engineering has provided her with a "home away from home" with strong women to look up to, she said.

"You say, 'Oh, I want to be someone like that,'" said de los Santos, who plans to pursue a Ph.D.

Female mentors can make male-dominated fields seem more approachable, said Johanna Teske, a Ph.D candidate in astronomy at the UA. Teske said mentors she encountered as an undergraduate continue to help her today.

She is former co-president of the department's Women Science Forum, a group of female astronomy students. The club is part social and part professional; women can practice for job interviews, push for policy changes and talk about balancing their academic and personal lives.

"You can be a successful and still sane woman in this career," Teske said.

### **"There's Been Progress"**

No one knows exactly why the pipeline of male and female scientists changes after graduate school, said Carol Bender, director of the UA's Undergraduate Biology Research Program.

Bender said her female graduates who enter doctoral programs are not showing up in postdoctoral positions at nearly the same rate as the men.

Bender teaches an undergraduate course geared toward female students in science and

engineering to address these issues early on. She introduces students to the statistics on women in these fields and has them map out how they will achieve their goals.

"It's much more difficult to appreciate the steps you have to take to get there," she said.

Increasing female representation at the faculty level is a slow-moving game of catch-up.

But the improvement is there, seen as much through a change in the climate as in the numbers, physics professor Sarcevic said.

Women are no longer expected to be back in the classroom a few days after giving birth like she was in 1991.

Women are consistently put on search committees for hiring.

And women continue to see female leaders at the UA, including its president.

"There's progress," Sarcevic said. "I've been here long enough to see the progress."

"You do wonder what it is about you that makes you invisible or inaudible."

Leslie Tolbert, UA senior vice president for research

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