

The Quest for Women Scientists

Tom Price

The National Science Foundation, the National Academy of Sciences and other U.S. organizations are looking for a few good women—well, more than a few—to pursue careers in the sciences.

Women's participation in U.S. science has increased steadily—and in some cases dramatically—over the past four decades, but women remain less likely than men to hold science jobs, especially at higher levels.

Women's share of bachelor's degrees in science and engineering has doubled since the mid-1960s, from 25 percent for the class of 1966 to 51 percent in 2006. The percentage of women with science-related master's degrees has risen to 45 percent, and those with doctorates soared nearly five times, to 39 percent in 2006.

The statistics for women in physics are even more dramatic—bachelor's degrees rose nearly four-fold, master's more than five-fold, and Ph.D.s nearly 12-fold. These increases stem from such a small base, however, that women still earn just more than a fifth of physics bachelor's and master's degrees and 17 percent of doctorates.

Women also remain less likely than men to carry those degrees into the workforce. They hold just 27 percent of all science and engineering jobs, 28 percent of science and engineering faculty positions and 18 percent of full professorships.

A 2004 study for the National Science Foundation (NSF) concluded that women are less likely to advance in

academic careers than men with similar credentials and years in the field. By percentages ranging from 3.3 to 8.5 percent, women were less likely than similarly qualified men to fill tenure-track positions, hold tenure or be full professors.

The primary reasons seem to be career disruptions caused by marriage and

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motherhood, the report stated. Married women and women with children are less likely than other women to hold tenure-track jobs or to earn tenure. Women who put off child-bearing until they become more established in their careers are more likely to hold tenure than women who became mothers at a younger age.

According to a 2007 report published by the National Academy, women faculty members in the science and engineering

departments of research universities typically receive fewer resources to work with than their male counterparts. Women are underrepresented in the leadership of academic institutions, scientific societies and honorary organizations. Women science faculty members earn less than men, according to the report, which was prepared by the Academy's Committee on Maximizing the Potential of Women in Academic Science and Engineering.

The discrepancies begin early. The National Center for Education Standards reported in 2000 that fourth grade girls and boys have about the same interest in math and science. By eighth grade, however, twice as many boys are interested.

According to the National Academies report, high school girls who express an interest in science or engineering are less likely than boys to pursue college majors in those fields. More women than men with science or engineering bachelor's degrees go on to graduate studies in other fields.

Under instructions from Congress, federal grant-making agencies began looking for bias in college science departments in 2006. To date, the investigations have not produced findings against any institution.

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University of California Regents

on “unintentional biases and outmoded institutional structures.” It called for a review of hiring, promotion and publication procedures to make sure they don’t discourage women. It placed particular emphasis on accommodating the demands of motherhood, with paid parental leave, subsidized child care and flexible timetables for completing a dissertation and acquiring tenure.

A study published in the *Harvard Business Review* this year investigated

why women leave science, technology, engineering and math (STEM) jobs in corporations. The researchers identified key causes as a “machismo” work environment, a dearth of other women to serve as mentors and role models, and long work hours that conflict with parenting.

Cisco Systems, Intel, Johnson & Johnson and General Electric are among the companies that have begun programs to improve their recruitment and promotion of women scientists, the authors of the *Business Review* report said. In education, NSF’s ADVANCE program makes grants for projects that research and implement methods of increasing women’s participation in science.

This year’s ADVANCE grants include some tightly focused projects, including one designed to enhance the roles of women in atmospheric science and another to help women move from post-doctoral positions into tenure-track faculty appointments. Others take broader approaches.

Purdue University President France Cordova, who is also a Ph.D. physicist and astronomer, is the principal investigator of a project aimed at transforming the institution to increase the number of women faculty in STEM disciplines. The researchers hope to generate knowledge that can be used throughout the country.

At the University of Maryland Baltimore County (UMBC), which has had

ADVANCE funding since 2003, women scientists and engineers have made notable moves up the academic ladder. In the first four years, female tenure-track faculty jumped 48 percent. In three years, the number of women assistant professors increased 58 percent, associate professors 33 percent and full professors 40 percent.

Women faculty at UMBC receive mentoring to help them navigate tenure and promotion systems. Each department

must prepare a “faculty diversity recruitment plan.” Faculty receive annual training on diversity recruitment. The university has adopted flexible tenure timelines.

Other efforts aim at inspiring girls to embrace science. The National Academy of Sciences has published

biographies of ten contemporary women scientists. The *Women’s Adventures in Science* series communicates the excitement of science to young girls. *Bone Detective* is about a forensic anthropologist; *Robo World* describes a robot designer; and *Strong Force* is about physicist Shirley Ann Jackson, the president of Rensselaer Polytechnic Institute. A related Web site—iwaswondering.org—describes Jackson as a “subatomic explorer.”

Engineeringgirl.org, a project of the National Academy of Engineering, takes a similar approach to that discipline.

The campaign to bring more women into science is not just about equity. “To maintain its scientific and engineering leadership amid increasing economic and educational globalization,” the National Academies report argues, “the United States must aggressively pursue the innovative capacity of *all* of its people—women and men.” ▲

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