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## Bias Called Persistent Hurdle for Women in Sciences

By TAMAR LEWIN

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A report on the underrepresentation of women in science and math by the American Association of University Women, to be released Monday, found that although women have made gains, stereotypes and cultural biases still impede their success.



Dima Gavrysh/Associated Press

Mae C. Jemison says she encountered bias in her studies for chemical engineering.

The report, "[Why So Few?](#)," supported by the [National Science Foundation](#), examined decades of research to cull recommendations for drawing more women into science, technology, engineering and mathematics, the so-called STEM fields.

"We scanned the literature for research with immediate applicability," said Catherine Hill, the university women's research director and lead author of the report. "We found a lot of small things can make a difference, like a course in spatial skills for women going into engineering, or teaching children that math ability is not fixed, but grows with effort."

The report treads lightly on the hot-button question of whether innate differences between the sexes account for the paucity of women at the highest levels of science and math.

Five years ago, [Lawrence H. Summers](#), then the president of [Harvard](#), sparked a firestorm when he suggested that "there are issues of intrinsic aptitude, and particularly of the variability of aptitude" reinforced by "lesser factors involving socialization and continuing discrimination."

The association's report acknowledges differences in male and female brains. But Ms. Hill said, "None of the research convincingly links those differences to specific skills, so we don't know what they mean in terms of mathematical abilities."

At the top level of math abilities, where boys are overrepresented, the report found that the gender gap is rapidly shrinking. Among mathematically precocious youth — sixth and seventh graders who score more than 700 on the math SAT — 30 years ago boys outnumbered girls 13 to 1, but only about 3 to 1 now.

"That's not biology at play, it doesn't change so fast," Ms. Hill said. "Even if there are

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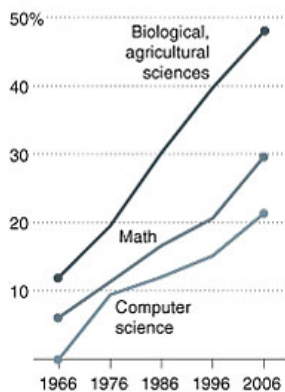
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## Underrepresented In Math and Sciences

Though the number of women receiving doctorates in science, technology, engineering or math have increased, men far outnumber women in the work force in those fields.

Share of doctorates earned by women in select fields



### Workers with doctorates

Computer and information sciences

17% female

Biological, agricultural and environmental life science

33%

### Tenured faculty in four-year institutions

Engineering

7% female

Physical sciences

14%

Computer and information sciences

21%

Biological, agricultural and environmental life science

22%

Source: "Why So Few?" AAUW

biological factors in boys outnumbering girls, they're clearly not the whole story. There's a real danger in assuming that innate differences are important in determining who will succeed, so we looked at the cultural factors, to see what evidence there is on the nurture side of nature or nurture."

The report found ample evidence of continuing cultural bias. One study of postdoctoral applicants, for example, found that women had to publish 3 more papers in prestigious journals, or 20 more in less-known publications, to be judged as productive as male applicants.

Making judgments about an individual's abilities based on his or her sex is a classic form of discrimination, said Nancy Hopkins, an [M.I.T.](#) biology professor who created an academic stir in the 1990s by documenting pervasive, but largely unintentional, discrimination against women at the university.

Even if male math geniuses outnumbered female geniuses 3 to 1, Dr. Hopkins said, it would be reasonable to expect one female math professor for every three male professors at places like Harvard and M.I.T. "But in fact, Harvard just tenured its first female, after 375 years," said Dr. Hopkins, who, famously, walked out of the room after Mr. Summers made his controversial remarks.

The university women's report cited research showing that girls' performance suffers from any suggestion that they do poorly at math. In one experiment, college students with strong math backgrounds and similar abilities were divided into two groups and tested on math. One group was told that men perform better on the test, the other that there was no difference in performance between the sexes. Their results were starkly different: in the group told that men do better, men indeed did much better, with an average score of 25 compared with the women's 5. In the group told there was no difference, women scored 17 and men 19.

Any suggestion of advantage based on sex affects results, the research shows, even where there is no cultural stereotype.

In an experiment ostensibly testing "contrast sensitivity ability" — a made-up skill — men and women in a group told there was no difference between the sexes in such sensitivity rated their own ability equally. But in a group told that men were better at it, men rated their skills far higher than women did.

Teaching girls about how stereotypes affect performance, the report found, can diminish such effects.

In a separate survey of 1,200 female and minority chemists and chemical engineers by Campos Inc., for the [Bayer Corporation](#), two-thirds cited the persistent stereotype that STEM fields are not for girls or minorities as a leading contributor to their underrepresentation.

Many in the Bayer survey, also being released Monday, said they had been discouraged from going into their field in college, most often by a professor.



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“My professors were not that excited to see me in their classes,” said Mae C. Jemison, a chemical engineer and the first African-American female astronaut, who works with Bayer’s science literacy project. “When I would ask a question, they would just look at me like, ‘Why are you asking that?’ But when a white boy down the row would ask the very same question, they’d say ‘astute observation.’ ”

The university women’s report found that girls have less confidence in their math abilities than boys with equivalent achievement levels. Because most people choose careers where they believe they can do well, the report said, girls’ lesser belief in their skills may partly explain why fewer young women go into scientific careers. Both the university women’s report and the Bayer survey stress the need for more female mentors and role models.

But even as women earn a growing share of the doctorates in the STEM fields, the university women’s report found, they do not show up, a decade later, in a proportionate number of tenured faculty positions.

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