

TEACHER-FACILITATOR MATERIALS FOR CORNELL INSTITUTE FOR
WOMEN IN SCIENCE VIDEO SERIES

Defining the Problem: Is there Discrimination Against Women Scientists?

Everywhere you look in universities and colleges you see evidence of women professors' many successes. Women hold a substantial portion of professorships in the humanities and liberal arts, and they are well represented in the social sciences such as psychology and sociology as well as in some fields of natural science, such as biology and medicine. But women are in short supply in math-intensive fields, such as chemistry, physics, mathematics, engineering and computer science. For example, in Top-100 U.S. universities in 2007, women were only 16% - 27% of assistant professors, and women full professors in these fields numbered only 4.4% - 12.3%. In the field of mathematics, in 2005 women earned 45 percent of undergraduate degrees and 29% of Ph.D.s. But in 2007, women comprised 27% of assistant professors in math, 18% of associate professors, and only 7% of full professors. Much has been written about the underrepresentation of women professors in math-intensive fields of science, and here we consider one of the major arguments, discriminatory treatment.

Bias Against Women. In the past it was undoubtedly the case that women experienced an uneven playing field in many professional fields. Countless testimonials exist of women's struggles against sexism in science. Women aspiring to be bench scientists were discouraged or even actively discriminated against by hiring committees. They were told the jobs were too demanding for delicate female constitutions or that a woman's place was at home raising children.

Sadly, this past discrimination against aspiring female scientists has had legacy of its own: today some to assume that the shortage of women in science is due to ongoing discrimination against women applicants for academic jobs. They argue that women are bypassed by hiring committees, and their research is harder to get published and funded. However, none of these claims is supported by contemporary data, although these forms of discrimination may have played important roles historically. In an article in the *Proceedings of the National Academy of Sciences*, Steve Ceci and Wendy Williams reviewed the evidence for this assertion and concluded that discrimination in publication, hiring, and funding are not responsible for the current underrepresentation of women. Consider one example of the research they cited. A large study of interviewing and hiring records in math-intensive fields in universities across the United States and found that women applicants were actually more likely to be interviewed and offered the best jobs (so-called tenure-track because they have the potential for lifetime job security) than were their male competitors, and that there were no differences in tenure and promotion rates for women and men. A number of other analyses have reached the same conclusions. Thus, when women Ph.D.s apply for academic jobs, they are more likely to be interviewed and offered jobs, a finding that runs counter to allegations of discriminatory hiring. And the picture is much the same with regard to funding and publishing. Women scientists are as successful as men at publishing their work and at earning grant funding,

according to analyses of hundreds of thousands of grant applications submitted throughout the United States, Canada, the United Kingdom and Australia.

Thus, the shortage of women in mathematical fields is not the result of current discriminatory hiring, publishing, and funding, nor can it be explained away on the basis of ability differences. What is the culprit? It turns out that the single biggest reason for the shortage of women in science is the perceived incompatibility of holding a full time tenure track job and raising a family simultaneously. Many women decide to drop out of the job search process after they complete their doctoral training because they aspire to have families and do not see that being compatible with holding a full time tenure track job because the latter often seems to demand very long hours in the lab. Surveys of women who exited from scientific careers reveal that many decide not to compete for tenure track positions even though they actually have a better chance of getting them than their male counterparts.

Elaine Howard Ecklund of Rice University and **Anne Lincoln** of Southern Methodist University asked 3,455 male and female scientists how many hours they worked, if they were married, if they had kids and if they had fewer children than they wanted because of the demands of their career. About half of the women said they had fewer children than they wanted because of the pressure their careers put on them. This was especially the case with women postdoctoral students, 55% of who said they had fewer children than they wanted. Almost 40% of females in PhD programs agreed, as did 45% of female science faculty members. So, the shortage of women scientists is aggravated by this perception that a tenure track job is too demanding to simultaneously raise a family or care for elderly parents.

Related to this cause is lifecourse differences between the sexes. In surveys of PhD students, David Lubinski, Camilla Benbow and their coauthors found that female PhD students viewed a full-time career as “important” or “extremely important” about as often as did their male counterparts (77 percent vs. 81 percent, respectively). However, when it came to the importance of temporarily having a part-time career, significant sex differences emerged (31 percent vs. 9 percent, respectively), as well as for always having a part-time career (19 percent vs. 9 percent, respectively). Although it is not proven, the single most likely reason for the desire to work less than full-time is to raise children. Such lifecourse preferences can lead to differences in research productivity and hours spent at the office, reflecting differing priorities in optimal life-work balance. Lubinski studied the amount of time that nearly 2,000 33-year-olds, who were in the top 1 percent of mathematical ability during their adolescence, spent working. He found that roughly twice as many high-math-ability men as women reported working at their jobs more than 50 hours per week. Three times more women reported working fewer than 40 hours per week. Other surveys underscore this male advantage in working very long hours, especially 60-plus hours per week in academic jobs.

One seeming puzzle is why raising a family would decrease women scientists but not decrease women veterinarians, medical doctors, lawyers, biologists and psychologists. Don't these fields also demand long work weeks? The answer is that they do. But the reason women in math-heavy fields are so affected is because there are fewer women in these pipelines to begin with. That is, in fields such as veterinary medicine and psychology where over 70% of recent doctorates have gone to women, decreases due to the desire to raise a family takes a toll that is less obvious than in fields where less 30% of doctoral holders are women. If a third of veterinary doctorates dropped out of full-time work there would still be a lot of female veterinarians. However, if a third of the 29% of women who earned a PhD in mathematics dropped out, that would reduce a what was a narrow stream of women to a trickle.

Discussion Questions:

- What can colleges and universities do to increase the number of women in those fields of science where they are in shortest supply if the reason is a desire to raise a family?
- Is it discriminatory if employers expect women to choose to be either a scientist or a mother but not both?
- Is it discriminatory if employers allowed parents to work fewer hours to raise their children than they demanded of childless employees?

Recommended Readings:

Ceci, S. J. & Williams, W.M. (2011). Understanding Current Causes of Women's Underrepresentation in Science. *Proceedings of the National Academy of Sciences*, 108, 3157-3162.

Ecklund, E.H. & Lincoln, A. E. (2011). Scientists want more children. *PloSOne*, 6, e22590: doi:10.1371/journal.pone.0022590.t003

Lubinski, D., Benbow, C. P., Webb, R. M., & Bleske-Rechek, A. (2006). Tracking exceptional human talent over two decades. *Psychological Science*, 17, 194–199.