

**U.S. HOUSE OF REPRESENTATIVES
COMMITTEE ON SCIENCE AND TECHNOLOGY
SUBCOMMITTEE ON RESEARCH AND SCIENCE EDUCATION**

HEARING CHARTER

Women in Academic Science and Engineering

Wednesday, October 17, 2007

2:00 p.m. - 4:00 p.m.

2318 Rayburn House Office Building

1. Purpose

On Wednesday, October 17, the Subcommittee on Research and Science Education of the House Committee on Science and Technology will hold a hearing to examine institutional and cultural barriers to recruitment and retention of women faculty in science and engineering fields, best practices for overcoming these barriers, and the role that Federal research agencies can play in disseminating and promoting best practices.

2. Witnesses

Dr. Donna Shalala, President, University of Miami.

Dr. Kathie Olsen, Deputy Director, National Science Foundation.

Dr. Freeman Hrabowski, President, University of Maryland Baltimore County.

Dr. Myron Campbell, Chair of Physics, University of Michigan.

Dr. Gretchen Ritter, Professor of Government, University of Texas at Austin.

3. Overarching Questions

- What is the current status of women in academic science and engineering? How do recruitment, retention, promotion and attrition rates differ for men and women in these fields? How and why do these data vary by discipline and type of institution?
- What are the greatest barriers to gender equity in academic science and engineering? What have we learned about what works and doesn't work to recruit and retain top female scientists and engineers into tenure-track positions? To what extent are best practices in recruitment and retention already being implemented?
- What can the Federal research agencies do to help identify, promote and disseminate best practices across the country? What responsibility do the agencies have to hold funded institutions accountable for subtle cultural barriers?

4. Overview

- Although women earn half of the bachelor's degrees in science and engineering (S&E), they continue to be significantly underrepresented at the faculty level in almost all S&E fields, constituting 28 percent (in 2003) of doctoral science and engineering faculty in four-year colleges and universities and only 18 percent of full professors.
- In 2006, the National Academies produced a report entitled, "Beyond Bias and Barriers: Fulfilling the Potential of Women in Academic Science and Engineering." The report was largely in response to the outcry over then Harvard President Lawrence Summers' 2005 remarks, in which he argued that biological differences may help explain female underrepresentation in academic S&E.
- The National Academies panel, in addition to dismissing the relative significance of any biological differences, made a series of recommendations to all stakeholders, including universities, professional societies and the federal government, to address cultural and institutional gender bias in academic S&E.
- The National Academies panel main recommendation to Congress was to carry out regular oversight hearings to investigate enforcement activities. Most of the experts contacted in preparation for this hearing agreed that while the Federal government could do a better job with enforcement of anti-discrimination laws at universities, the more subtle cultural barriers present a much greater challenge to women seeking academic careers.
- The National Science Foundation (NSF) established the ADVANCE program in 2000 to develop approaches for increasing the representation and advancement of women in academic science and engineering careers. While previous NSF programs for the advancement of women focused on support for individual scientists, the goal of ADVANCE grants is institutional transformation.

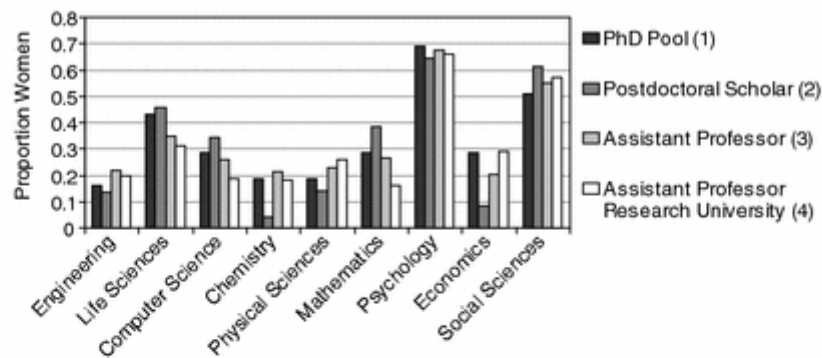
5. Current Status of Women in Academic Science and Engineering

According to data compiled by NSF, in 2003, women held nearly 28 percent of all full-time science and engineering (S&E) faculty positions. Specifically, they constituted 18 percent of full professors, 31 percent of associate professors and 40 percent of junior, or assistant professors.

Most of the social science disciplines and psychology are already dominated by women at both the graduate level and in faculty positions. The percentage of women earning PhD's in other S&E fields has grown steadily in the last 30 years, and has already exceeded 50 percent in the life sciences. However, in 2003 women constituted 34 percent of assistant professor appointments in the life sciences, and slightly less at research universities. Half of this drop-off can be accounted for by including only the available

pool of PhD's¹ in the life sciences: 42 percent in 2003. But attrition is still high in the step from completion of training to faculty appointment. Female underrepresentation in life sciences faculties continues through the associate and full professor levels. Notably, while the physical sciences continue to have low representation at the graduate level (20 percent), relative to the available pool of PhD's the physical sciences actually show better representation for women in tenure-track faculty positions than the life sciences and other fields with a greater percentage of women PhD's. The figure below shows these data for assistant and associate professor positions across all fields².

A: Postdoctoral Scholars and Assistant Professors



B: Associate Professors

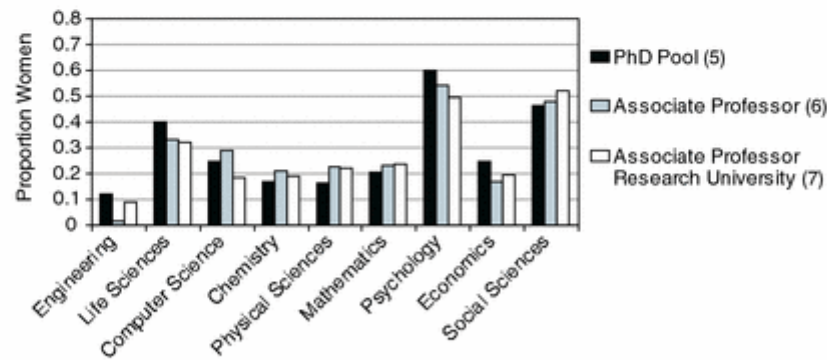


FIGURE 1-2 Comparison of the proportion of women in PhD pools with those in tenure-track or tenured professor positions in 2003, by field.

¹ In the case of assistant professor appointments, the available pool is the sum of PhD's earned by women in the 6-year period preceding appointment.

² Figure and related data is this section from National Academies report, "Beyond Bias and Barriers."

Women who start out on academic pathways in S&E fields leave for other career paths at higher rates than their male counterparts, even though for the fields in which attrition is highest, women show increased representation at the postdoctoral level. Postdoctoral positions are a necessary prerequisite to faculty jobs in most S&E fields. From among those who leave post-faculty appointment but pre-tenure review, men are more likely to move into other employment sectors and women are more likely to move into adjunct positions. However, in most fields, women and men faculty who are reviewed receive tenure at similar rates. As faculty move up in rank, there are again differences between men and women, this time in promotions, awards and even salary.

6. Institutional and Cultural Bias and Barriers

In 2006, the National Academies produced a report entitled, “Beyond Bias and Barriers: Fulfilling the Potential of Women in Academic Science and Engineering.” The report was largely in response to the outcry over then Harvard President Lawrence Summers’ 2005 remarks, in which he attributed what many thought to be a greatly exaggerated level of significance to a biological explanation for female underrepresentation in academic S&E. The NAS panel reviewed the existing literature on gender differences in cognition and biology and concluded that, “if systematic differences between male and female scientific and mathematical aptitude and ability do exist, it is clear that they cannot account for women’s underrepresentation in academic science and engineering³.” Instead, the panel focused on the need to fix institutional, social and cultural bias and barriers.

To this end, the National Academies panel made a number of recommendations to all stakeholders. The panel called on university presidents and provosts to provide clear leadership in changing the culture and structure of their institutions, and deans and department chairs to take responsibility for implementing changes to recruiting, hiring, promotion, and tenure practices. They recommended that higher education organizations form an inter-institution monitoring organization and that scientific and professional societies help set professional and equity standards across the activities they lead, such as awards and conferences. The recommendations made to the federal government ranged from rigorous enforcement of federal anti-discrimination laws by enforcement agencies to provision of workshops to minimize gender bias by NSF and other Federal funding agencies. The full list of recommendations is in the report summary available from the National Academy Press: http://books.nap.edu/catalog.php?record_id=11741.

The status of women in academic S&E has improved appreciably in the last three decades, and institutions across the country are continuing to address institutional barriers to gender equity. However, the National Academies panel argues that changes in institutional policies are necessary but not sufficient – even many policies that appear on the surface to be equitable in fact disadvantage women. For example, many women who

³ Critics of the NAS report disparage the panel for dismissing the significance of biology before all of the scientific evidence is in.

want children struggle with the intersection of the tenure clock and their biological clock. Many more men are also making work/life balance career decisions⁴. In order to attract top faculty candidates who want both career and family, a number of universities offer the possibility of an extension of the tenure clock – the number of years to tenure review – for assistant professors who have a child while under the clock. But in most cases young faculty feel pressure not to request this extension for fear that they will be judged differently in the tenure review process. In this case, cultural norms undermine a well-intentioned policy, and women, who are more often the primary caregivers for infants (especially if they breast feed), are disproportionately disadvantaged. Some universities have instituted an automatic rather than voluntary extension of the tenure clock in an attempt to overcome those cultural barriers.

The report also discusses at length a phenomenon known as “implicit bias,” in this case an implicit assumption of what a scientist is supposed to look like, i.e., a man, and probably a white man. The panel cites a Swedish⁵ study of peer-review scores, in which men received systematically higher competence ratings by their peers than equally productive women. In fact, women postdoctoral fellowship applicants included in that study had to be twice as productive (as measured by defined, quantitative measures of productivity) than their male counterparts to be judged equally competent. This field of research is still relatively young, but the collection of evidence supporting the notion of implicit gender bias in academic S&E continues to grow. Minority-group women, as members of two major demographic groups historically excluded from the scientific enterprise, face their own unique set of challenges.

The list of cultural norms that appear to disadvantage women also includes the favoring of disciplinary over interdisciplinary research and publications, and the only token attention given to teaching and other service during the tenure review process⁶. Thus it seems that it is not necessarily conscious bias against women but an ingrained idea of how the academic enterprise “should be” that presents the greatest challenge to women seeking academic S&E careers. Overcoming these cultural barriers is much more difficult than just enforcing anti-discrimination laws or making university policies more family friendly. And even among those who passionately advocate for change, there is no consensus about how or if to modify some of those core practices that have defined the academic enterprise for generations.

7. NSF ADVANCE Program

The National Science Foundation established the ADVANCE grant program to develop approaches for increasing the representation and advancement of women in academic

⁴ Currently, 42 percent of women in tenure and tenure-track careers have children, while 50 percent of their male colleagues have children.

⁵ Sweden has been named by the United Nations as a world leader in gender equity.

⁶ While the reasons are unclear, it appears that women are more likely to engage in interdisciplinary and collaborative research, and to put more energy and time into teaching and mentoring activities than their male colleagues.

S&E careers through institutional transformation. Nearly 30 institutions have been awarded five-year ADVANCE grants since 2001. While previous NSF programs for the advancement of women focused on support for individual scientists, the goal of ADVANCE grants is to tackle the institutional and cultural barriers to all women. These grants have enabled funded institutions to experiment with innovative recruitment and retention policies, as well as targeted mentoring, workshops on implicit bias, and other activities to raise awareness among departmental chairs and S&E faculty at large about the existence of real barriers to women scientists and engineers. As the witnesses in today's hearing will testify, the "rubber hits the road" at the departmental level, where department chairs are responsible for implementing the policies and goals established by their institutions' leaders.

Many of the activities funded under the ADVANCE program were cited by the National Academies panel as examples of policies and programs that seem to be making a difference. In particular, they recommended workshops to minimize gender bias, and NSF and other research agencies have already hosted such workshops in the physics and chemistry communities. Grantees share those and other best practices through their websites and annual meetings of principal investigators, and NSF plans to award Partnerships for Adaptation, Implementation, and Dissemination (PAID) Awards in 2008. Two of the witnesses on today's panel are at universities that have or had ADVANCE grants.

8. Questions for Witnesses

Donna Shalala

- Please describe the findings and recommendations of the National Academies report, *Beyond Bias and Barriers*, in particular the recommendations directed toward the federal government and that are relevant to issues of faculty recruitment, retention and promotion.
- What are the biggest challenges and most promising solutions to achieving gender equity in academic science and engineering?
- As president of a university, what policies have you instituted on your own campus to ensure gender equity, and how do you ensure compliance at the departmental level?

Kathie Olsen

- Please describe what the National Science Foundation (NSF), through its ADVANCE program for institutional transformation, has learned about the biggest challenges and most-promising solutions to achieving gender equity in faculty recruitment, retention and general climate in science and engineering fields.
- What is NSF doing to broadly disseminate and encourage best practices identified through the ADVANCE program?

- In addition to the activities already described, what else can NSF and other federal research agencies do to promote and ensure a more favorable environment for women in academic science and engineering fields?

Freeman Hrabowski

- Please describe the programs that you have been able to carry out through your university's ADVANCE grant. What are the biggest challenges and greatest successes in trying to achieve institutional change toward greater gender equity on your campus? How do you ensure compliance at the departmental level?
- The National Academies report, *Beyond Bias and Barriers*, described a "conspiracy of silence" regarding minority-group women. What are the greatest challenges faced by minority-group women scientists and engineers? Have you been able to identify institutional policies or practices that successfully mitigate these challenges?
- Beyond funding ADVANCE grants at a handful of universities, what can the National Science Foundation and other federal funding agencies do to help identify and encourage best practices in faculty gender equity across the country?

Myron Campbell

- Please describe the efforts you have undertaken as chair of your physics department to recruit and retain women faculty. How did you come to take this on as a priority? What are your biggest challenges and greatest successes?
- Beyond funding ADVANCE grants at a handful of universities, what can the National Science Foundation and other federal funding agencies do to help identify and encourage best practices in faculty gender equity across the country?
- Please describe the purpose of the American Physical Society (APS) workshop on gender equity that you participated in last May. What can APS and similar societies do to help promote gender equity in science and engineering fields?

Gretchen Ritter

- Please describe efforts on your own campus to identify and address any barriers to recruitment and retention of women faculty, especially in science and engineering departments.
- What are the biggest challenges and most promising solutions to achieving gender equity in academic science and engineering across the country?
- Beyond funding ADVANCE grants at a handful of universities, what can the National Science Foundation and other federal funding agencies do to help identify and encourage best practices in faculty gender equity across the country?