Women in Academic Science and Engineering: A Guide to Maximizing their Potential

Committee on Science, Engineering, and Public Policy

Science and engineering education and research is increasingly a global endeavor. Identifying and nurturing the best, brightest, and most innovative talent will be crucial for industries and nations to maintain a competitive edge. In the United States in the last forty years, large strides have been made in the numbers of women graduating with science and engineering undergraduate and graduate degrees. However, women do not hold academic positions in numbers commensurate with this talent pool. This loss of talent will make it increasingly difficult for the United States to compete in the rapidly changing global marketplace.

STUDY PURPOSE

The proposed study would guide faculty, department chairs and deans, academic leaders, funding organizations, and government officials on how to maximize the potential of women science and engineering researchers. An ad hoc COSEPUP committee will integrate the wealth of data available on gender issues across all fields of science and engineering. The committee will focus on academe, but will examine other research sectors to determine effective practices and develop findings and recommendations for recruiting, hiring, promotion, and retention of women scientists and engineers.

> "Until women can feel as much at home in math, science, and engineering as men, our nation will be considerably less than the sum of its parts. If we do not draw on the entire talent pool that is capable of making a contribution to science, the enterprise will inevitably be underperforming its potential."
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> *-The presidents of MIT, Stanford University and Princeton University, 2005*

The committee is charged to:

(1) Review and assess the research on gender issues in science and engineering, including innate differences in cognition, implicit bias, and faculty diversity.

(2) Examine the institutional culture and practices in academic institutions that contribute to and discourage talented individuals from realizing their full potential as scientists and engineers.

(3) Determine effective practices to ensure women doctorates have access to a wide range of career opportunities, in academe and in other research settings.

(4) Determine effective practices on recruiting and retention of women scientists and engineers in faculty positions.

(5) Develop findings and provide recommendations based on these data and other information the committee gathers to guide the following groups on how to maximize the potential of women science and engineering researchers:

(a) Faculty: roles in hiring, promotion, retention, and mentoring

(b) Deans and Department Chairs: roles in hiring and promotion and equitable provision of resources

(c) Academic Leadership: roles in hiring, promotion, resource allocation, tracking, and setting the tone for institutional culture

(d) Funding Organizations: roles in education and training, compensation levels, review, and tracking of grant applicant and recipient data

(e) Government: roles in enhancing and diversifying access to education, training, and research funding, and in ensuring that data about program users are collected and available for assessment purposes.

POLICY CONTEXT

The proportion of women earning S&E bachelors degrees has increased every year since 1966, overtaking the number of men in 2001. More women are also attaining S&E doctoral degrees. By 2001, women earned 37% of S&E PhDs and 57% of non-S&E PhDs, up from 8 and 18%, respectively, in 1966. Despite this progress, the increased representation of women among doctoral recipients does not correspond with increased faculty representation. In S&E departments at top 50 universities, the proportion of full professorships held by women ranges from 3-15%. Recent faculty hires do not reflect the available pool: women earned 31.3% of chemistry PhDs between 1993 and 2003, but in 2002 held only 21.5% of assistant professorships. In the biological sciences, the drop-off between doctoral and assistant professor stages was

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similar, from 44.7% to 30.2%. Hiring compared to the postdoctoral talent pool shows a similar trend.

There is an institutional incentive to increasing the diversity of S&E faculty. A recent survey of Fortune 500 companies found a connection between companies' financial performance and the representation of women in top management teams. Companies with more women performed better financially, and the top-performing companies also tended, on average, to have more women in leadership positions. If the same performance measures hold true in academic settings, universities that improve their recruiting, retention, and promotion practices will be at a great advantage in the future.

In light of these issues, what can be done to recruit women scientists and engineers to faculty positions and improve their retention and promotion? What is needed is a synthesis of available data to produce a comprehensive interdisciplinary guide to effective policies and practices for recruiting, hiring, and retaining women faculty, one that considers implicit and explicit barriers to career advancement, the intersectionality of race and gender, and addresses its recommendations to each of the multiple layers of faculty, administration, and funders who determine institutional culture and implement policies.

PROJECT MANAGEMENT & OVERSIGHT

The study will be performed by an ad-hoc committee, overseen by the National Academies Committee on Science, Engineering and Public Policy (COSEPUP), which has a history of seminal work in the areas of science and technology policy:

- *Reshaping the Graduate Education of Scientists and Engineers* (1995)
- *Enhancing the Postdoctoral Experience for Scientists and Engineers* (2000)
- *Scientific and Medical Aspects of Reproductive Cloning* (2002)
- *Science and Technology in the National Interest* (2004)
- *Facilitating Interdisciplinary Research* (2005)
- *Policy Implications of International Graduate Students and Postdoctoral Scholars in the US* (2005)

PROJECT DETAILS

To carry out this 12-month study, the committee will meet three times to gather data, draw findings and conclusions, and develop recommendations in the form of best practices and guidelines. These data will be supplemented with on-site focus groups with women researchers and department chairs and deans. The committee will hold a convocation open to the public to discuss current research and will publish the proceedings.

PRODUCT & AUDIENCE

The anticipated product will be a report providing guidance to Congress, research and professional organizations, funding agencies, as well as individual researchers. The report will be widely disseminated to the public including posting on the internet. The audience for the study will be funding agency officials, congressional committees and staff; the education community; policy leaders, professional societies, and the research community.

DISSEMINATION

In addition to distributing the report, activities will likely include congressional testimony, public briefings, editorials, and a Web site.

COMMITTEE

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