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**Briefing on New Report:  
Gender Differences at Critical  
Transitions in the Careers of  
Science, Engineering, and  
Mathematics Faculty**

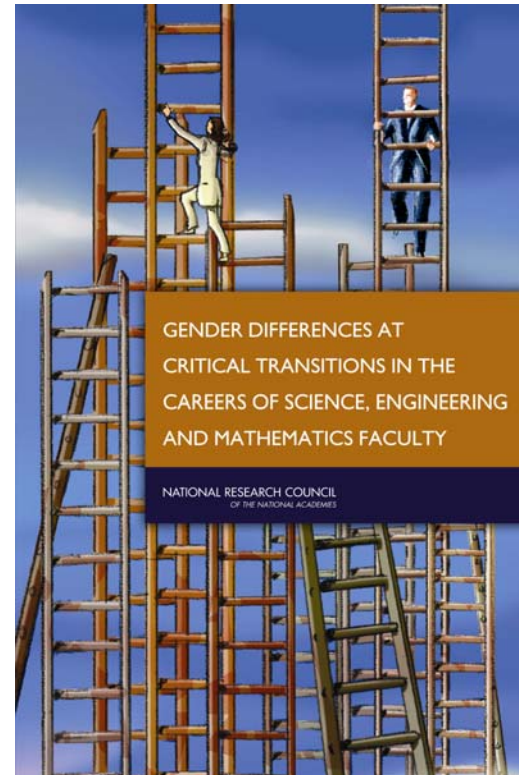
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THE NATIONAL ACADEMIES  
*Advisers to the Nation on Science, Engineering, and Medicine*

National Academy of Sciences  
National Academy of Engineering  
Institute of Medicine  
National Research Council

## Briefing Overview

- **Context of Study**
- **Summary and Findings of Report**
- **Recommendations**



## Committee on Gender Differences in Careers of Science, Engineering, and Mathematics Faculty

- **Claude Canizares**, *Co-chair*, Vice President for Research and Associate Provost and Bruno Rossi Professor of Experimental Physics, Massachusetts Institute of Technology
- **Sally Shaywitz**, *Co-chair*, Audrey G. Ratner Professor in Learning Development and Co-Director, Yale Center for Dyslexia and Creativity, Yale University School of Medicine
- **Linda Abriola**, Dean of Engineering and Professor of Civil and Environmental Engineering, Tufts University
- **Jane Buikstra**, Professor of Bioarchaeology, Director, Center for Bioarchaeological Research, School of Human Evolution and Social Change, Arizona State University
- **Alicia Carriquiry**, Professor of Statistics, Iowa State University
- **Ronald Ehrenberg**, Director, Cornell Higher Education Research Institute and Irving M. Ives Professor of Industrial and Labor Relations and Economics, Cornell University
- **Joan Girgus**, Professor of Psychology and Special Assistant to the Dean of the Faculty for Matters Concerning Gender Equity, Princeton University
- **Arleen Leibowitz**, Professor of Public Policy, School of Public Affairs, University of California at Los Angeles
- **Thomas N. Taylor**, Roy A. Roberts Distinguished Professor, and Senior Curator of the Natural History Museum and Biodiversity Research Center, University of Kansas
- **Lillian Wu**, Director of University Relations, IBM Research

## Context of Study

- **Congressional request** from PL 107-368 Section 18 (b), which stated that the “study shall build on the Academy’s work on gender differences in the careers of doctoral scientists & engineers and examine issues such as faculty hiring, promotion, tenure, and allocation of resources including laboratory space.” **National Science Foundation funded the study.**
- Congressional request was the result of **hearings on Title IX** with respect to mathematics, science, and engineering education held by Senator Ron Wyden (D-OR), then chair of the Subcommittee on Science, Technology and Space.

## Context of Study Continued

- Committee conducted **two national surveys** in 2004 & 2005 of faculty & departments. 1<sup>st</sup> survey of almost 500 departments focused on hiring, tenure, & promotion processes. 2<sup>nd</sup> survey gathered career-related information from over 1,800 faculty. **Response rate was 85% for departments and 73% for faculty.**
- The data present a **snapshot in time** not a longitudinal view.
- Six disciplines are examined: **biology, chemistry, civil engineering, electrical engineering, mathematics, and physics.**
- Institutions are limited to the 89 major research universities, referred to as **Research Intensive (RI) institutions.**
- **Only full-time**, regularly appointed professorial faculty who are either **tenure eligible or tenured** are included.

## Overall Summary of Major Findings

- For the most part, **men and women faculty** in science, engineering, & mathematics have **enjoyed comparable opportunities within the university**, and gender does not appear to have been a significant factor in a number of important career transitions and outcomes.
- However, although women represent an increasing share of science, mathematics, and engineering faculty, they **continue to be underrepresented in many of these disciplines.**

## **Finding #1:**

- **The proportion of women who received the first job offer was higher than the percentage who were invited to interview.**

## **Finding #2:**

- **The proportion of women who were interviewed for tenure-track positions was higher than the percentage of women who apply.**

### **Finding #3:**

- **In each of the six disciplines, the proportion of applications from women for tenure-track positions was lower than the percentage of PhDs awarded to women.**

**TABLE S-2 Transitions from Ph.D. to tenure-track positions by field at the RI Institutions Surveyed (%)**

	<b>Doctoral Pool</b>	<b>Pools for Tenure-Track Positions</b>		
	<b>% women Ph.D.s (1999-2003)</b>	<b>Mean % of applicants who are women</b>	<b>Mean % of applicants invited to interview who are women</b>	<b>Mean % of offers that go to women</b>
<b>Biology</b>	<b>45</b>	<b>26</b>	<b>28</b>	<b>34</b>
<b>Chemistry</b>	<b>32</b>	<b>18</b>	<b>25</b>	<b>29</b>
<b>Civil Engineering</b>	<b>18</b>	<b>16</b>	<b>30</b>	<b>32</b>
<b>Electrical Engineering</b>	<b>12</b>	<b>11</b>	<b>19</b>	<b>32</b>
<b>Mathematics</b>	<b>25</b>	<b>20</b>	<b>28</b>	<b>32</b>
<b>Physics</b>	<b>14</b>	<b>12</b>	<b>19</b>	<b>20</b>

SOURCE: Survey of departments; Ph.D. data is from NSF, WebCASPAR.

## **Finding #4:**

- **Most institutional & departmental strategies proposed for increasing the proportion of women in the applicant pool were not strong predictors of the percentage of women applying.**
- **Almost two-thirds of the departments in our sample reporting they took either no steps or 1 step designed to increase the gender diversity of the applicant pool.**
- **The proportion of females on the search committee and whether a woman chaired the committee were both significantly and positively associated with the proportion of women in the applicant pool.**

## Finding #5:

- **Male & female faculty have similar access to many kinds of institutional resources.**
- **Great deal of similarity between the professional lives of male & female faculty. Men & women spent similar proportions of their time on teaching, research, & service:** male faculty spent 41.4% of their time on teaching, while female faculty spent 42.6%. Male & female faculty members reported comparable access to most institutional resources, including start-up packages, initial reduced teaching loads, travel funds, summer salary, and supervision of research assistants & postdocs.
- **At first glance, men seemed to have more lab space than women, but this difference disappeared once other factors such as discipline & faculty rank were accounted for.**

## Finding #6:

- **No differences between male & female faculty on 2 of our measures of inclusion: chairing committees (39% for men & 34 % for women) and being part of a research team (62 % for men & 65 % for women).**
- **Women reported that they were more likely to have mentors than men (57 % for tenure-track women faculty compared to 49% for men).**
- **Women were less likely to engage in conversation with colleagues on a range of professional topics, including research, salary, & benefits (also interaction with other faculty & departmental climate). This distance may prevent women from accessing important information & may make them feel less more marginalized in their professional lives. Men & women faculty surveyed did not differ in their reports of discussions with colleagues on teaching, funding, interaction with administration, & personal life.**

## Finding #7:

- **Little evidence that men & women exhibited different outcomes on most key measures** (publications, grant funding, nominations for honors and awards, salary, & offers of positions in other institutions).
- **Overall there appears to be no difference in refereed publications between men (13.9 publications) & women (12.8 publications) in most fields with 2 exceptions.**
- **Men published significantly more papers than women in chemistry. In electrical engineering, women had published marginally more papers than men.**

## Finding #7 Continued:

- **No significant gender differences in the probability that male or female faculty would have grant funding** (a PI or Co-PI on a grant proposal). Male faculty had significantly more research funding than female faculty in biology; in the other disciplines, differences were not significant.
- **Female assistant professors who had a mentor had a higher probability of receiving grants than those who did not have a mentor.** Chemistry female assistant professors with mentors had a 95% probability of having grant funding versus 77% for those without mentors. **For all six fields surveyed female assistant professors with no mentors had a 68% probability of having grant funding versus 93% of women with mentors.**
- **Contrasts with the pattern for male assistant professors;** those with no mentor had an 86% probability of having grant funding versus 83% for those with mentors.

## **Finding #7 Continued:**

- **Gender was a significant determinant of salary among full professors; male full professors made, on the average, about 8% more than females, once we controlled for discipline.**
- **At the associate & assistant professor ranks, the differences in salaries of men & women faculty disappeared.**

## Finding #8:

- **The proportion of women candidates for tenure was smaller than the proportion of female assistant professors.** The discrepancy was largest in fields in which they accounted for the largest share of the faculty biology & chemistry.
- **There are several possible explanations. This difference may suggest that women assistant professors were more likely to leave before being considered for tenure than men were. It might also reflect increased hiring of women assistant professors in recent years. Snapshot data did not allow us to address this question.**

## Finding #9:

- **Women were more likely than men to receive tenure when they came up for tenure review.** In 6 fields women were tenured at the same or a higher rate than men (an overall average of 92% for women and 87% for men).
- **Women were more likely to be promoted when there was a smaller proportion of females among the tenure-track faculty.**
- **Discipline, stop-the-clock policies, and departmental size were not associated with the probability of a positive tenure decision** for either male or female faculty members who were considered for tenure.
- **Both male and female assistant professors were significantly more likely to receive tenure at public institutions (92%) than private institutions (85%).**

## Finding #10:

- **No significant gender disparity existed at the stage of promotion to full professor.**
- **In the disciplines surveyed 90% of the men & 88% of the women proposed for full professor were promoted, a difference that was not statistically significant, after accounting for other factors such as disciplinary differences, departmental size, & use of stopping-the-clock policies.**
- **Women were proposed for promotion to full professor at approximately the same rates as they were represented among associate professors.**

## Finding #11:

- **Women spent significantly longer time in rank as assistant professors than men did.**
- **Time in rank as an assistant professor has increased over time for both men & women, but women showed significantly longer durations than men.** It is difficult to determine if differences might be explained by individual & departmental characteristics such as length of post-doctoral experience and stopping-the-clock for family leave.
- **Male & female faculty spent longer in assistant professor ranks at institutions of higher prestige.**

## Finding #12:

- **Male & female faculty who stopped the tenure clock spent significantly longer as assistant professors than those who did not (74 months versus 57 months).**
- **Clock stoppers had a lower chance of promotion to associate professor (about 80%) at any time (given that they had not been promoted until then) than those who did not stop the clock.**
- **Everything else being equal, however, stopping-the-clock did not affect the probability of promotion & tenure; it just delayed it by about a 1 ½ years.** It is unclear how that delay affected women faculty, who were more likely than men to use policy.
- **Effect of stopping-the-clock is similar for men & women, use is not.** 19.7 % of women assistant professors used this policy compared to 7.4% of male assistant professors. At the associate professor level, 10.2 % of female faculty versus 6.4% of male faculty stopped the tenure clock.

## Recommendations for RIs:

- Need to **enhance institutional efforts to encourage female graduates & postdocs** to consider careers at RI institutions.
- **Evaluate existing programs** to increase the number of women applying for tenure-track or tenured positions **for effectiveness.**
- **Involve current female faculty in faculty searches, with appropriate release time.**
- **Initiate mentoring programs** for all newly hired faculty, especially at the assistant professor level.
- **Explore gender differences in the obligations outside of professional responsibilities & how these differences may affect the professional outcomes of their faculty.**

## Recommendations for RIs Continued:

- **Explore gender differences in the obligations outside of professional responsibilities** & how these differences may affect the professional outcomes of their faculty.
- **Investigate why female faculty**, compared to their male counterparts, **appear to continue to experience some sense of isolation in subtle & intangible ways.**
- **Make tenure and promotion procedures as transparent as possible and ensure that policies are routinely and effectively communicated to all faculty.** 81% of male faculty know their institution's policies on promotion, yet only 75% of female faculty do.
- **Departments in particular need to review their communication strategies**, as only 49% of all faculty surveyed reported that their department had written procedures yet 78% of departments reported that they had written tenure & promotion policies.

## Recommendations for RIs Continued:

- **Collect data encompassed in this study** (including applications, interviews, first offers, hires, time in rank, tenure award, and promotion) **disaggregated by race, ethnicity and gender.**
- **Many of the departments surveyed have made significant gains in their numbers of female faculty** at many of these critical junctures, **yet these results are not well known.**
- The collection of data can **allow departments and institutions to focus their scarce resources on transitions that need the most attention.**
- **Our findings do not address race and ethnicity**, but this information is essential as institutions work to increase diversity.

## Recommendations for Professional Societies:

- **Collect data on the career tracks of members.** This study identified many differences among disciplines that warrant investigation.
- **Disseminate successful strategies to increase the gender diversity of the applicant pools** in their disciplines for tenure-track and tenured faculty positions.
- **Conduct in-depth surveys of their members** at regular intervals on the climate for professional success and the role of mentoring in their discipline.

## For Additional Information:

- [www.nationalacademies.org](http://www.nationalacademies.org) (webcast of briefing)
- [www.nap.edu](http://www.nap.edu) (PDF of pre-publication)
- [www.nationalacademies.org/cwsem/](http://www.nationalacademies.org/cwsem/) (Committee on Women in Science, Engineering, and Medicine's web site)
- [www.nationalacademies.org/cnstat/](http://www.nationalacademies.org/cnstat/) (Committee on National Statistics' web site)