



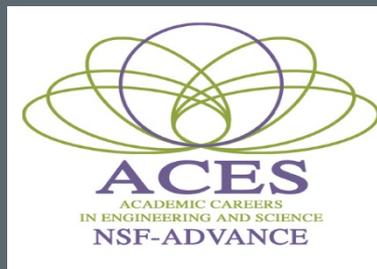
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# The Academic Glass Ceiling: Women Faculty in STEM Fields

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# Outline

- The status of women faculty in academic STEM (science, technology, engineering, & management)
- The ADVANCE institutions and their activities
- Conclusions



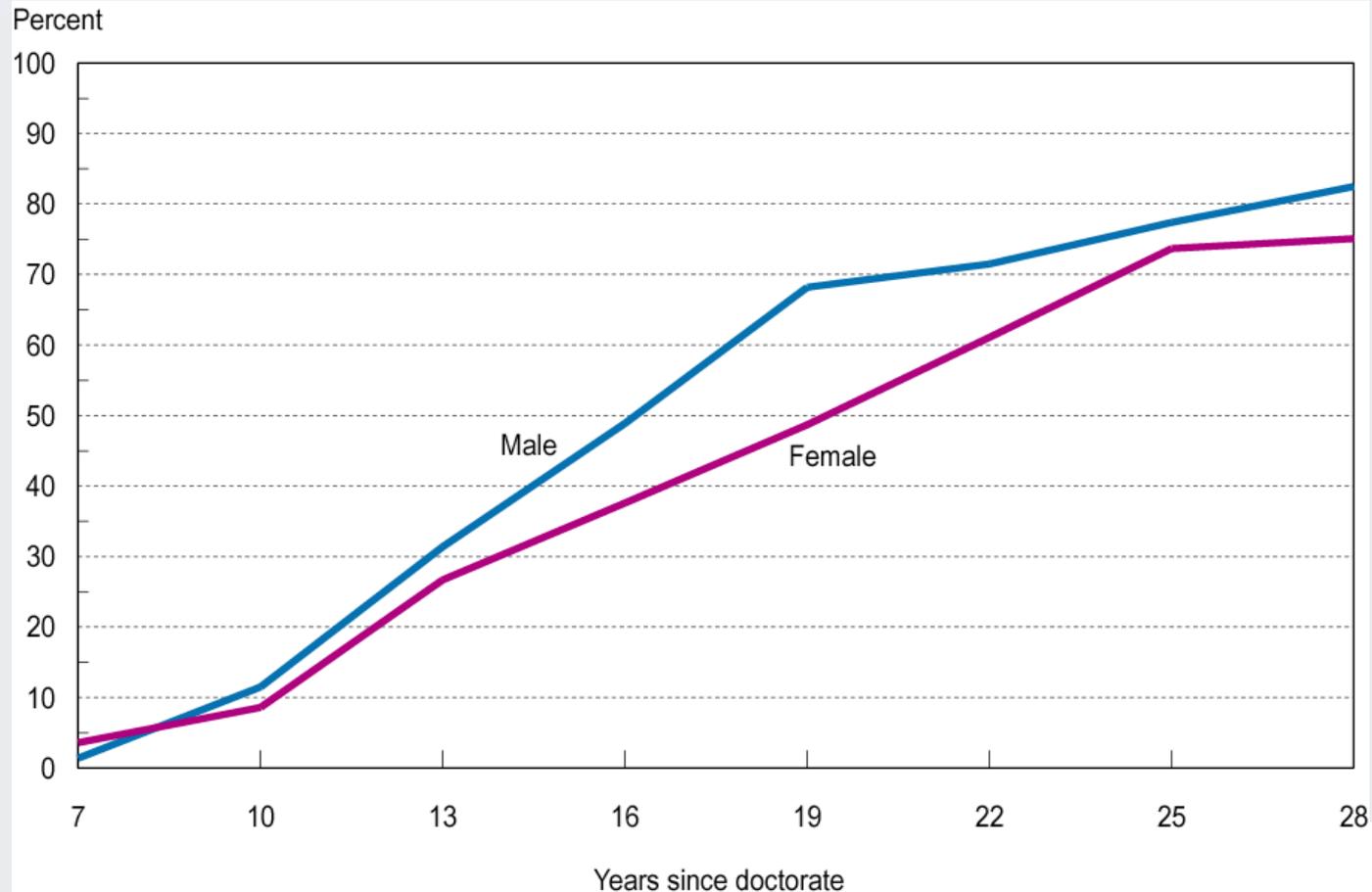
# Doctorate Holders in S&E Employed in Universities and 4-year Colleges

All occupations	Professor	Associate professor	Assistant professor	Other faculty	Rank not applicable
<b>Female</b>	13,380	15,660	18,580	--	--
<b>Male</b>	73,020	37,260	29,210	--	--
	Tenured	On tenure track	Not on tenure track	Tenure not applicable	Total
<b>Female</b>	24,400	13,660	11,510	--	69,520
<b>Male</b>	97,920	25,420	18,240	--	175,530

Source: Women, Minorities, and Persons with Disabilities in Science and Engineering, 2004, Table H-21 and Table H-25.  
 Sample drawn from NSF, 2001, Survey of Doctorate Recipients.



# S&E Full Professors in 4-year Colleges and Universities: 2001



SOURCE: Women, Minorities, and Persons with Disabilities in Science and Engineering, 2004, Figure H-5. Sample drawn from NSF, 2001, Survey of Doctorate Recipients.



# Gender Difference in Tenure-track & Academic Rank

Among scientists and engineers working in academia,

- Women are less likely to be employed in tenure-track positions than men who are similarly situated.
- Women who are married and have children are less likely to be employed in tenure-track positions than men who are married and have children.
- Women are less likely to earn tenure than their male counterparts, partly because women are less likely to be employed in tenure-track positions.
- Women are more likely to be employed in junior ranks and are less likely to hold the rank of full professor than are men.
- Married women who have older children under their care are more likely to be employed in junior ranks and are less likely to hold the rank of full professor than are similarly situated men.

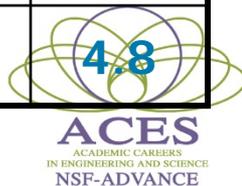
SOURCES: NSF, 2004, *Gender Differences in the Careers of Academic Scientists and Engineers*. Sample drawn from Survey of Doctorate Recipients, 1997.



# What Are the Most Significant Issues/Challenges/Opportunities Facing Women Scientists Today?

Categories	Means of Responses %			
	1997	1998	1999	2000
<b>A. Pressures women face in balancing career and family (e.g., dual career)</b>	<b>31.9</b>	<b>30.8</b>	<b>35.0</b>	<b>32.4</b>
<b>B. Problems faced by women because of their low numbers and stereotypes held by others regarding gender (e.g., networking, negative social images)</b>	<b>12.3</b>	<b>10.1</b>	<b>9.8</b>	<b>14.5</b>
<b>C. Issues faced by both men and women scientists and engineers in the current environment of tight resources, which may pose particular difficulties for women (e.g., time mgt, lack of funding)</b>	<b>10.0</b>	<b>4.8</b>	<b>8.2</b>	<b>7.9</b>
<b>D. Discrimination and harassment</b>	<b>3.0</b>	<b>4.4</b>	<b>5.8</b>	<b>4.8</b>

Source: Sue V. Rosser, 2004: The Science Glass Ceiling: Academic Women Scientists and the Struggle to Succeed. Table 6.



# Continuing Barriers to the Advancement of Women

1. Women are not being hired in proportion to their availability in the relevant labor pool.
2. Women faculty are disproportionately burdened with mentoring and advising responsibilities.
3. Sporadic efforts to create gender equity do not work.
4. Lack of clarity about the criteria for advancement and lack of transparency in the decision-making process lead to inequitable application of standards.
5. Characterizing women's family responsibilities as career distractions that signal lack of commitment hinders their ability to succeed.
6. Insufficient attention has been paid to cultural and environmental factors that make some departments hostile environments for women.

Source: Creating Gender Equity in Academia: Equal Rights Advocates' (ERA) Higher Education Legal Advocacy Project, 2003.



# Steps need to be taken (ERA)

1. To increase the number of women hired into tenure-track, tenured and high level administrative positions.
2. To reduce excessive burdens placed upon women and women of color, or to change the reward structure to acknowledge the importance of these contributions to the institution.
3. To institutionalize and perpetuate practices that promote gender equity in order to reduce the likelihood of backlash and backsliding.
4. To accommodate and integrate women's family responsibilities into cultural expectations about what a normative academic career trajectory looks like.
5. To address cultural and environmental factors that discourage women from pursuing academic careers.

Source: Creating Gender Equity in Academia: Equal Rights Advocates' (ERA) Higher Education Legal Advocacy Project, 2003.



# NSF ADVANCE Institutional Transformation (IT) Awards

- Increase numbers of women at all academic and faculty leadership levels
- Stimulate department change
- Transform campus-wide culture
- Institutionalize transformation



# 19 ADVANCE Institutions

## 1<sup>st</sup> Round (9)

Georgia Institute of Technology  
Hunter College  
New Mexico State University  
University of California, Irvine  
University of Colorado  
University of Michigan  
University of Puerto Rico,  
Humacao  
University of Washington  
University of Wisconsin,  
Madison

## 2<sup>nd</sup> Round (10)

Case Western Reserve University  
Kansas State University  
University of Alabama-Birmingham  
University of Maryland-Baltimore County  
University of Montana  
University of Rhode Island  
University of Texas-El Paso  
Utah State  
Virginia Tech  
Earth Institute at Columbia University

3<sup>rd</sup> Round RFP for ADVANCE IT Awards - Current



# Examples of ADVANCE Program Activities and Evaluations

- Distinguished scholar/lecture series (many schools)
- Mentoring programs (almost all schools)
- Opportunity Funding for women scientists (many schools)
- “Women Talking Science and Engineering” seminar (U of Michigan)
- Leadership workshop for department chairs (U of Washington)
- Workshop on lab management (U of Wisconsin-Madison)

**Impact:** Helps participants develop specific skills and networks, and gain institution- and discipline-specific knowledge and resources; emphasizes faculty development; Helps catalyze institutional change



# ADVANCE Institutions Are Documenting

- Number & proportion of female and male faculty, by rank
- Racial/ethnic composition
- Salary data, start-up packages
- Promotion & tenure outcomes and numbers
- Representation in distinguished, administrative and decision-making positions
- Office and lab space allocation
- Teaching hours, the number of course releases, student supervision, committee service time
- Productivity, research funding

**Impact:** Helps focus administrative attention on key issues and inequities; raises general awareness level among faculty



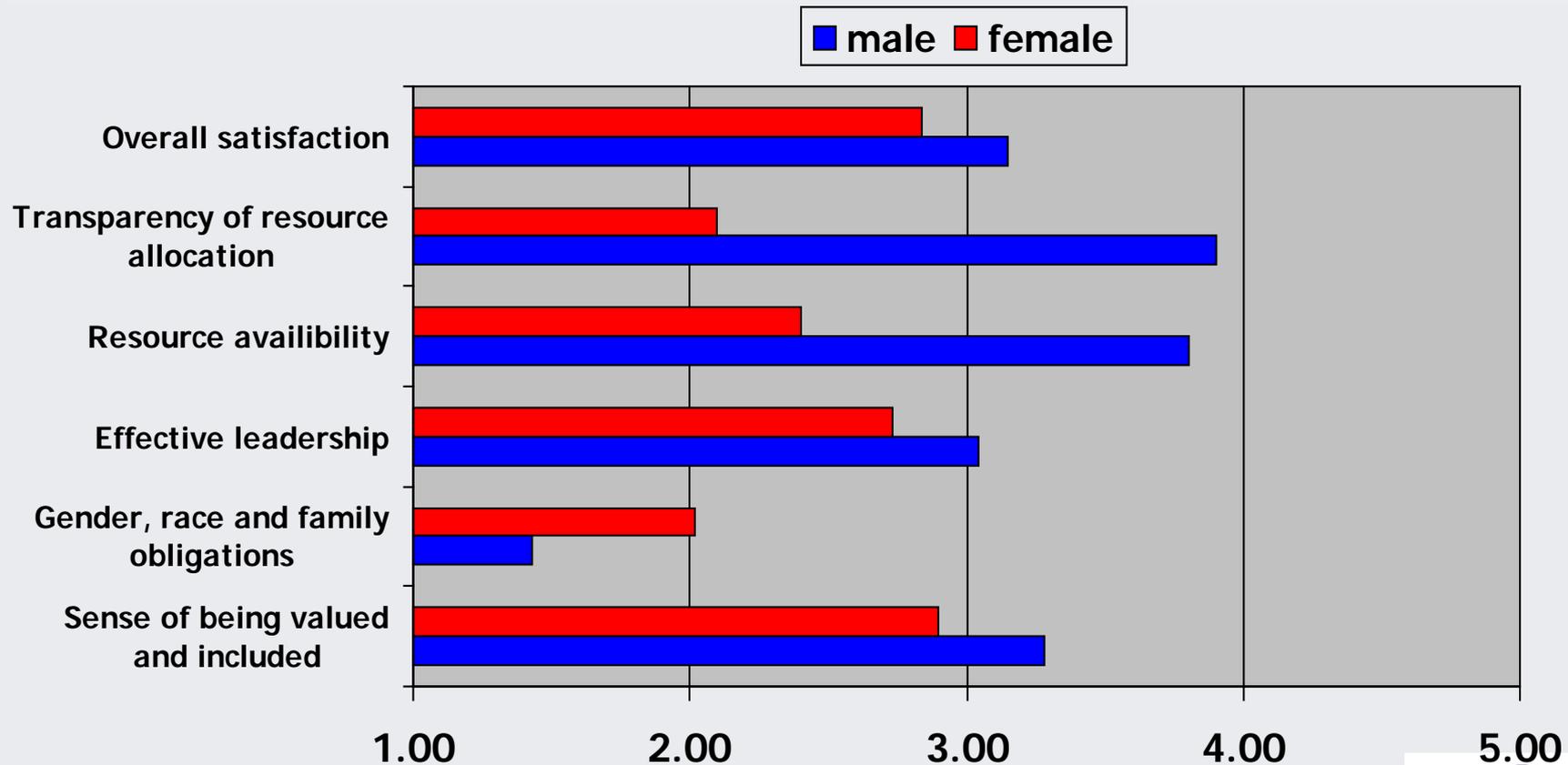
# Advance Institutions Are Conducting Studies on Gender-Relevant Issues

- Institutional Climate (most schools)
- Mentoring and Networking (most schools)
- Exit and Hiring (many schools)
- Work-Life Integration Issues (many schools)

**Impact:** Identifies the specific problem;  
provides insights about appropriate solutions



# Climate Survey (2004)



Source: ACES Climate Survey 2004

# Women Faculty Report That Climate is Not Inclusive (Case, 2004 Survey)

Female faculty as compared to male faculty:

- Feel less supported and valued in their academic units, and feel more pressure and restrictions
- Perceive that gender, race, and family obligations make a difference in how faculty members are treated
- Rate their academic unit head's leadership lower, and rate the resources and supports they provide lower
- Perceive that compensation and non-research supports are less equitably distributed
- Perceive lower transparency in allocating compensation, office and lab space, teaching requirements, and clerical support
- Are less satisfied with their overall community and job experience at Case.



# Gendered Institutional Structures and Practices: Focus Groups 03-04

- **Unwelcoming Community for Women**

The university was described as a “techie, male-dominated, male-oriented, medical kind of place”.

- **“Everything is negotiable,”** manifested in perceptions of “side deals” and of unequal application of procedures
- Several participants observed that **university procedures, rules, policies and practices are unclear or not applied with equity.**
- **Secrecy within private institutions**  
‘Oh, it’s all confidential.’
- Women participants at all levels addressed **the lack of mentoring**
- **Unfair/Unequal access to/allocation of resources**, including purchase of library materials, assistance from teaching assistants, access to services from support staff, travel money, and “protected time.”



# Mentoring and Networking – Identifying Key Issues

- 26 Interviewed; 1340 Surveyed
- A strong majority of women faculty (69.9%, 255) thought **the mentoring program is valuable**.
- **Women faculty who are not U.S. citizens** think the program is more valuable than do U.S. citizens.
- Interviewees described a number of **benefits** they received from the program. (e.g., create confidence and decrease of isolation on campus), and some **limitations** (e.g., approach cautiously, the length of time it took and the process of being assigned a mentor).

University of Wisconsin-Madison, Evaluation of the women faculty mentoring program: Survey and in-depth interviews, 2003-04.

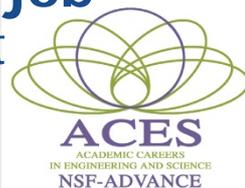


# Exit and Hiring – Issues Identified

- 11 face-to-face exit interviews. Found that:
  - **It's Not Just About Money!** Salary is a “scapegoat” – faculty leave because of conflicts and problems within their dept.
  - **Departmental Climate**, Unresolved Interpersonal Conflicts, Sexism and Racism
  - **“Red Tape”**: Difficulty Getting Work Done
- 22 telephone exit Interviews: Both male and female former faculty members reported
  - being relatively **dissatisfied with the departmental commitment to (or appreciation of) their area of research.**
  - The primary reason noted for leaving was an **attractive job offer** from another university, with salary being the most important element of the competitive offer.

New Mexico State University, 2003

University of California-Irvine, 2004



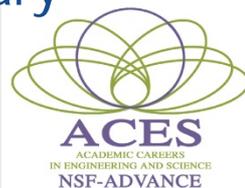
# Exit and Hiring – Issues Identified

- 11 new faculty interviews about initial perceptions and the hiring process
  - **The flexibility to pursue their research interests** was attractive to the majority of new faculty (81%).
  - 73 % (8) new faculty members felt that it was conveyed to them that their departments were positive and supportive work environments.

Virginia Tech, 2003-04

- Survey of 118 faculty regarding perceptions of faculty recruitment practices. Factors motivating faculty members to apply for their jobs included:
  - Opportunities for professional development (59.3 %), the prestige of the institution (47.5 %).
  - Fewer science women than science men negotiated salary-rank, type of contract, office space, health insurance.

University of Puerto Rico–Humacao (04)



# Work-Life Integration Assessments

- A survey of the **child care needs** of the faculty, staff and graduate students (N=1390)
  - the availability of child care is increasingly an issue for faculty recruitment
- An assessment of the **stop-the-clock policy** for tenure track faculty for its frequency of use, consistency of implementation and outcome for the faculty member
- Discussion groups of 60 faculty from 8 colleges to discuss **work-life balance issues**
- Interviews about **dual-career issues**
  - 20 interviews on dual-career hire experiences: about 50% of the participants felt that their peers were somewhat unsupportive of the dual career hires.

Virginia Tech



# Work-Life Integration Assessments

- The **Dual Career Couple program** currently being evaluated for effectiveness (archival longitudinal data, in-depth impact interviews, climate surveys)
  - Those who used campus child care were likely to show higher satisfaction levels with child care.
- Faculty **work-life survey** (evaluated the satisfaction with work-life balance, child care facilities etc)
- **White paper on campus child care facilities**
- **Recommendations** made for implementation include:
  - Reserve 'slots' in the campus childcare centers for new faculty
  - Make sure that there is higher representation from the departments with the largest number of affected parties on committees that deal with tenure clock extension and parental leave issues.

University of Wisconsin-Madison



# Conclusions about Advance Research and Program Evaluation Activities

- Research and program evaluation findings are **having some impact** on changing academia through:
  - Influencing the decision making of current administrators
    - Changes in allocation of funding and other resources
    - Creating new facilities (e.g., child care, lactation centers)
  - Changes in university policies and structures
  - Changes in academic processes and departmental climate
  - Emphasis on faculty development across all ranks
  - Empowerment/leadership development of individual faculty participants
- Systematic accumulation of evidence (slowly) leads to university transformation
- External legitimation (e.g., by NSF) of research activities helps bring about change



# Challenges

- Need to reexamine the fundamental structures of academic work to create greater valuing of women faculty
- Need to institutionalize interventions, data collection, and reporting practices
- More dissemination of research findings is needed, especially across universities and in the public domain
- External funding sources (e.g., NSF) should consider mandating certain types of annual self-study activities in all institutions receiving funding

