Toward Gender Equality in STEM: A U.S. Perspective

Shirley M. Malcom, Ph.D.
Overcoming Inequality in STEM

- What overall problems are we trying to address?
- How have the problems been expressed historically?
- How are these problems currently being expressed?
- What has been tried in the past, and how effective have those strategies been?
- How should we go forward to promote diversity and inclusion in STEM?
The Shoulders of Giants/ The Biases of the Past (and Present)

- The history of science has largely been a story about men, even where women played vital roles
- The scientific enterprise—structures created by men, for men and the lifestyles they expected
- Women in science and engineering excepted rather than accepted
- The impact of social/legal/cultural progress on STEM
- From explicit bias to implicit bias
Toward Equality in STEM: A View from AAAS

- Founded in 1848 and always open to women
- But, reflecting the mores of the larger society
- First woman president in 1971, Mina Rees
- Resolutions on gender equality in 1971 and 1974 with re-affirmation in 2005
- Established Committee on Opportunities in Science and Office of Opportunities in Science in 1973
Women as AAAS Leaders

- Mina Rees (1971)
- Margaret Mead (1975)
- E. Margaret Burbidge (1983)
- Anna J. Harrison (1984)
- Sheila Widnall (1988)
- Eloise E. Clark (1994)
- Rita R. Colwell (1996)
- Jane Lubchenco (1997)
- Mildred Dresselhaus (1998)
- M.R.C. Greenwood (1999)
- Mary Good (2001)
- Mary Ellen Avery (2004)
- Shirley Ann Jackson (2005)
- Alice Huang (2011)
- Nina Federoff (2012)
- Geraldine Richmond (2016)
- Barbara Schaal (2017)
- Susan Hockfield (2018)
- Margaret Hamburg (2019)
Present Board makeup

2017-2018 Officers

Barbara A. Schaal (2018)
Chair of the AAAS Board
Washington University in St. Louis

Susan Hockfield (2019)
AAAS President
Massachusetts Institute of Technology

Margaret Hamburg (2020)
AAAS President-Elect
National Academy of Medicine

Women are 5 of the additional 9 board members. The board also has race/ethnic and disciplinary diversity.
Women’s Leadership of Key U.S. Science Institutions

Dr. France A. Córdova
Director
National Science Foundation

Women’s Leadership of Key U.S. Science Institutions

Dr. Marcia McNutt
President
National Academy of Sciences
Former Editor-in-Chief of the *Science* family of journals

http://www.nasonline.org/about-nas/leadership/president.html
Laws and Policies to Support Women’s Equity

- Employment—Title VII of the Civil Rights Act of 1964
- Education—Title IX of the Education Amendments of 1972
- Education—Women’s Educational Equity Act of 1974. Last funding for the program in 2010.
Science and Technology Equal Opportunities Act of 1980

- Origins—introduced by Senator Edward Kennedy in response to recommendations and research conducted as part of a AAAS organized conference on women in science and engineering in 1978.

- Requirements of the Act
  - authorizes the NSF to support programs in science and mathematics at K-12 through continuing education;
  - to support research to understand barriers;
  - to support efforts to raise awareness of the importance of gender equity;
  - report proposing comprehensive national plan and policy;
  - created CEOSE;
  - biennial report to Congress on the status of women and minorities in science, mathematics and engineering with needed levels of disaggregation.
Collection of Disaggregated Data—Measuring Progress and Keeping Score
What We Know about the Current Status

- Women have made tremendous progress in many fields, little movement in others as measured by degrees awarded

![Graphs showing progress in degrees awarded in different fields](image-url)
What We Know about the Current Status

- There have been declines in women’s proportion of degrees over time: at the bachelor’s level in mathematics, physics and computer science.
But even in those fields where women are present in large numbers they are not present on faculties of major research universities or as heads of major institutions or national labs.

**High participation fields for women: Biosciences and social sciences, 1995–2014**

- **Biosciences BA**
- **Social sciences MA**
- **Biosciences MA**
- **Social sciences BA**
- **Biosciences PhD**
- **Social sciences PhD**

NOTE: Data not available for 1999.

*Women, Minorities, and Persons with Disabilities in Science and Engineering: 2017*
Research Reveals a Gender Gap in the Nation’s Biology Labs

Study of 24 top institutions finds ‘tide’ male faculty in the life sciences employ fewer women.

By Rebecca Coustan

A new study reveals a decades-long disparity in the hiring practices of biology departments at top research universities, the field finds.

New study reveals a decades-long disparity in the hiring practices of biology departments at top research universities, the field finds.

“Women are often hired at the lowest ranks, and are more likely to be denied tenure,” says Emi Kolawole, an assistant professor of biology at MIT, who led the study with her colleague Tien Chen.

The study, published in the journal *Nature* in March, examined hiring practices at 24 of the nation’s top institutions, including Harvard, MIT, Stanford, and Yale. The researchers found that women were significantly less likely to be hired at the highest ranks, and that those who were hired were more likely to be denied tenure.

For example, the study found that women were hired at a rate of 6.5% at the highest rank, compared to 8.6% for men. The study also found that women were less likely to be recommended for tenure, with only 37% of women receiving a recommendation compared to 48% of men.

The researchers suggest that these findings may be the result of a number of factors, including gender bias in the hiring process, a lack of support for women in the field, and a lack of opportunities for women to advance in their careers.

The study has sparked a great deal of interest in the scientific community, and has led to new efforts to address the gender gap in the life sciences. Many institutions have taken steps to address the issue, including implementing new policies to support women, and creating new programs to encourage women to pursue careers in science.

“I think these findings are really important, and they should be taken very seriously,” says Jennifer Hahn, a professor of biology at the University of California, Berkeley. “We need to do more to address this gap, and to support women in the life sciences.”
Women in Medicine


This redesigned report displays the state of women in academic medicine and helps you turn data into action to advance women at your institution. Get started by clicking the boxes below to discover the percentage of women in various roles.

Compare your school with the Benchmarking Tables and Tool:
- Benchmarking Tool
- 2013-2014 Data Tables

- 47% of students are women
- 46% of residents are women
- 38% of full-time faculty are women
- 21% of full professors are women
- 22% of tenured professors are women
- 24% of division chiefs are women
- 15% of department chairs are women
- 33% of senior associate/vice deans are women
- 16% of deans are women

Read the Full Report
Women in Medicine

Leading in the Pipeline—Women in Leadership Positions

A 10-year Comparison of Women’s Representation in Permanent Leadership Positions

Women are continuing to make progress in obtaining administrative positions in the dean’s office, yet the percentage of women in department-level and deans’ positions remains low compared to men.

See Tables 4a and 5a for more information. Data from 2003–04 represent an average percentage and are not based on the total percentage.

*The percentage shown in red are percentage point changes not increases in actual percent.
Barriers – Bias: Explicit and Implicit

- Building a base of research and assessment
- The MIT Study and formation of the MIT 9
- Women’s Committee of the National Academies
- AAAS workshop on implicit bias in publishing and grants
- Release of GAO report on women in STEM research science – need for data and information sharing among agencies
- Recommendations of ways to increase diversity in the STEM workforce by reducing impact of bias
  https://www.si.edu/content/oeema/OSTP-OPM_Report.pdf
Addressing Intersectionality

- Women of color in STEMM
- More than 40 years later, still low levels of participation among faculty at research universities
- A call for institutional responses and support
Interventions

- Programs for girls in STEM
- Prizes that recognize women in different fields
- Building awareness of women in STEM (GE commercial with Mildred Dresselhaus)
- Support to help kick start careers
- International collaboration and recognition
- Women’s organizations and conferences (AWIS, SWE, Grace Hopper)
- ADVANCE and its focus on policies
What Does It Mean to Have Intervention Programs for the Majority?

- Women are 57 per cent of students in higher education
- African Americans and Hispanic Americans are about 20 per cent of students in higher education
- Difficult to justify “intervention” programs to support equity in STEM
- A rationale for systemic approaches
Investing in Human Potential

Model for the Evolution of Intervention Programs

- Isolated Projects
- Department/School-based efforts
- Formal coordination of discrete projects
- "Center" for coordination of science/engineering resources and efforts
- Structural Reform
- Institutional Commitment
Systemic Efforts—SEA Change

- Leadership by Steering Group: Paula Rayman, Julie Chen and Joyce Wong
- Discussions and meetings among potential collaborators (Fall 2015)
- Connection with and assistance from Queens University, Belfast
- Learning more about Athena SWAN
- Linkage and discussions with the White House Office of Science and Technology Policy (2015-2016)
- National Science Foundation support to U-Mass, Lowell for April 2016 workshop at AAAS (12 participating institutions)
- Building on the experiences of NSF ADVANCE
Structural Reform/Transformation—SEA Change

- **SEA Change—STEM Equity Achievement**
- Institutions conduct a **voluntary assessment** that looks at **diversity and inclusion** issues in STEM for **different institutional audiences** (undergraduate and graduate students, faculty, post-doctoral scholars, staff).
- Leads to recognition of departments, colleges and institutions with bronze, silver and gold awards.
- Institutions would collect data, set goals and develop a plan for improving their metrics.
- Focus determined by institutions’ or departments’ challenges: recruitment, hiring and retention of diverse STEM faculty; recruitment and success of diverse student populations in STEM; presence of a supportive campus climate.
- Help make universities and their STEM departments more diverse and welcoming, to provide a more supportive learning and working environment for underrepresented faculty, staff and students in STEM.
Systemic Efforts—SEA Change

- Agreement on expanded vision of STEM equity that includes race, ethnicity, disability, SES, and more
- AAAS as the “host organization”?
- Establishing linkage to and drawing on experience and expertise of the Equality Challenge Unit of the UK
- Identifying a group of pilot institutions
- Bridge support from the Alfred P. Sloan Foundation grant to AAAS
- Assessing data collection capacities within pilot institutions
- Support for pilot from the Heising-Simons Foundation
SEA Change: Challenges

- Different political environment in the U.S.
- Dismantling or underfunding of key equity monitoring and regulatory entities
- Uncertainty in fate of data collection systems
- Proposed deep cuts in science budget
- Significant public funding in support of initiative highly unlikely
SEA Change: Opportunities

- Reaction to changing political environment in the U.S.
- Providing structures for institutions to declare ongoing support for diversity and inclusion in STEM
- Some activities still required by law
- Enhanced value related to voluntary assessment (e.g., LEED Green Building certification)
- Some public funding, such as through ADVANCE and INCLUDES at the NSF
- Steering how “broader impacts” criterion is satisfied
- Diversity and inclusion assessment/requirements by private philanthropy? (Johns Hopkins Medical School)