

## **AAAS and Minority Women in Science**

**Shirley M. Malcom, Director and Yolanda S. George, Deputy Director,  
Education and Human Resources Programs,  
American Association for the Advance of Science (AAAS)**

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We are pleased to provide written testimony on the work of AAAS with regard to minority women in science for the **NRC Seeking Solutions: Maximizing American Talent by Advancing Women of Color in Academia Conference, June 7-8, Washington, DC**. As indicated by the information provided in this testimony, we are proud of the AAAS record on advancing minority women in science, engineering and biomedicine—proudest, perhaps, of the fact that we, as a professional association, initiated this discussion and defined the related issues that have helped shape and guide the work in policy, programs, and practices over the past 37 years (<http://archives.aaas.org/docs/1975-Double%20Bind.pdf>). The recommendations provided are based in part on the work that we describe in this document.

### **History of AAAS Involvement**

In 1973 the AAAS Board of Directors appointed a Committee on Opportunities in Science (COOS) to advise the Association on matters related to increasing the representation of women and minorities in science, engineering and related fields. In 1975 the mandate of COOS was expanded to include persons with disabilities.

While, from its establishment, the committee's concerns implicitly included minority women, it was not clear in 1973 if or how these concerns might differ from those of "all women" or "all minorities." In summer 1975 Dr. Janet Welsh Brown, first director of the AAAS Office of Opportunities in Science, participated in a meeting of project directors of minority-focused programs and a subsequent meeting of women-focused projects, all supported by the National Science Foundation (NSF). She noted that, in the first meeting, the principal investigators were all minority men and in the latter the principal investigators were all White women. Thus, began the efforts of the AAAS to explore the particular concerns related to minority women in science and engineering.

With support from the NSF, the AAAS undertook the first study and convened the first conference on minority women in science in December 1975. The specific groups targeted for this effort included African American, American Indian, Mexican American and Puerto Rican women; the specific fields included those in the physical and biological sciences, mathematics, and engineering, as well as biomedicine. Despite the source of funding from the NSF, it was argued that the inclusion of biomedical fields was necessary if we were to identify a critical mass

for example, American Indian women where the population in science-related areas was especially small.

Themes emerged from the organization of the initiative (surveys, interviews and conference discussions) that foreshadowed later work and advocacy by AAAS and others: the need for better data collection and reporting by race, sex and field of study; the need to look at experiences of different age cohorts; the variation in experiences across racial/ethnic groups, across the educational spectrum and in the workforce; the role of HBCUs and other minority-serving institutions; career and family related issues; and the impact of affirmative action and the law on education and careers.

Though the report of the conference, *The Double Bind: The Price of Being a Minority Woman in Science* (Shirley Mahaley Malcom, Paula Quick Hall, and Janet Welsh Brown, AAAS, Washington DC, 1976) was published in 1976, it has remained a touchstone that has guided many researchers as they sought to move from the experiences shared by the conferees to a rigorous exploration of issues and circumstances first elaborated in the report.

AAAS highlighted the conference and reported in the AAAS News section of *Science* magazine (*Science*, 6 February 1976:Vol. 191 no. 4226 p. 457DOI: 10.1126/science.191.4226.457), giving visibility to the issue to the larger science community. In 1977, a National Network of Minority Women in Science (MWIS) was established at an AAAS Annual Meeting with Yolanda Scott George as its founding chair. In addition, several local, independent networks were established, with at least one, the DC MWIS, operating to this day.

Subsequent work by AAAS was undertaken to address recommendations that emerged from the conference: the development and publication of career related materials specifically aimed at speaking to the challenges and tensions of minority women in science and engineering called out by the conferees; collaboration with the Scientific Manpower Commission (later the Commission on Professionals in Science and Technology) in promoting the availability and use of race by sex disaggregated data; networking at the AAAS annual meeting; greater recognition given to minority women, such as in nominations and appointments to committees, for prizes, etc. Subsequently efforts have also been made to understand issues related to participation in science and engineering by Asian American women, especially with regard to barriers to their advancement.

### **Mainstreaming Issues Related to Minority Women in Science**

AAAS is proud of its legacy related to minority women in science. Minority women are present across all aspects of the work of the Association: they have served on its Board and two as AAAS president; they have been present as members and leaders of its Board-appointed committees; they have participated

in its programs, such as the highly regarded AAAS Science and Technology Policy and Diplomacy Fellowships; they serve among its senior management.

A *Double Bind* conferee, Dr. Shirley Ann Jackson, President of RPI, has served as president of AAAS. Dr. Alice Huang of Caltech has also led the Association as its president.

AAAS, through the advocacy of its Committee on Opportunities in Science, has continued to express its concerns related to the availability of data from the NSF, in this case around newly emerging challenges related to suppression of data due to small “cell size,” aggregated in many instances with increasing sub-field disaggregation. For example, this has proven problematic in accessing race by sex data at the PhD level for science and engineering, making it very difficult to assess progress of minority women in science and engineering. In contrast, data systems of the Association of American Medical Colleges provide a model of data accessibility.

In the recent work of the AAAS on law and diversity, undertaken in partnership with the Association of American Universities, we have attempted to specifically understand the position of minority women as students and faculty in science and engineering as legal challenges to affirmative action increase, including in science and engineering fields.

AAAS staff continues to publish scholarly work and give presentations on minority women in science and engineering to the extent possible, to nurture and encourage the work of other researchers.

Profiles of minority women continue to be included among those highlighted in *Science Careers* (<http://sciencecareers.sciencemag.org/>), and minority women are included in projects and programs undertaken throughout the organization.

### **Women of Color in STEM in the 21<sup>st</sup> Century**

While women of color are earning more bachelor's (10% vs 7% of all STEM bachelors awarded in 2009) and advanced STEM degrees (7% vs 4% of all such degrees awarded in 2009) than men of color, there are striking differences across fields. In addition, more men of color are employed in STEM fields than women of color (Data sources include the *National Center for Education Statistics, IPEDS Completions and Fall enrollment surveys; Higher Education Research Institute, American Freshman Survey; and U.S. Census Bureau, Current Population Survey*).

- Underrepresented minority women, like women in general, earn higher proportions of bachelor's degrees in medical and social sciences and lower proportions of bachelor's degrees in computer sciences and engineering (1989 to 2008 data).

[http://www.nsf.gov/statistics/wmpd/digest/theme2\\_3.cfm](http://www.nsf.gov/statistics/wmpd/digest/theme2_3.cfm)

- Unemployment rates are higher for minority scientists and engineers than for white scientists and engineers overall and are higher for minority female than for minority male scientists and engineers (2006 data).  
<http://www.nsf.gov/statistics/wmpd/digest/theme3.cfm>
- Black and Hispanic women are 2% of the STEM workforce, while Black and Hispanic men are 5%. Asian women are 5% of the STEM workforce, while Asian men are 12% of the STEM workforce (2006 data).  
<http://www.nsf.gov/statistics/wmpd/digest/theme4.cfm>

Thirty-five years later, in 2011, as a result of a Harvard University symposium on *Unraveling the Double Bind: Women of Color in STEM*, Lindsey Malcom and Shirley Malcom, examined the progress of women of color in STEM since the *Double Bind* Conference. In general, their research findings indicate that:

- *The next generation women, The Double Bind Daughters, face different challenges...the responses required being less about the actions of the women, individually or collectively, and more about the responsibilities and action (or inaction) of institutions.*
- *Community colleges and all types of institutions play an increasing role in the STEM education of minority women.*
- *Minority women faculty are more likely to be in two-year colleges and non-doctoral granting four year colleges, and they spend more time on instructional activities versus research.*
- *Between the 1970's and now, there have been numerous legal challenges to special STEM educational programs for minorities and women.*
- *Small numbers are driving statistical agencies to suppress data needed to inform programs, policies, and practices (Lindsey E. Malcom and Shirley M. Malcom, *The Double Bind: The Next Generation*, 2011 Harvard Education Review).*

Other studies, such as “Inside the Double Bind” (Maria Ong, Carol Wright, Lorelle Espinosa, and Gary Orfield, 2010, (<http://www.terc.edu/work/1513.html>) identified several characteristics across the undergraduate and graduate experiences that affect the progression of women of color in STEM, namely:

- The difficulties of transitions between academic stages (i.e. high school to college, community college to four-year institution, college to graduate school) and transitions from minority serving institutions to predominantly White institutions;

- The critical role that social climate – including issues of isolation, identity, invisibility, negotiating/navigation, micro-aggressions, sense of belonging, and tokenism – plays in women’s satisfaction and retention in STEM; and
- The positive, as well as negative, effects of words and actions by faculty who serve as mentors, role models, teachers, and authorities on the intelligence and abilities of their students.

In light of the changing demographics, it is time once again to examine how to move a national agenda forward to support the success and advancement of minority women in STEM. Over the 37 years since the *Double Bind* conference there has been no coordinated national response to the challenges and opportunities for women of color in STEM. Federal efforts have been limited; responses of higher education institutions as well as professional societies have been spotty or non-existent. Perhaps the failure to mount a full program for women of color in STEM helps explain why so many of the concerns outlined in the *Double Bind* still resonate today, and why recommendations made at that time have yet to be fully implemented.

With better data come better understandings, such as around the issues related to Asian American women. At the time of the 1975 conference, participation was limited to women from underrepresented minority groups largely because of funder interest. As we explored data related to Asian American women we noted that there was the need to look much more closely at the notion of representation:

- To disaggregate statistics for citizens versus non-citizens and permanent residents;
- To distinguish among different Asian American populations (e.g., Chinese or Japanese origins versus Filipino or Hmong origins); and
- To focus on advancement, unemployment rates and salary differentials as well as educational outcomes and workforce participation.

Lack of data makes it difficult to say very much beyond anecdotes for women with disabilities (another double bind) or about those affected by the triple bind of race, sex and disability.

## Recommendations

Moving into the future we would recommend the following policies, programs and actions:

- **Awareness building** – More effort needs to be focused on building awareness of the issues related to advancement of women of color in STEM (science, technology, engineering, mathematics and related fields).

The conference is an excellent place to start and should be a launch pad for continuing discussion and action.

- **Better data collection and reporting**– It is critical to be able to assess current conditions related to women of color in STEM as well as to measure progress and evaluate the impact of interventions undertaken to improve their status. Data must inform this work. Disaggregated data are essential if institutions and organizations are to identify baselines and measure progress.
- **More funding for research** – More funding is needed for research related to minority women in STEM. It will be difficult to make progress in advancing women of color in STEM without better information regarding effective strategies.
- **More funding of research**-- Minority women in STEM need more support for research. Malcom and Malcom, 2011 note that minority women in STEM are more likely to be engaged in instructional as opposed to research activity in higher education institutions. Support for start-up research funding and for time to pursue research is critical. In the recent article in *Science Magazine* related to disparities in RO1 grants (NIH funding) received by African Americans, data were not provided by sex, making it hard to determine the role of gender in contributing to the results seen (*Science* 19 August 2011: Vol. 333 no. 6045 pp. 1015-1019DOI: 10.1126/science.1196783).

In light of the continuing isolation and absence from many networks that provide informal mentoring and support, there remains the need for mainstreaming issues and concerns related to women of color in STEM even as we target, as needed, to address specific professional development and career-family issues that may be group specific. Guidance is needed for those who develop and implement STEM programs, K-grad, regarding strategies for identifying, recruiting, retaining and supporting women of color as well as reaching out to and working with parents and communities to support these women's STEM career aspirations.

Professional societies have much to offer in creating professional development and support programs as well as online resources to benefit the recruitment, retention and advancement of women of color and women with disabilities in the STEM workforce, and in fostering their recognition within and integration into their discipline and the profession.