Academic Women of Color in Computing: A Testimony on the Issues and Possible Solutions

Computing Research Association (CRA)
http://www.cra.org

Center for Minorities and People with Disabilities in Information Technology (CMD-IT)
http://www.cmd-it.org

Coalition to Diversify Computing (CDC)
http://www.cdc-computing.org

Committee on the Status of Women in Computing Research (CRA-W)
http://www.cra-w.org

Computing Alliance of Hispanic Serving Institutions (CAHSI)
http://cahsi.cs.utep.edu

Anita Borg Institute for Women and Technology (ABI)
http://anitaborg.org

National Center for Women and Information Technology (NCWIT)
http://www.ncwit.org

Association of Computing Machinery’s Council on Women (ACM-W)
http://women.acm.org

IEEE Computer Society
http://www.computer.org

Latinas in Computing
http://latinasincomputing.org

Black Women in Computing (BWiC)
http://anitaborg.org/initiatives/systers/bwic

Alliance for Access to Computing Careers (AccessComputing)
http://www.washington.edu/accesscomputing
Introduction

The lens through which women of color view their environment is that of ethnicity and gender as indicated by Malcom et. al. (1976). It is this intersection that results in unique experiences and perspectives for women of color, including women with disabilities. The focus of this testimony is on the broad field of computing, which is dominated by whites and men. As noted by Malcom (2011), in 1975 minority women earned just 0.6 percent of the science and engineering doctorates; while this percentage has grown over time, it is only 6.4 percent in 2008 (33 years later). It was further noted that within computer science, the percentage of minority women earning doctorates went from zero in 1975 to only 2.1 percent in 2008 (corresponding to just fourteen minority women).

The CRA Taulbee\textsuperscript{1} survey counts 3,509 US citizens or permanent residents who received PhDs in computer science from US institutions in 2006-2011. Of these, only 69 (2\%) were women of color. While the numbers are extremely small, women of color took academic positions at a higher rate than other resident PhD recipients (36\% compared to 23\% overall) and industry/government lab positions at a lower rate (22\% compared to 42\% overall). Of PhD recipients entering academia, minorities were more likely to take positions in non-PhD-granting departments (25\% for men and 28\% for women, compared to 20\% for both white men and women). This outcome is in contrast to career interests among students, as found in the fall 2011 surveys from the CRA-W/CDC Data Buddies project\textsuperscript{2}. Those results indicate that, among US resident PhD students, women of color are less likely to report interest in an academic career at a non-PhD institution (33\% said they were somewhat interested, very interested, or considered it a top choice, compared to more than 55\% of men of color and white students of both genders). Without additional research, we can only speculate the difference between interest and actuality.

Computer science is a field for which the underlying technology changes rapidly and the technology permeates all fields. As such, computer science is a very diverse field that includes such areas the theoretical foundations, graphics, networks, security, robotics, human computer interaction, software, information as well as applied areas such as bioinformatics and computational science.

\textsuperscript{1} The CRA Taulbee survey data includes approximately 150 US institutions granting PhDs in Computer Science. http://cra.org/resources/taulbee.

\textsuperscript{2} The CRA-W/CDC Data Buddies project includes 21 US institutions granting PhDs in Computer Science. http://www.cra.org/databuddies.
Below, we identify the key issues particular to women of color faculty in computing, highlight three strategies for success, and provide several recommendations to address the key issues.

**Key Issues**

The key issues that are often identified with any group for which there are very small numbers are isolation, self-doubt, and heavy load (Malcom et. al. 1976, Moody 2004, Stanley 2006). These issues are discussed below as they relate to women of color in computing.

**Isolation.** The dismal number of women of color in academia, especially in computer science, results in one having to deal with isolation. It is often the case that a woman of color faculty member is the only woman of color in the given department. For example, within the top 100 computer science departments, only one department has two women of color; the other nine women of color are at different institutions (Nelson 2007). The remaining 90 institutions have zero women of color faculty. We note that these top 100 computer science departments represent only 10 percent of the number of institutions that award baccalaureate degrees in computer science. The isolation is further exacerbated within the different sub-areas of computing; women of color faculty are usually “the only” within a department, as well as “the only” at conferences and professional activities.

**Self-doubt.** The very small number of faculty in computing who are women of color results in a lack of sufficient role models, which can often lead to self-doubt. When a person has never seen another person of similar ethnicity and gender in a job for which they are engaged, a person often wonders if that job is the right fit (Stanley 2006).

**Heavy load.** Diverse representation is very important with respect to membership on committees, ranging from institutional committees to professional committees. In computing, there are also review committees for peer-reviewed conferences, in addition to editorial boards for journals. As noted previously, computing technology changes rapidly. Thus, refereed conference publications (which includes presentations) are just as important as journal publications in computing. Women of color are often viewed as covering “double minorities -- women and minorities”. As such, women of color receive a large number of requests to serve on committees and often feel obligated to accept a larger load than normal, in order to represent the perspective of women of color.

**Strategies for Success**

The impact of dealing with all three aforementioned issues, in an environment where you may be the only women of color, can be overwhelming. This section focuses on three strategies for success:
(1) mentoring women of color, including women with disabilities, in computing, (2) role models for women of color, including women with disabilities, in computing, and (3) acknowledging culture.

**Mentoring/Networks for Women of Color, including Women with Disabilities, in Computing:**
The Catalyst Group conducted a survey involving 1,735 Hispanic, Asian, and African-American women professionals and managers in 30 Fortune 1000 companies (Catalyst 2006). The study focused on two types of informal networks: “blending in” and “sticking together”. Blending in means the woman of color would develop a network that includes those with power, which are often white and/or male. An example of a blending in network for an Hispanic woman first line manager includes people in positions that are at least one level or beyond the first line manager; the people may be at the same company but in different groups or divisions and/or different companies. Sticking together means the woman of color would create a network consisting of those similar to herself. An example of a sticking together network for the Hispanic woman first line manager includes other Hispanic women at the given company. The results of the study are given below by ethnicity:

- African-American women followed a sticking together strategy, for which they had the largest number of women of their race in their networks.
- Latinas followed a somewhat blending in and sticking together strategy, for which they had high numbers of white members in their networks. They also had mainly female members.
- Asian women followed a blending in strategy, whereby more than half of their network members were white and 53% male.

It is often the case that both types of networks are needed for women of color. The sticking together networks are necessary to identify good strategies for (1) dealing with situations that are particular to a given culture and (2) providing significant support based upon common experiences. The blending-in networks are necessary to identify effective strategies for navigating the political environment and being successful with promotions. For example, sticking together networks can help women of color navigate work-life balance (especially with respect to giving back to the community), and can provide a social outlet for sharing common experiences. Blending-in networks can help women of color navigate the politics of major decisions within a department or college, as well as identify important committees for participation.

With respect to academic women of color in computing, the networks are very small. Because of isolation, there is no network of women of color faculty in computing within a given department. To have such a network, one must reach out to other women of color faculty in computing departments at other institutions. Further, to reach a critical number in one’s mentoring network, the woman of color
often needs to expand her network to industrial women of color researchers in computing. Currently, there are networks such as Latinas in Computing and Black Women in Computing that include women from industry, government labs and agencies, and academia.

**Role Models:** As discussed previously, for women of color faculty in computing, it is very hard to find role models that have the same gender and ethnicity because of the very low numbers. This is also the case for women with disabilities. Having such role models, however, is very important to provide validation and inspiration with respect to achieving one’s goals (Moody 2004, Stanley 2006). It is very important for established women of color faculty (e.g., tenured faculty) to serve as role models, especially for aspiring women of color faculty. Because of the very small number of women of color faculty in computing, it is often the case that one has to seek role models outside of computing.

**Acknowledging Culture:** As discussed previously, women of color represent the intersection of race and gender. The intersection requires the appreciation of race and gender to be truly engaging to women of color. The appreciation of race requires knowledge about culture. This knowledge can be obtained via books, articles, and/or time spent engaged with a culture – all of which requires an investment of time. Departments that spend time acknowledging different cultures through activities and discussions are often considered very welcoming by all cultures.

**Recommendations**

In developing this testimony, we learned that there is little research about academic women of color in computing. In particular, it is unclear where the “leaks” occur with respect to the different paths that lead to the position of tenured faculty positions for women of color in computing. Hence, our first recommendation is to endorse the need to conduct a detailed study of the factors that influence women of color in computing to successfully navigate their paths to becoming a tenured faculty member. Research is also needed to explore the impact of disability with academic women of color in computing.

Second, it is important that demographic data be disaggregated to ensure that trends related to women of color faculty in computing, including those with disabilities, can be identified. We recognize that the numbers are very small, but it is important to understand the trends to avoid developing programs that neglect academic women of color in computing.
Lastly, it is important to provide resources for establishing virtual and in-person networks of academic women of color in computing to allow for the needed “sticking together” and “blending in” mentoring, the sharing of best practices, and for senior academic women of color in computing to be visible role models to junior academic women of color as well as women students of color.

References