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# PERSPECTIVES OF WOMEN OF COLOR IN SCIENCE-BASED EDUCATION AND CAREERS

## SUMMARY OF THE CONFERENCE ON DIVERSITY IN SCIENCE

October 21-23, 1995

Committee on Women in Science and Engineering
Office of Scientific and Engineering Personnel
National Research Council

Washington, D.C. 1998

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# PREFACE AND ACKNOWLEDGMENTS

On October 21-23, 1995, the Committee on Women in Science and Engineering of the National Research Council convened a conference in Washington, D.C., on "Diversity in Science: Perspectives on the Retention of Minority Women in Science, Engineering, and Health-Care Professions." The conference was attended by researchers, policy analysts, representatives of federal agencies and private foundations, and university administrators. The majority of participants, however, and the most important ones, were women of color who were practicing scientists, engineers, or health-care professionals. They came from universities and colleges, private industry, and the federal government, sharing their own personal experiences as well as the results of research.

While their messages differed somewhat by age, race, experience, and sector of employment, the conference participants displayed remarkable communality on the issues confronting women of color in science-based education and careers and on recommendations for educational institutions, employers, and women of color themselves.

This paper is a summary of issues and recommendations identified by conference participants in both plenary sessions and informal break-out groups. Many of the conference papers contained references to the literature, and these are also included. In addition, many individual participants shared stories from their personal experience, which offer insights into the challenges confronting women of color in science-based careers that a summary alone cannot provide.

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# CONTENTS

# 1

# INTRODUCTION

Of the estimated 543,000 science and engineering doctorates in the United States in 1995, 16,000, or approximately 3 percent, were women of color (NRC, 1995).

Due primarily to their small numbers, women of color are often overlooked in research that focuses either on gender or on racial and ethnic background. Very little is know about the status of women of color in science and engineering in relation to their white male and female counterparts. Research on inequality or stratification in science and engineering tends to concentrate on black/white or male/female difference; very few studies have discussions of both race and gender. Consequently, very little is known about the exact course that women of color take in science-based education and employment or about the course that steers them out of science-based careers.

Questions abound:

- What are the environmental factors that affect the choices in education and science-based careers of women of color?
- What has influenced women of color who currently are in science-based careers?
- Is critical mass important and, if so, what are the keys to increasing it?
- What recommendations can be made to
  - colleges and universities
  - faculty members
  - employers
  - the federal government
  - women of color themselves
  - to improve the conditions and numbers of women of color in science-based careers?

These questions prompted the National Research Council's Committee on Women in Science and Engineering (CWSE) to convene a conference on "Diversity in Science: Perspectives on the Retention of Minority Women in Science, Engineering, and Health-Care Professions," held on October 21-23, 1995. Confronting the problem of the lack of knowledge about the journey of women of color in science-based education and career, the conference offered opportunities for these women to describe the paths that they have taken and to identify strategies for success. Their perspectives ground this report.

For purposes of this document, women of color include women in the following racial or ethnic groups: Hispanics, African-Americans, Asian and Pacific Islanders, and American Indians and Alaskan Natives. Science-based careers include those in the physical sciences and mathematics, life sciences, social sciences, and engineering.

# 2

# ENVIRONMENTAL FACTORS AFFECTING CAREER CHOICES

"Many [minority] students of color cannot perceive themselves as scientists, even after positive experiences in mathematics, computer, and science activities" (Johnson and Parrott, 1993). Several aspects of the experiences of women of color—including socioeconomic status, cultural background, stereotyping, lack of critical mass, and family/community responsibilities—can create barriers to entry into science-based careers. (see also, Welch, 1992).

## Socioeconomic Status

Low socioeconomic status correlates with parents who have low educational levels and sometimes low expectations for the educational attainment of their children (Jones, 1991). Compounding this effect are the difficulties faced by children in poor areas whose school systems lack the resources to provide them with adequate academic preparation for science-based careers.

For women of color, low socioeconomic level may impose additional barriers. For instance, broken families and less stable family life are more common among individuals of lower socioeconomic levels (NSF, 1994). Black women are more likely than women of other racial and ethnic backgrounds to be single parents with total responsibility for the economic support of their families. This impacts the time and money that they have to continue their own education (Moses, 1989). It also reduces the likelihood that women of color enter science-based careers and then will be able to serve as role models for aspiring science and math students.

## Cultural Background

Cultural background often affects the career decisions of a woman of color. There are strong links among her parental support for choices and the sense of obligation to her family and community, and assimilation of her own culture by the mainstream.

Family support for education often can be a cultural expectation. One conferee, a professor of chemistry, reported, "One of the ways to be upwardly mobile in Jamaica is through education. Everyone is expected go to school; this is particularly true for females, who are, in fact, the bearers of family responsibilities, as is the case in most Third World countries."

Different cultures shape family expectations differently. Hispanic women often have strong family ties, and culture often isolates them from society and from science (Aguirre and Martinez, 1994). In Latino culture, gender is very important. Women are viewed as care-givers, and careers in science and engineering are often not considered appropriate for them (Luhrs,

1995). "Women aren't encouraged to pursue science. People think women aren't logical or analytical" (NSF, 1988).

The American Indian/Alaskan Native culture stresses the community and extended family. Women often face great pressures stemming from their responsibilities to take care of their family, which may include children, parents, and other relatives. As is true for many Hispanic women, the American Indian woman is often discouraged from leaving her community (Steele, 1995). Direct eye contact, competitiveness, and boasting about oneself are taboos among many American Indians. Group harmony and cooperation are often viewed as more important than the success of one individual.

Of course, caution is advised in generalizing for any population. Women of color vary not only in race and ethnicity but, within any one racial/ethnic category, vary by socioeconomic background and by individual characteristics, such as persistence and self-motivation.

**Stereotyping**

Stereotyping occurs early and in many settings. Several conferees recalled stereotyping they faced as school children:

- "Black kids could not do well in science; and if we could do well in the social sciences, we couldn't succeed in the physical sciences."
- "A teacher at the reservation school did not think that the females should be in the geometry class. He would seat all of the Indian students in the back of the class, where we would figure out the answers together and then volunteer to prove theorems at the chalkboard. He hated us because he did not think that we should have been in there doing so well."

The effects of stereotyping are perniciously long-lasting and wide-ranging. Some women of color may be afraid to ask for help for fear that doing so might confirm the stereotype that they are ill-prepared or less able. They may also feel they should "do it on their own," concerned that, if less than stellar, their performance may reflect badly on all women or people of color.

The longevity of stereotyping adds to the frustrating nature of this vicious cycle, explains Raul Alvarado, chairperson of the Society of Hispanic Professional Engineers (SHPE) Foundation,

> "Why are Hispanics behind? For 500 years or so, through negative stereotyping and discriminatory practices, they've been told, 'Don't worry about achieving; don't even think about it.' Now, for the past 10 years, we're hearing, 'You have to come up to speed.'" (Jones, 1991)

Stereotyping about women of color not only obscures their abilities, but may lead to unfair and damaging biases. For example, because Asian women are often stereotyped as being docile, submissive, and lacking leadership skills, they may not be considered for managerial positions in the government and industry (Tang, 1995).

## Lack of Critical Mass

> "Critical mass" is defined as the discrete point at which the presence of a sufficient number [of people in a particular group] brings about qualitative improvement in conditions and accelerates the dynamics of change" (Etzkowitz *et al*, 1994). Often considered to be the biggest obstacle for the advancement of women in general in science-based careers (see, for instance, Shepherd, 1995), the lack of a critical mass of women of color in science-based careers and education is even more severe. It can lead to a pervasive sense of isolation and of not belonging (Wilson, 1995). Particularly in academe, isolation is a widely-recognized problem,
>
> > "...carrying with it a variety of negative consequences including stigma, depletion of confidence, and exclusion from access to informal sources of professional information. Informal networks are indispensable to professional development, career advancement, and the scientific process" (Etzkowitz *et al*, 1994).

Because of the scarcity of colleagues or role models like themselves, women of color often do not perceive that they themselves or their concerns are recognizable in the mission, goals, or social structure of college campuses or the workplace (Moses, 1989).

## Integrating Work, Family, and Community Responsibilities

For women of color, there can also be the extra burden of sorting out whether to assimilate into the mainstream or to keep their cultural identify (Wallace and Page, 1995). The need to integrate work, family, and community is often strong for women of color because of both their cultural upbringing and their sense of responsibility to their communities. Science-based careers, with their extraordinary demands on personal time and energy, conflict directly with this integration need. As a result, women of color may not pursue the career for which they have been educated but, rather, one that will more enable them to handle their family and community responsibilities.

Many women of color believe in the importance of serving as role models, mentors, and committee members to bring about change, but they often find that their service in these areas hinders their own career advancement (see, for instance, Aguirre *et al.*, 1994). Ironically, they are often expected by their employers to serve in these exceptional capacities without acknowledgment or reward. This further confounds the situation caused by the demands that family, work, and community place on their time. The dissonance that is created is difficult to manage even in a supportive work or study environment; in an environment lacking that support, the likelihood that a woman of color will leave is increased.

# 3

# INFLUENCES ON THE SUCCESS OF WOMEN OF COLOR

What influences the success of women of color in science-based professions?

- How do families affect career success?
- What influences in school and in the workplace are significant?

A variety of people—family members, teachers, and work colleagues—play important roles.

## Family Influences

**Parental support.** Family members, particularly parents, have unique opportunities to influence the achievements of women of color. Parents' attitudes help determine their daughters' educational success through a strong sense of the importance of schooling; and the expectation to pursue advanced education, regardless of gender, frequently in opposition to cultural or familial stereotypes.

A parent's own academic background and occupation often determine the support and encouragement that his/her child receives. One conferee, an electrical engineer, said, "My parents, especially my father, who is an electrical engineer, was the most supportive of my academic career." A biochemist echoed the same sentiment, "My father is a biochemist and my mother is a math teacher, so there never was an attitude that girls can't do this. They gave me a microscope in the fifth grade."

At the same time, parents with limited education themselves can and do provide the encouragement needed to stimulate education in their daughters. For example, a faculty member whose parents did not complete high school reported, "The six children in our family were encouraged by our parents to always want to be somebody."

Sometimes it is the child who "jump starts" her parents' support. As one scientist explained, "For me, there were no role models or mentors early on, so I said, 'The hell with it; I'll do it myself.' . . . And my parents have become really supportive, but it's been hard for them. They do not understand because they were never in an academic environment."

Other family members, in addition to parents or in their stead, can boost the decisions of minority females to undertake and persevere in postsecondary education. For example, in the Navajo culture a woman's relationship with her uncles is quite important. The uncle is the one

who "tells you like it is, gets you set straight when you are off course, and sort of nudges you along when you need nudging," said one participant.

While most conferees reported positive family influences, some described parents who discouraged their daughters from pursuing advanced education. Some parents in the Hispanic and American Indian populations did not consider higher education, much less professional careers, as options for their daughters. Two examples stood out:

- "As I prepared to leave for college," said a Hispanic woman, "I found that my mother wanted me to pursue a certificate in the secretarial field at a community college, saying that 'being a scientist is not for us.'"
- Another conferee told a similar story: "My mother was so upset when all her friends' children were getting married and I was not that she told me, 'I've finally figured it out: it only takes nine months to make a baby but it takes three years to get a Ph.D.!'"

## Influences In Education

**Gate-keeping.** Gatekeepers exist at all levels of education, usually in the form of high school counselors and undergraduate and graduate advisors. Many women of color find when they enter college that their precollege education has been quite lacking (see Ihle, 1991). Frequently college administrators and academic advisors direct them into nonscience-based programs of study rather than help them design coursework that will bring them up to the same level as those who are better prepared.

**Road blocks in the system.** The influence of a person in authority at a college or university has a significant impact on a woman of color. While there is no way to gauge how many women are diverted from science-based education because of "bars at the door," conferees made clear that to persist toward the completion of a science-based degree often required them to "fight back against the system."

**Faculty attitudes.** Faculty members significantly affect women of color through their attitudes toward them. The positive influence of teachers at all levels is critical to the success of women of color. Conferees also described negative actions that ranged from patronizing attitudes to harassment, all of which chill the progress of a student at any stage of her education.

## Influences In The Workplace

Among women of color at the conference there was a prevalent sense that being good technically as a scientist or engineer is not enough for them to succeed in most employment settings. They identified a number of external barriers to success:

- difficulty in finding support for their need to balance personal and professional life;
- hostile environments characterized by exclusion, condescension, stereotyping, sexual harassment, tokenism, and devaluation;

- difficulty in finding mentors and role models, and subsequent lack of access to social networks;
- failure of the institution to empower;
- limited career advancement possibilities; and
- lower evaluation of their professional success.

In private industry, downsizing has made the corporate environment more competitive. "The downsized corporate culture creates a belief," one conferee explained, "that in order to make important contributions to the company and to be taken seriously technically, a person has to be single-minded and put her company or her work first above all....This can create a real problem for a woman who is trying to raise a family, and it is particularly difficult for a minority woman, whose cultural upbringing may dictate that the greatest identity for her is her family."

Similarly, in academic institutions faculty of color are often expected to devote much more of their time to committee work and other forms of service than their white counterparts. This detracts not only from the requirement time they can devote to their primary goals of research and teaching, but (especially in the case of women faculty) also from time available for family and social obligations.

A successful response to this dilemma is to create an environment where employees can be themselves and yet be engaged in the organization on as many levels as possible. Companies and employees working together provide an environment where every colleague's unique qualities, skills, and experience, including their backgrounds and cultures, are fully valued and utilized. A personal and ongoing orientation program can go a long way to smooth the introduction of women scientists and engineers into the culture, and flexible scheduling can be key to their retention. Job-sharing and programs for child care and elder care can also contribute to a high level of productivity and satisfaction for women of color as well as for employees generally.

The improvement of conditions in many science or technology-based companies was hastened by the establishment of a women's network or women's development committee by the employees themselves. Human resource managers and diversity directors sometimes were a part of these groups, or at least did not oppose them. If recruiting and retaining women of color is a goal, then nurturing women's networks and committees, coupled with obvious and high-level support, is an important component.

In the area of career development, opportunities afforded men and women are often not equivalent. The type of professional development provided by gender or race of the participant may not even be known. Employers often appear to be providing adequate career advancement opportunities, but the outcome by gender and race tells a much different story.

Similarly, employers' support for women and people of color seeking advanced degrees is frequently questioned. Industry recruiters emphasize an employer's commitment to advanced degrees, however, when the employee decides to "cash in" on the promise, managers are often less than supportive.

Research has shown that "to the extent that organizational structures and practices follow models based solely on how white men develop, women and minorities are disadvantaged." (Morrison and vonGlinow, 1990). Employers need to make efforts to integrate members of underparticipating groups into the organizational culture, and one way is through professional development beyond the "white male model."

# 4

# PARTICIPANT RECOMMENDATIONS

These recommendations for increasing the recruitment and retention of women of color in science-based careers were made by many of the participants at the conference. Since they were not agreed to through the concensus of a committee appointed by the National Research Council, they should not be taken as National Research Council recommendations. They are presented below in order to assist those readers who seek to increase the participation in science-based careers of women of color.

## General Recommendations

**Mentoring.** There should be mentors who coach and sponsor capable women to enable them to advance in their careers.

**Professional networks.** Professional networks are key. Women of color should be encouraged to participate in professional and scientific organizations. The responsibility for this belongs to established professionals, regardless of color or gender. In addition to disciplinary societies there are gender-specific associations that provide support, information, and professional development opportunities. Women of color should join both kinds of organizations and take advantage of the leadership, publication, and mentoring opportunities afforded there.

**Inclusion.** For inclusion to have any meaning, senior faculty or managers should actively encourage the participation of women of color and personally demonstrate the expectation that newcomers will be welcomed by all. In many cases this will require a change attitudinally and operationally at all levels.

**Information-sharing.** All professionals should make a commitment to share information about job possibilities and the availability of research funds with each other. This serves to deepen the pool of applicants and increase the likelihood that science-based positions will be populated by a more diverse set of people over time.

## Recommendations For Educational Institutions

**Assessment of the culture.** The institution should determine whether its culture and climate makes it difficult for women of color (whether students or faculty) to enter and be successful. Senior faculty and administrators should commit to eliminating factors that impede women's complete involvement in the institution and replacing them with programs geared to success.

**Recruitment.** Recruitment policies at every level should include provisions to track and analyze retention after recruitment has occurred.

**Campus resources.** Institutions should devote space and funding for centers on campus where well-informed staff provide programs, resources and services that enhance the development of women of color as successful students.

**Reporting.** Institutions should develop and make widely available profiles of their students by gender and race, including academic performance, persistence toward the degree, and graduation rates. Since "critical mass" is a factor in the success of women of color, such reporting, at the program level should be made available to assist prospective students in making informed decisions about program choice and institution choice.

**Support.** Educational institutions should create programs like MARC and MBRS at the local level to support the education of women of color. Undergraduate scholarships, formal mentoring, and tutoring programs that involve faculty-student interaction are essential.

**Support groups.** Opportunities should be provided to students from the beginning of college to discuss their career goals in small but diverse groups. Leaders of the groups should understand the socioeconomic and cultural influences at work. Support groups at every level of the educational process are vital to success.

**Re-entry.** Part-time re-entry programs should be available for women who have had to drop out of or slow down their science-based education.

**Diversity training.** Institution-wide diversity training should be on-going so that the attitudes and approaches of all front-line staff (e.g. departmental secretaries, graduate assistants, etc.) reflect the institution's commitment to a welcoming environment for all students of color and their families. The commitment of the most senior professor or administrator to encouraging women of color is undermined by a thoughtless, biased, or stereotypical remark made by a front-line staff member.

**Promotion and tenure policies.** Policies that provide for part-time, tenure track appointments permit all faculty with families, not just women of color, to participate fully in the promotion process. Promotion and tenure policies should also recognize more fully the service and teaching components of the faculty role.

**Building on the collaborative process.** Graduate school is very much a collaborative process, and institutions should build programs that permit students to participate with each other and with faculty in meaningful research and dialogue about the academic enterprise in which they all are engaged.

## Recommendations For Employers

**Creative employment.** Employers should commit to programs that assist women of color in remaining involved in their science-based careers. These include:

- Grants to attend conferences
- Encouragement to participate in professional societies
- Technical support for researchers to work part-time
- Job-sharing
- Flexible work hours

**Integrating company policies.** Employers should review and change policies that work in conflict with each other to the detriment of women of color. For instance, recruitment programs that bring these women into the workplace are undercut by a "last hired, first fired" down-sizing policy. Also, a policy supporting inclusion is vitiated by a policy that distributes professional development dollars only to senior or full-time employees.

**Meaningful professional development.** Women of color should participate equally with other employees in professional development through flexibility in release time, adequate financial support, and creativity in identifying opportunities. Redefinition of traditional professional development is essential.

**Developing expertise.** All parts of a company should look for ways to improve participation of women in color in activities of the company and ways to permit them to become experts in at least one facet of the company's business.

**Orientation.** An orientation program that genuinely informs new staff members about the culture of the company should be a part of every company's agenda. The orientation should instill company expectations around diversity, civility, lines of authority, acceptance of new ideas, promotion, and networking.

**Identifying champions.** There should be champions who are willing to speak up on behalf of programs that enhance the inclusion, retention, and effectiveness of women of color.

**EO/AA Policies.** Equal opportunity and affirmative action policies should be in place and should be working effectively. Employees should be knowledgeable about these policies and adhere both to their explicit and implicit intent.

## Recommendations for the Federal Government

**Creative personnel practices.** Success with diversity should be included as part of the formal appraisal process in promotion and as part of the responsibility of managers to develop all of their staff members. Hiring policies should counteract the effect of any downsizing that may be taking place at the same time.

**Introduction to federal service.** All federal agencies should implement programs to introduce women of color to the federal service--even if only temporarily--through programs like those created under the Interagency Personnel Act.

**Research on women of color.** The federal government should set a research agenda and establish research priorities that help the nation understand more about women of color in science-based careers. In particular, this research should be qualitative as well as quantitative in order to "gauge the intensity of the aspirations and the frustrations of those who have made it through the pipeline." (Tang 1995).

**Effective mentoring.** Programs to teach and demonstrate effective mentoring should be developed. There should be rewards--directly related to advancement--for those who are effective mentors.

**Reducing the impact of downsizing.** To lessen the impact of reductions in force, which disproportionately affect more recent government employees and consequently women of color, the federal government should develop strategies for retaining diversity. Serious review of seniority systems is required in this regard. The long-term impact of downsizing on the very small numbers of women of color in science-based, as well as non-science based, positions in federal government is disproportionately large.

**Formalizing networks.** Formalized networks in science-based agencies of the federal government should be established that help women of color negotiate the confusing bureaucracy and various twists and turns of succeeding in the federal service.

**Data collection.** Federal agencies should collect and report separate statistics on women by race, and on people of color by gender. Because of the small numbers of individuals in many of these groups, actual numbers should be reported along with percentages.

## Recommendations For Women Of Color And Their Families

**Creating high expectations.** Women of color and their families should realize that women of all racial backgrounds and cultures have the ability to participate in science-based careers and education.

**Family support.** Parents, spouses, significant others, and even children play a critical role in encouragement and nurturing of women in science-based education and careers. Traits that mark family support of many women who have been successful in science-based education and careers include:

- Flexibility in demands on their time and family duties;
- Willingness to accept responsibility for additional income needs and household chores;
- Learning about the courses, work requirements, projects, and demands placed on them;
- Providing childcare;
- Helping with transportation

**Building networks.** Women of color should participate actively in staff meetings, school organizations, and professional development and networking opportunities, including social functions. They should take every opportunity to meet and talk with others, especially more senior individuals in their area of interest. Networking is not a geographical concept; with the availability of electronic communications, it can be global. Networking should not be limited to employment settings; women of color can find supporters in their neighborhoods, in religious groups, on the Internet, or at the local gym.

The significance of networks cannot be underestimated. To build her networks, a woman of color should:

- Keep files of business cards and contact names of everyone she becomes acquainted with and keep in regular contact about professional issues—as well as personal ones;
- Send notes of congratulations to acquaintances in recognition of advancements, publications, and presentations;
- Take advantage of a variety of social activities to interact with colleagues, including social engagements, athletic events (as player or spectator), conferences, staff "coffees," and building or department functions;
- Invite colleagues to collaborate on professional projects and follow through on strategically wise opportunities for collaboration;
- Persist in follow-up with contacts.

**Become good at self-promotion.** Women of color are responsible for their own public relations. They should:

- Keep abreast of salary information and advancement potential. Networking and acute awareness of regional, national, and, of course, local happenings are essential;
- Develop management skills and expertise in budgeting, negotiation and problem-solving;
- Shrug off attempts at stereotyping; and
- Pay attention to the impact they create in the classroom, lab, or workplace.

**Attend to personal and professional development.** Women of color should stay informed about the possibilities for personal and professional development—grants, awards, institutes, seminars, collaborations—and make supervisors aware of their interest in participating. While employers should be expected to pay for major professional development opportunities, there are "no free rides;" the astute woman will make her own financial provisions for incidental expenses to cover professional development.

**Find a mentor.** At every point in their educational and professional careers, women of color should find mentors who can provide them with valuable strategic advice, emotional support, and career guidance. Mentoring is a very personal interaction. What is right for one person may not

be right for another. For instance, a single mentor may be adequate for some women but too limiting for others. Mentors also change over time, and a women of color should aware of the need to add mentors to her "brain trust" as her career progresses.

**Mentoring reciprocity.** In the natural course of advancement and growth, women of color should become mentors to others.

**Making strategic decisions.** A woman of color should make key decisions strategically, that is, with her own advancement in mind. This involves making education and employment decisions that suit her lifestyle but with awareness of and careful regard for the culture of the workplace. Enlisting allies in this process to advocate or promote decisions that she has made increases the chances of success.

## APPENDIX A: CONFERENCE OVERVIEW

### Keynote Addresses

- "Creating a Critical Mass of Minority Women in Science"
  Bruce Alberts, president, National Academy of Sciences, and chair, National Research Council
- "Responding to `The Double Bind'"
  Shirley A. Jackson, chair, Nuclear Regulatory Commission
- "Being an Entrepreneur"
  Maria Estela de Rios, founder and vice president of corporate affairs, ORION International Technologies, Inc.

### Plenary Sessions

- "What the Data Reveal"
  Moderator: Daryl E. Chubin, division director for research, evaluation, and dissemination, National Science Foundation
  Clifford Adelman, senior research analyst, U.S. Department of Education: Cross-Currents: Changes in the Undergraduate Careers of Minority Women in Science, Mathematics, and Engineering, 1972-1993
  Mary Golloday, director, Science Resources Studies, National Science Foundation: Minority Female Scientists: Undergraduates to Practitioners
  Joyce Tang, professor of sociology, Queens College: Glass Ceilings in Science and Engineering
  Lois Bergeisen, senior staff officer, Division of Community and Minority Programs, Association of American Medical Colleges: Retention of Women in Medical Schools

- "Retention of Minority Women in Postsecondary Science, Engineering, and Health (SEH) Education"
  Moderator: Edward Roy, Jr., vice-president for academic affairs, Trinity University
  Taft H. Broome, Jr., professor of civil engineering, Howard University: The Heroic Woman Engineer
  Patricia Chavez, director of public relations and advancement, Anderson School of Management, University of New Mexico: Students as Seedlings
  Cecilia Gonzalez, professor of biology, San Antonio College: Retention of Minority Women in Postsecondary Education

- "Climbing the Academic Ranks: Retaining Minority Women Faculty"
  Moderator: Eugene H. Cota-Robles, professor emeritus of biology, University of California-Santa Cruz
  Lynda M. Jordan, assistant professor of chemistry, North Carolina A&T State University: Issues Facing Minority Female Faculty and Students

Carolyn W. Meyers, dean of engineering, North Carolina A&T University): Speaking from Personal Experiences

Anne S. Pruitt, dean in residence, Council of Graduate Schools: Minority Women Faculty

- "Succeeding in Federal Service"

  Moderator: Lois Steele, research medical officer, Indian Health Service-Tucson

  France Cordova, fomer chief scientist, National Aeronautics and Space Administration (now Vice Chancellor for Research, University of California, Santa Barbara): NASA's Commitment to Diversity

  Joyce Justus, former assistant director for social and behavioral sciences and education, Office of Science and Technology Policy: Achieving Diversity in the Federal Sector

  Cora B. Marrett, former associate director for social, behavioral, and economic sciences, National Science Foundation (now Professor of Sociology, School of Education, the University of Wisconsin at Madison): Succeeding in Federal Service

  Vivian Pinn, M.D., director, Office of Research on Women's Health, National Institutes of Health: Programs of NIH's Office of Research on Women's Health

- "Retaining Minority Women in the Industrial Enterprise"

  Moderator: Lilian S. Wu, applied mathematician, IBM Corporation

  Carol Balfe, former research scientist, Raychem Corporation: The Working Environment

  Mi Dong, project manager for drug development, Parke-Davis/Warner-Lambert Pharmaceuticals: Individuals and Companies Can Work Together

  G. R. (Bob) Martinez, director of human resources, IBM: Diversity in IBM's Technical Work Force

  Barbara A. Sanders, director of advanced development, Delphi Interior & Lighting Systems, General Motors Corporation: Retaining Minority Women in the Technical Enterprise

  Toni Tomacci, multicultural specialist, Apple Computer: Elements of Successful Retention Programs

## APPENDIX B: PARTICIPANTS

Bruce Alberts
National Academy of Sciences

Charlotte Kuh
National Research Council

Linda Skidmore
National Research Council

Shirley A. Jackson
Nuclear Regulatory Commission

Maria Estela de Rios
ORION International Technologies, Inc.

Daryl E. Chubin
National Science Foundation

Clifford Adelman
U.S. Department of Education

Mary Golloday
National Science Foundation

Joyce Tang
Queens College

Lois Bergeisen
Association of American Medical Colleges

Edward Roy, Jr.
Trinity University

Taft H. Broome, Jr.
Howard University

Patricia Chavez
University of New Mexico

Cecilia Gonzalez
San Antonio College

Eugene H. Cota-Robles
University of California-Santa Cruz

Lynda M. Jordan
North Carolina A&T State University

Carolyn W. Meyers
North Carolina A&T University

Anne S. Pruitt
Council of Graduate Schools

Lois Steele
Indian Health Service-Tucson

France Cordova
National Aeronautics and Space Administration

Joyce Justus
Office of Science and Technology Policy

Cora B. Marrett
National Science Foundation

Vivian Pinn
National Institutes of Health

Lilian S. Wu
IBM Corporation

Carol Balfe
Raychem Corporation

Mi Dong
Parke-Davis/Warner-Lambert Pharmaceuticals

G. R. (Bob) Martinez
IBM

Barbara A. Sanders
General Motors Corporation

Toni Tomacci
Apple Computer

Etoi Amecca Garrison
Tulane University School of Medicine

Patricia D. Hatch-Riddick
Carnegie Mellon University

Margaret Imogene Kanipes
Carnegie Mellon University

Susan A. Henry
Carnegie Mellon University

Natama V. Summers
Howard University

Monica Bond
Howard University

Denise-Margaret Thompson
University of South Florida

Wini Warren
Indiana University

Tori D. Williams
Yale University

Nabanita Datta Gupta
Aurhus School of Business, Aarhus, Denmark

Nancy M. Tooney
Polytechnic University

Avis J. Davis
American Association of University Women Educational Foundation

Carlos M. Rodriguez
Pelavin Research Institute

Margaret E. M. Tolbert
Argonne National Laboratory

## APPENDIX C: REFERENCES


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