



## Introduction

### *Understanding Young African American Women's Experiences in Science*

The study of elites has historically been an important part of social-science theory and research. Elites have been described as those occupying powerful and influential positions in government, corporations, and the military. These elites share interests and attitudes, and have networks that work to encourage and include some but discourage and exclude others (Domhoff, 1983; Mills, 1956; Zweigenhaft and Domhoff, 1998). In a technologically advanced, postmodern, global society, the status, power, shared interests, and powerful networks of those in science suggest that they must be considered as members of the new elite. One of the most distinguishing features of the science elite (historically and currently) is the shortage of women and non-whites. In spite of the progress that women and minorities have made in science education and occupations (Hanson et al., 2004; National Science Foundation, 2000, 2004), the culture of science continues to be a white male culture that is often hostile to women and minorities (Catalyst, Inc., 1992; Harding, 1986; Rossiter, 1982, National Science Foundation, 2000, 2004; Pearson and Bechtel, 1999; Ramirez and Wotipka, 2001).

Although research on women in science has proliferated, its focus has often been on differences between men and women, with little attention to subgroups of women. It is a mistake to think of women as an undifferentiated group. Increasingly, researchers have come to the conclusion that not all women have the same experiences in science

education and occupations (Hanson and Palmer-Johnson, 2000; Mau et al., 1995). In fact, preliminary research has suggested that young African American women are particularly interested in science (sometimes more so than their white counterparts) (Hanson and Palmer-Johnson, 2000; Hanson, 2004; National Center for Education Statistics, 2000a). In spite of this interest, some have suggested that African American women experience racism and sexism in the science domain and remain underrepresented in science programs and occupations (Malcom et al., 1998; Vining Brown, 1994; National Science Board, 2000). The paradox at the center of this book involves the expressed scientific interest and motivation of many young African American women in the context of a science culture that remains openly hostile to those who are not white and not male.<sup>1</sup>

The conceptual framework that is used here in trying to understand the complex interaction between race and gender in the science domain is one that focuses on gender and race as structures that are major principles of organization and inequality.<sup>2</sup> It is not qualifications but master statuses such as gender and race that are viewed as being important determinants of entry and success in science. This framework is multicultural and feminist in suggesting that gender structures are powerful aspects of organization but they are not identical across cultures. It is important that diversity in gender systems across race/ethnic groups is acknowledged. The framework also borrows from the critical perspective in suggesting that it is not structure alone that creates and discourages opportunities in science. Women and African Americans and African American women are not merely “victims” of racism and sexism. Sometimes structures and status quos are questioned and challenged. Thus, it is not just structure that is important for understanding African American women’s experiences in science but these young women’s responses to race and gender structures.

My goal in this book is to examine the experiences of young African American women in science education. First, I describe these young women’s attitudes about science, their course-taking in the science curriculum, and their science achievement. Additionally, I report on the extent to which these young women see discrimination and a chilly climate in the science classroom. A second goal of the book involves an examination of young African American women’s experiences in school systems, families, communities, and peer groups that work to encourage or discourage their interest and achievement in science. The major research questions revolve, then, around the experi-

ences of young African American women in science and the push-and-pull factors in a variety of areas of life that influence these experiences. My special focus is on experiences in science education during the high school years, although later experiences are also considered. In order to understand the way in which race and gender come together, comparisons with young white women and young African American men are included.

The research questions are addressed using a triangulation of methods and data sets. A chapter is devoted to each area of influence: school, family, community, and peer. The chapters begin with a short discussion of relevant literature. Analyses of the National Educational Longitudinal Study (NELS) of American youth are then presented. These analyses lend insight into the experiences of a large, nationally representative sample of high school students in the science curriculum. The data include rich information on science experiences, as well as experiences involving schools, families, communities, and peers, thus allowing measurement and understanding of the processes at work in young African American women's science experiences.

The examination of NELS data will be supplemented by information from a Web survey of young African American women that I conducted in 2003. The Web survey attempted to gain further insight into young African women's science experiences by using vignettes and open-ended qualitative questions. The survey used a new Web technology that combined probability sampling with the reach and capabilities of the Internet. The open-ended questions (as well as focused, closed-ended questions) inquired specifically about the variety of influences in family, community, peer groups, and schools that might have encouraged or discouraged these young women in science education. As Feagin, Vera, and Imani (1996) suggest, it is critical that we allow minorities to explain their experiences in their own words.

Additionally, my Web survey used the vignette technique to gauge young African American women's perceptions of discrimination in the science classroom. I know of no other researchers who have used the vignette methodology in the context of the Web survey. The attitude survey has become standard technique in social science research. However, it can be argued that questionnaires and surveys are not well suited for the study of human attitudes and behaviors since they often produce unreliable and biased self-reports (Alexander and Becker, 1978). Standardized surveys often use vague questions that are interpreted within the respondent's own meaning system. One solution, then, is to make

the stimulus given to the respondent as concrete and detailed as possible, as in a vignette. This stimulus should resemble a real-life decision making or judgment-making situation. In addition, since the stimulus can be held constant or varied in a systematic fashion, it gives the researcher greater control, as in experimental designs. The vignette is an ideal strategy for gaining this detail and control.

The vignette in the Web survey began with the respondent being shown a picture of a young woman. One part of the sample was given a picture of a young African American woman, LaToya. The respondent clicks on the picture and listens to the following vignette, provided in LaToya's voice:

Hi, my name is LaToya. I'm an African American student and I go to high school in Northern Virginia. I love science. Especially biology. I am thinking of maybe becoming a veterinarian. But even though I love science, I don't feel so welcome there. I mean like the other day I was sitting in my biology class and all of a sudden I noticed that I don't get called on very often in this class. And it's like my teacher's white and most of the students in the class are white. Then I look in my textbook and see pictures of all of these white scientists. Sometimes I don't feel like I belong in science.

This vignette was followed by a series of questions that attempted to measure specific responses, experiences, feelings, and sources of encouragement and discouragement in science. Most questions were qualitative and some, but not all, refer to the vignette. Distinction was made between their own experiences and those of minority women in general. Some questions asked for specific examples of encouragement and discouragement from specific sources (e.g., teachers, parents) and other questions asked whether the respondent thinks that their abilities and interests are influenced by feedback from these sources. Finally, they were asked what they would do to change the school system so that all students would feel encouraged in science. Note that other forms of the vignette involved LaToya talking about gender as a problem in the classroom. In another vignette, the respondent listened to a young white woman, Michelle, talking about gender discrimination in the science classroom. A fourth, neutral vignette is also given where LaToya feels unwelcome but does not mention race or gender. Thus, the race of the target was varied as was the content of the vignette (focusing on race or gender [or neither] in the classroom). Keep in mind that each of the

vignettes was given to a sample of white women and each was given to a sample of African American women. Respondents only received one version of the vignette.

Race discrimination is a sensitive topic and standardized questions have the potential for generating socially desirable responses. The vignette provides a solution. It avoids asking about the respondent's own experiences but rather presents a hypothetical situation. Additionally, the Web survey allows a greater feeling of anonymity, again contributing to more honest, valid responses.

The paradox of young African American women's interest in science in the context of a chilly climate for those who are not white and not male is a complex one that demands a complex explanation. The literature and analyses presented here within the context of the critical feminist framework present a picture of a school system that does not tend to see young African American women as science talent. That is not to say that there are no teachers who make a difference for these young women. Overall, however, the science education system is structured in a way that favors white middle-class males. The answer to the paradox continues to evolve as the African American family, community, and peer systems are examined. As research and theory on human agency suggests, sometimes events and circumstances come together in unexpected ways. The African American family and community have a different definition of femininity than does the white family and community. African American women have historically been viewed as strong individuals who work and head families. Gender is often thought of in a universal way—especially within a particular society. I provide evidence here of a unique gender system in the African American family, community, and peer systems that sometimes works against all odds to encourage interest and activity in science. The above statements are phrased at a very simplistic level. The actual processes revealed by the NELS and Web survey data allow the reader to see the complexity and subtleties of the push-and-pull factors that influence young African American women in the science domain. It is when these young women are allowed to provide answers in their own words—in the Web survey—that the paradox of young African American women in science is unraveled.

This research examines gender structures in science and in African American communities. More specifically, it attempts an understanding of young African American women's experiences in science and the factors that encourage and discourage success there. Data from a

variety of sources is used to chronicle these experiences and share the young women's view of them. When gender and skin color are the major factors determining who will do science, a considerable amount of scientific talent is lost. The implications of this talent loss for scientific discovery and advance are considerable. The implications are also great for the young people who are denied access to science since they will not be involved in the creation of policies and technologies that will guide us through the next century.