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Diversifying Science and Engineering Faculties: Intersections of Race, Ethnicity, and Gender

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Abstract

The fields of science, technology, engineering, and mathematics (STEM) drive economies worldwide. In such knowledge-based economies, no nation can afford to use its human resources inefficiently and ineffectively. Faculties exert a great deal of influence on the science and engineering (S&E) enterprise insofar as they conduct cutting-edge research as well as educate and train the S&E labor forces. This article focuses on the dynamics of the intersections of race/ethnicity and gender on diversifying S&E faculties in colleges and universities in the United States, and the criticality of disaggregating data to better understand these dynamics. Failure to disaggregate race/ethnicity data by gender, and gender data by race/ethnicity, masks important distinctions among groups. Failure to systematically take into account these distinctions results in policy, programs, practices, and institutions that are both inefficient and ineffective in developing and enhancing the S&E labor forces.

Keywords

race, ethnicity, gender, STEM, faculty

During the 20th century, the economic base of the United States shifted from the manufacture of durable goods to the manipulation of symbols (Naisbitt, 1982). Such knowledge-based economies are driven by the fields of science, technology, engineering, and mathematics (STEM). More and more nations seek competitive advantages by developing their indigenous scientific and technical infrastructures. One key component

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of these infrastructures consists of human resources. Over the past 30 years, concern has increased over both the quantity and quality of the pool from which the United States recruits its talent in STEM fields (Leggon & Malcom, 1994; Office of Technology Assessment, 1988; Pearson & Fechter, 1994). In knowledge-based economies, STEM faculties exert a great deal of influence by training the science and engineering (S&E) labor forces of the future, as well as by conducting cutting-edge research. Yet in the United States, African Americans, Hispanics, Native Americans, Alaskan Natives, Pacific Islanders, and non-Hispanic White women are underrepresented in the STEM labor force in general and on postsecondary faculties in particular (American Association of University Women, 2004; Building Engineering and Science Talent [BEST], 2004; Committee on Equal Opportunities in Science and Engineering [CEOSE], 2004; Jackson, 2004; MacLachlan, 2004; Malcom, Chubin, & Jesse, 2004).

Because science is an enterprise in which "facts" are created by human beings, Friere (1985) argues that "reality is never just simply the objective datum, the concrete fact, but it is also people's perception of it" (p. 15). In the same vein, Collins (2004) contends that knowledge is shaped not only by gender but also by race. Who practices science exerts a great deal of influence on what questions are asked, how questions are framed, and what evidence is collected and analyzed (Leggon & Malcom, 1994; Leggon & Pearson, 1995). Contrary to popular belief and characterization of science as "value free," scientists are human beings who are the products of their socialization; as a consequence, they bring certain values, beliefs, and views to the scientific enterprise (Hubbard, 2001). The creation of knowledge in general and science in particular is not only an intellectual process but also a social and political process (Laslett, Kohlstedt, Longino, & Hammonds, 1999). Therefore, excluding certain groups from the academy, or relegating them to the "outer circle" of academe (Zuckerman, Cole, & Bruer, 1991), places them in the position of "outsiders-within" the academy (Collins, 2000, p. 12). Moreover, such exclusion or marginalization suppresses perspectives that could enrich the scientific enterprise.

By bringing a variety of perspectives to S&E, faculty members from diverse racial and ethnic backgrounds infuse vitality and creativity into the S&E enterprises (Bassett-Jones, 2005; Commission on Professionals in Science and Technology, 2006; Malcom et al., 2004). Who practices science has significant ramifications extending far beyond the generation of data and analyses, to include the following:

- How research problems are selected, framed, and formulated
- Which groups should be studied, and how
- How results are reported, disseminated, and used

Just as important as who practices science is who teaches science (Leggon & Pearson, 2006). Faculty members exert a great deal of influence not only on the knowledge base but also on the quantity and quality of the members of the S&E labor forces. Science in general, and academic science in particular, is a type of apprenticeship. Professors function as gatekeepers insofar as they regulate the supply of scientists and engineers, determine which students they will advise and which they will not, and identify who will be mentored and who will not. Research documents that graduate school socialization "and identification as a 'chosen' student targeting a faculty position" exert influence on the early professional adjustment of new faculty (Eddy & Gaston-Gayles, 2008). Some of the literature on mentoring indicates that often mentors choose as their protégés people who are of the same race and gender because they identify with these protégés and want to help them overcome barriers to advancement (Ragins & Scandura, 1994, 1997). Although much research on demographic differences in mentoring relationships focuses either on race or on gender, studies that examine the interaction of race and gender may provide more accurate information.

Another significant way in which professors serve as gatekeepers is that they choose which students will be research assistants and which will be teaching assistants. The significance of this decision goes beyond financial assistance. Research assistants are more likely than teaching assistants to publish as graduate students or even as undergraduate students. This is a critically important distinction because predoctoral publications are one of the strongest predictors of success in an academic career.

Advantages of Faculty Diversity

Having a diverse faculty enhances the recruitment and retention of students from groups underrepresented in S&E. For example, the most accurate predictor of subsequent success for female undergraduates is the percentage of women among faculty members in their college. This effect is even more pronounced for African American women. Among African American women awarded doctorates in biology between 1975 and 1992, for example, 75% graduated from two colleges—Spellman and Bennett—both of which are women's colleges as well as historically Black colleges (Leggon & Pearson, 1995). Being of the same race, ethnicity, and/or gender is not a prerequisite for mentoring, although a student is more likely to identify with a professor who looks like him or her. Research on cross-race and cross-gender mentoring has produced conflicting results. These conflicts are partially due to studies focusing on different aspects of mentoring and different organizational contexts; as a consequence, much research needs to be conducted.

The effects of diverse faculty are not limited to students from underrepresented groups. Having a diverse faculty produces a stronger and richer educational experience for all students; this is increasingly the case in the context of a global economy. Faculty diversity not only benefits education but also benefits the S&E enterprise as well. By bringing a variety of perspectives to bear on S&E, researchers from diverse racial and ethnic backgrounds enrich the pedagogy, culture, and curricula of S&E disciplines; this in turn infuses vitality and creativity into the S&E enterprise (Bassett-Jones, 2005; Malcom et al., 2004).

Framing Diversity

Historically in the United States, the S&E talent pools have been demographically homogeneous, that is, they consist largely of non-Hispanic White men. However, over the past two decades, there has been a decline in interest among non-Hispanic White men in pursuing S&E careers (National Science Foundation [NSF], 2002, 2003; Zumeta & Raveling, 2002). Traditionally, shortages (real or imagined) of S&E talent were met by importing talent from abroad, rather than developing it among its citizens, with the possible exception of Asian men (BEST, 2004; CEOSE, 2004; Levin & Stephan, 1999); recently, however, S&E graduate degree attainment for Asian Americans is beginning to slow in some fields. Importing S&E talent is a quick short term fix; however, this option is no longer viable because of major political and socioeconomic factors (Commission on the Advancement of Women and Minorities in Science, Engineering, and Technology Development, 2000).

The United States is now competing for science and technical talent with other nations, most notably, the nations in the European Union and the Pacific Rim. In addition, one of the aftermaths of September 11, 2001, is that some S&E jobs are limited to U.S. citizens because of concerns about non-U.S. citizens being engaged in security-sensitive research (Marburger, 2002). Moreover, recent changes in U.S. visa policies impede the flow engineering talent into the United States (BEST, 2004; Colwell, 2003; National Science Board, 2004). A viable long-term solution for the United States is to identify and develop S&E talent in all of its people and especially those from indigenous groups that are underrepresented in S&E—African Americans, Mexican Americans, Native Americans, Native Pacific Islanders, Puerto Ricans, and non-Hispanic White women (CEOSE, 2004; Martin & Pearson, 2005). In addition to sociopolitical changes, the United States is also experiencing major demographic changes.

Demographics and the Differences They Make

The demographic profile of the U.S. population is undergoing major changes. As of 2005, one in every three U.S. residents (98 million people) was part of a group other than single race non-Hispanic White. Between 2000 and 2006, the growth rate for Hispanics (24.3%) was three times that for the total U.S. population (6.1%); Hispanics accounted for 50% of the nation's population growth. Between 2004 and 2005, the Hispanic population in the United States increased by 3.3%. As of July 1, 2006, the 44.3 million Hispanics made up 14.8% of the U.S. population of 299 million. The African American and Hispanic populations are younger than both non-Hispanic Whites and the U.S. population as a whole, as shown in Figure 1. At the postsecondary level, the demographic composition of the student population is becoming more diverse in terms of both race and ethnicity. Despite significant increases in the proportions of the U.S. population that include African Americans and Hispanics, the U.S. S&E labor forces remain overwhelmingly non-Hispanic, White, and male (BEST, 2006; Leggon & Pearson, 2006). Although major discoveries have been made in the United States without diverse S&E labor forces, the question is, how long can relatively homogeneous S&E labor forces continue to engage in creative and innovative

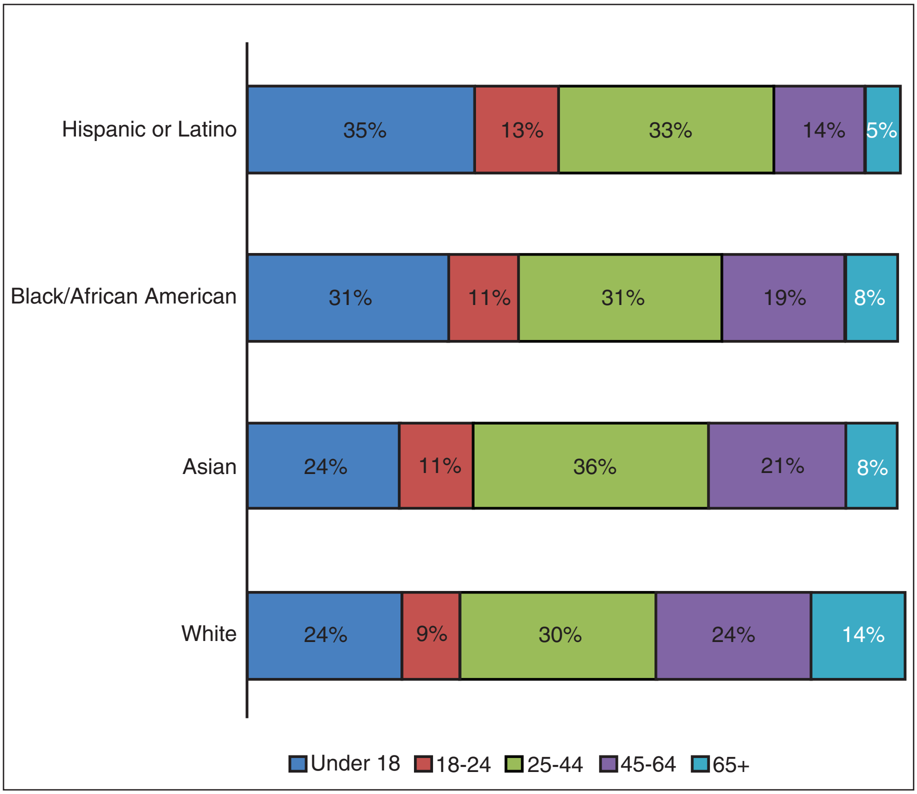


Figure 1. Percentage of population by age group, race, and Hispanic or Latino origin (any race), 2000
Source: U.S. Census Bureau Age 2000 Census Brief by Julie Meyer, C2KBR/01-12, Issued October 2001.

S&E in the context of significant demographic, socioeconomic, and political changes in the S&E-based global economy?

Racial/ethnic groups that are the fastest growing segments of the U.S. population—African Americans and Hispanics—are also the groups that are underrepresented in the S&E labor forces. The increasing racial/ethnic diversity among students is not reflected in S&E faculties. For example, in 2003, of all STEM faculties in universities and 4-year colleges, non-Hispanics made up 79% of all S&E faculties and 83% of tenured S&E faculties; African Americans made up 3.7% of S&E faculties and 3.2% of those tenured; and Hispanics made up 3.3% of S&E faculties and 2.8% of those tenured (SESTAT, 1999). The second major change is the aging of the professoriate in the United States. More than one third of full-time faculty in colleges and universities in the United States is 55 years of age or older. By 2018, between 40% and 60% of current faculty members will reach retirement age (Plater, 2008). The aging of the professoriate provides a demographic window of opportunity to increase diversity among S&E faculties. However, taking advantage of this demographic window of opportunity necessitates a critical review of the way that both the concepts and issues are framed.

Reconceptualizing Faculty Diversity

According to the Whorf-Sapir hypothesis, language not only enables people to express ideas, but it also influences the framing of those ideas (Whorf et al., 1998). This certainly applies to research, policy, and practices designed to diversify the S&E labor forces. Both the terminology used and the framing of issues concerning diversifying the S&E labor forces are fraught with problems, especially using acronyms and inappropriately aggregating categories.

Acronyms

The first problem concerns the use of acronyms: STEM and URM. In the United States, it has become customary to use the acronym STEM as shorthand for the fields of science, technology, engineering, and mathematics; similarly in Europe, the acronym SET is used to refer to the fields of science, engineering, and technology. A major advantage of using these acronyms is economy of expression in terms of discussing similarities among the fields. This alleged advantage is offset by a greater disadvantage: Using these acronyms obscures significant differences between the broad fields—S&E—as well as among fields within the S&E. Structural differences between and among these fields in terms of content and career paths necessitate that policies and programs to increase the racial and ethnic diversity among S&E faculties be developed so as to take field differences into account.

Just as the acronym STEM obscures noteworthy differences between and among S&E fields, so too does the acronym URM, which refers to people from racial and ethnic groups that are underrepresented in S&E, obscure differences between groups included in this category. Two racial/ethnic groups that are the fastest growing segments of the U.S. population—African Americans and Hispanics—are also two of the groups that are underrepresented in the S&E labor forces; other racial/ethnic minority groups underrepresented in S&E include Native Americans and Native Pacific Islanders.

Hispanic

Hispanic is used by the U.S. Census Bureau and the NSF to refer to people from Mexico, Puerto Rico, Cuba, the Dominican Republic, Central and South America, and other Latin nations. Mexican Americans make up the largest group followed by Puerto Ricans, as shown in Figure 2. Although it captures the notion of a shared common sociocultural origin, the category "Hispanic" is problematic because it veils significant socioeconomic, political, historical, and cultural differences among these groups. For

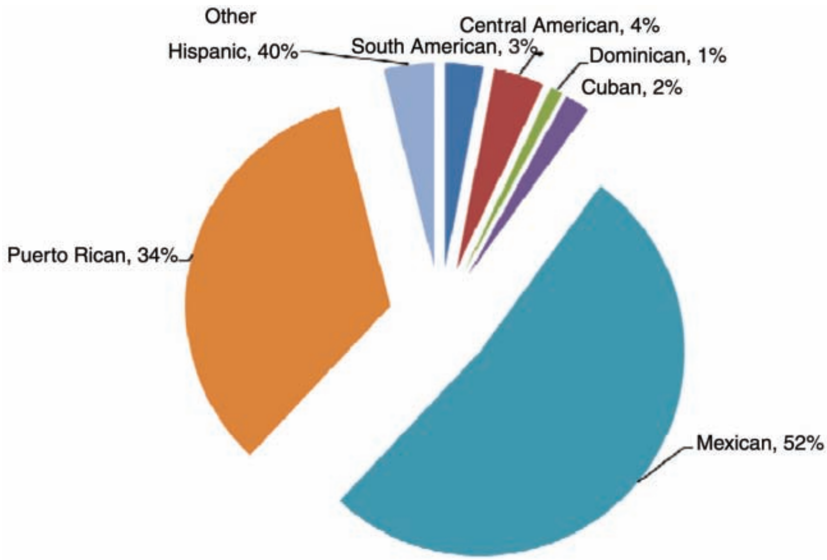


Figure 2. Hispanic origin by type, 2006
Source: U.S. Census Bureau, Current Population Survey, Annual Social and Economic Supplement, 2006, Ethnicity and Ancestry Statistics Branch, Population Division.

example, Americans of Cuban ancestry differ in terms of when they arrived in the United States: Earlier waves of immigrants from Cuba had more resources (such as education and money) than did later migrants; therefore, it is important to distinguish among waves of immigrants. In the same vein, one important factor affecting both education and career experiences for Puerto Ricans is whether they were educated on the island or on the mainland. Differences within racial and ethnic groups are important and must be taken into account in the development of policies and programs to increase faculty diversity. In sum, it is imperative to disaggregate data on all groups by citizenship status and to disaggregate Hispanics by national origin. Data from the 2006 Survey of Earned Doctorates do indeed disaggregate data by Hispanic subgroup and gender.

Inappropriate Aggregation

Assessing the extent to which subpopulations are participating in the S&E labor forces is hampered by the ways in which data are aggregated and/or categorized. Analyses of the demographic composition of the U.S. S&E labor forces must disaggregate data by citizenship.

From 1997 to 2006, the percentage increase in S&E doctorates awarded was 9.6%. However, disaggregating the data by citizenship status revealed that "the increase in awards to non-U.S. citizens was almost three times larger than to U.S. citizens" (SRS, 2006). Similarly, data that combine Asians, Native Americans, and Native Pacific Islanders into a single category obscure the severity of Native Americans' and Native Pacific Islanders' under participation in S&E careers. Although Asian Americans tend to be overrepresented among the S&E labor forces—that is, they make up greater percentages of the S&E labor forces than they do of the overall U.S. population—this trend appears to be changing at least for the men. It is especially important to disaggregate data for Asians by citizenship status. Between 1996 and 2006, there was a 20.1% increase in S&E research doctorates awarded to Asians. Disaggregating these data by citizenship status reveals that during this same 10-year period, there were percentage increases in S&E research doctorates awarded to Asians who were U.S. citizens and on temporary visas—27.1% and 4.9%, respectively (see Figure 3). However, there was a 68.4% decrease in S&E research doctorates awarded to Asians who are permanent U.S. residents (SED, 2006).

All too often, discussions of underrepresentation in the S&E workforce in the United States are framed in terms of two groups: women, and underrepresented racial/ethnic minorities. Framing issues of underrepresentation in this way is problematic on a host of levels. First, this framework suggests that the categories of gender and race are mutually exclusive. What about women from underrepresented racial and ethnic minority groups? In which category should they be placed? In theory, it is assumed that women from racial/ethnic "minority" groups should be included in both categories—"women" and "minorities." In practice, women from underrepresented racial and ethnic minority groups often tend to fall through the cracks: "Minority women tend to disappear among aggregates of all women or among all members of a particular ethnic group" (MacLachlan, 2001).

Data on S&E faculties must be disaggregated by race/ethnicity and gender. Specifically, race and ethnic data must be disaggregated by gender, and gender data must be disaggregated by race and ethnicity. Disaggregating gender by race and ethnicity should not create dichotomous categories, such as women and minority women or women and women of color. These dichotomies suggest that the term *women* refers to women who are non-Hispanic and White. Moreover, the terms *minority women* and *women of color* hide important racial/ethnic differences among women. The effects of the confluence of race/ethnicity and gender are greater than the sum of the effects of the individual components. In other words, the results from the intersection of race, ethnicity, and gender are not additive but synergistic: Race/ethnicity influences how gender is experienced, and gender influences how race/ethnicity is experienced. For that reason, race/ethnicity data must be disaggregated by gender, and gender data must be disaggregated by race and ethnicity.

Intra-Racial and Intra-Ethnic Comparisons

Among African Americans, Mexican Americans, Puerto Ricans, Native Americans, and Native Pacific Islanders, both men and women are severely underrepresented

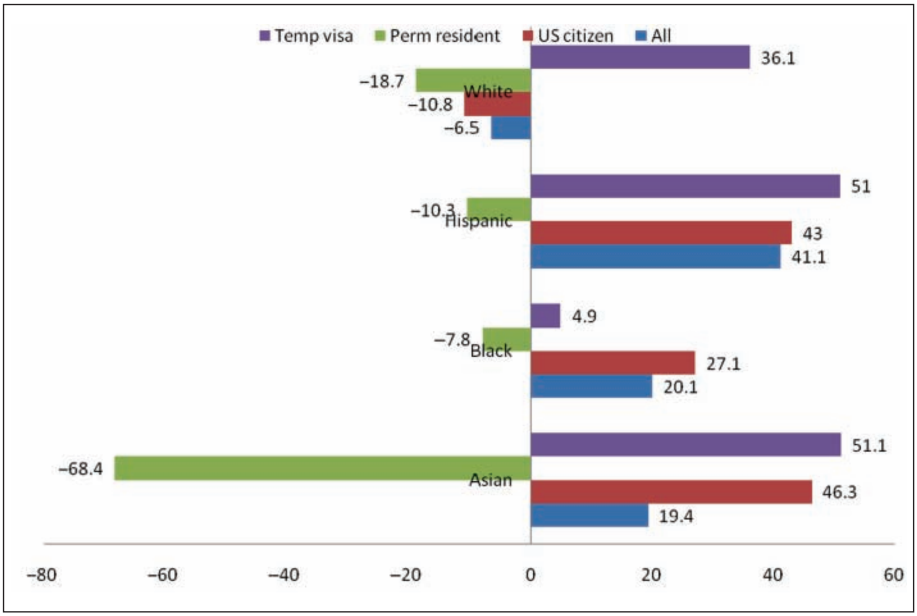


Figure 3. Percentage changes in S&E research doctorates' citizenship status, 1996-2006
Source: SED (2006).

among tenured faculty at research universities in the United States. Despite this similarity, there are gender differences within these groups in terms of the following:

- Field distribution of earned PhDs
- Degree trends in earning the doctorate
- Representation on faculties

African Americans, Mexican Americans, Puerto Ricans, Native Americans, and Native Pacific Islanders—men as well as women—are severely underrepresented among tenured faculty in general, and tenured S&E faculty in particular at research universities; among non-Hispanic Whites, women—but not men—are underrepresented among tenured faculty at research universities. Despite earning PhDs at higher rates than their male counterparts, African American women still make up less than one half of African American faculty. During the 1990s, among African Americans and Hispanics, women were responsible for the increases in the numbers of doctoral degrees earned by African Americans and Hispanics. Nevertheless, African American and Hispanic men still hold the majority of faculty positions (Harvey, 2003). Regardless of race or ethnicity, there is an inverse correlation between rank and the numbers of women in that rank in general, and in S&E in particular, as shown in Figure 4.

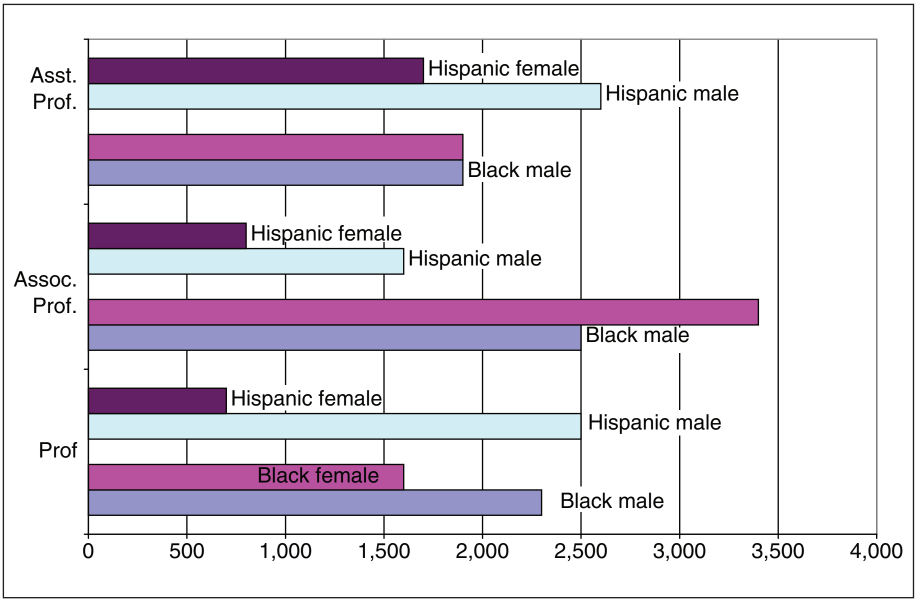
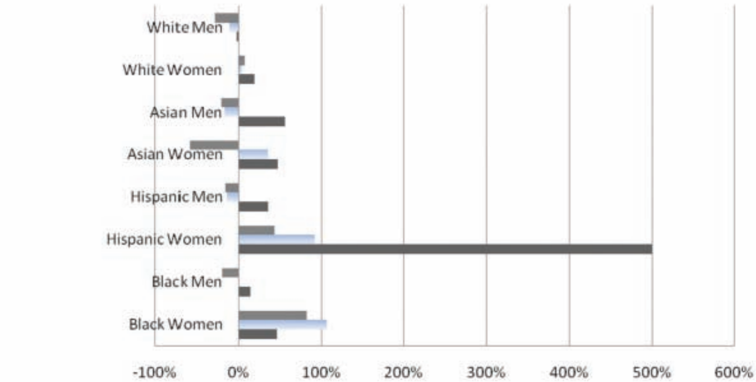


Figure 4. Black and Hispanic S&E doctorate holders employed in 4-year colleges and universities by gender and rank, 2003
Source: NSF/SRS SESTAT.

Intra-Gender Comparisons

Disaggregating gender data reveals racial/ethnic differences in percentages of S&E doctorate degrees earned by broad field. For example, between 1995 and 2004, the percentage of S&E doctorate degrees earned by Black women and Hispanic women increased in the biological sciences, physical sciences, and engineering. Between 1995 and 2004, the percentages of doctorate degrees earned by non-Hispanic White women increased in the biological sciences but decreased in both the physical sciences and engineering, as shown in Figure 5. Regardless of the institutional category—doctoral, master's, baccalaureate, associate—women make up a greater portion of part-time faculty than men but a smaller portion of full-time faculty. Moreover, there is an inverse correlation between the ranking of an institution (or department) and the proportion of women faculty. The higher the ranking, the smaller the percentage of female faculty. In fields where women tend to be extremely underrepresented—engineering, computer science, and physics—the representation of women from underrepresented racial/ethnic minority groups relative to that of their male peers exceeds that of non-Hispanic White women.

In sum, data that are not disaggregated by race/ethnicity as well as gender tend to both reflect and reinforce the inaccurate dichotomous conceptualization of diversity—or lack



	Black Women	Black Men	Hispanic Women	Hispanic Men	Asian Women	Asian Men	White Women	White Men
Engineering	82%	-20%	43%	-16%	-59%	-21%	7%	-29%
Physical Sciences	107%		92%	-14%	36%	-17%	4%	-11%
Biological Sciences	46%	14%	500%	36%	47%	56%	19%	-2%

Figure 5. Changes in the percentages of research doctorates earned by broad field, gender, race, and ethnicity, 1997-2006
Source: Survey of Earned Doctorates.

thereof—in the S&E labor forces. Because language both enables the expression of ideas and shapes those ideas, using the concepts STEM, URM, and Hispanic and dichotomizing issues of underrepresentation in S&E fields both reflect and reinforce conceptualizations that are problematic at best and inaccurate at worst.

Reframing Diversity in the Professoriate: What Can Be Done?

Data Collection

Three major sources of data on U.S. faculty are the Survey of Earned Doctorates, the Survey of Doctorate Recipients, and the Doctorate Records File.

Survey of Earned Doctorates (SED). Beginning in 1957-1958, the SED has collected data continuously on the number and demographic characteristics of people earning research doctoral degrees from all accredited U.S. universities (see www.nsf.gov). From 1957-1958 to 1997, the SED was conducted by the National Research Council; since 1997, the National Opinion Research Center (NORC) has conducted the SED. All U.S. graduate schools must provide the survey to their graduates and submit completed surveys to the survey contractor. In addition to the hard copy survey, there is a

Web SED option. Because the survey is a census and graduate schools "collect the questionnaires from degree recipients at the time of doctoral completion, the universe for doctoral recipients is quite complete" (see www.nsf.gov).

Survey of Doctorate Recipients (SDR). Unlike the SED (which is a census), the SDR is a sample selected from the Doctorate Records File (DRF). Cumulative data from the SED are stored in the DRF (Kannankutty, 2007). The DRF, a record of all research doctorate recipients from U.S. universities since 1920, is updated annually based on data collected from the SED. The SDR is a survey of 40,000 S&E doctorate recipients who earned their degrees from U.S. institutions. The SDR follows this sample as they enter the U.S. workforce and through their careers until they reach age 75 (Kannankutty, 2007). Both the SDR and SED are conducted by NORC for the NSF and the National Institutes of Health. In addition, the SED is conducted for the U.S. Department of Education, National Endowment for the Humanities, U.S. Department of Agriculture, and the National Aeronautics and Space Administration. The SDR used a mixed-mode data collection protocol consisting of a traditional paper questionnaire, computer assisted telephone interviews (CATI), and Web-based data collection instruments. SDR data are incorporated into the NSF's Scientists and Engineers Statistical Data System (SESTAT) (NORC at the University of Chicago Web site: http://www.norc.org/projects).

SESTAT is an integrated data collection of information about demographic, educational, and employment characteristics of scientists and engineers in the United States (see www.nsf.gov). These data come from three national surveys: the National Survey of College Graduates, the National Survey of Recent College Graduates, and the Survey of Doctorate Recipients. SESTAT was created in response to recommendations from the National Research Council to NSF on how to increase both the quality and usefulness of NSF surveys on scientists and engineers (SESTAT, 1999). The S&E Equal Opportunities Act (Public Law 96-516) enhanced the NSF's mandate to "ensure that obtaining information on women, minority group members and persons with disabilities in the S&E workforce were important considerations in data collection and analysis" (Kannankutty, 2007, p. 6). Beginning in 1994, racial/ethnic data separated by gender were requested for the first time. The Asian/Pacific Islander category from earlier surveys was divided into Asian American and Native Hawaiian/Pacific Islander categories.

The Division of Science Resources Statistics (SRS) fulfills the legislative mandate of the National Foundation Act to "provide a central clearinghouse for the collection, interpretation, and analysis of data on scientific and engineering resources" (see www.nsf.gov/statistics/about). Historically in the United States, data by race, gender, field of study, and institution were considered to be public information because those data were collected and reported by the National Center on Education Statistics in the U.S. Department of Education. In 2003, only the three largest demographic groups (U.S. White, non-U.S. White, and non-U.S. Asian) were stratified by the 15-category degree-field recode. All other demographic groups were stratified by a 7-category degree-field recode, except that American Indians and Native Hawaiians/other Pacific Islanders were stratified only by sex.

Failure to disaggregate data by race/ethnicity as well as gender precludes adopting the effective strategy of accurately targeting groups for policy and program purposes. "Statistics help identify problems and can monitor the effectiveness of remedies. . . . No statistics, no problem, no policy" (Otchet, 2007). Because one size does not fit all, MacLachlan (2006) argues for reshaping the discourse and the logic behind diversity in the academy. Reframing the issue of diversity among S&E faculties necessitates reconceptualizing diversity in terms of the intersection of race/ethnicity as well as gender. In addition, diversity among the professoriate must not be viewed in isolation but rather as part of a complex system: Increases in faculty diversity will affect other parts of the system. Increases in faculty diversity can increase student diversity, enrich education for all students, and enhance the S&E enterprise; lack of faculty diversity can have the opposite effects on education, the S&E enterprise, and global competitiveness.

Policies, Programs, and Practices

Identifying the "best" or "most promising" policies and practices to diversify S&E faculties can be helpful in discovering what works and how. In this regard, a caveat is in order: Policies and practices that seem effective in one institutional environment will not necessarily be effective in another institutional environment. Just as one size does not fit all, policies and practices that worked in one place do not necessarily work in another institutional setting. Identifying the "worst" policies and practices may be as informative and instructive as identifying the best or most promising policies and practices. Identifying both the best and worst policies and practices enhances understanding of what works and what does not work.

Policies and programs to diversify the professoriate must not only be research driven but also must be institutionalized, that is, be an integral part of the standard operating procedures of an institution and, as a consequence, one criterion on which the performance of faculty and administrators is evaluated. Similarly, funding organizations can require that one major award criterion is broad impact.

Evaluation of policies, programs, and practices to increase diversity in S&E faculties is absolutely necessary to identify what works well (and why) and what needs to work better (and how). Evaluations can provide real-time feedback to facilitate making any changes that are warranted. Moreover, evaluations can further enhance the research base. One critical component of these evaluations is longitudinal data, that is, data on careers over time. Such data not only enable the assessment of the duration of the effect of targeted policies and programs but also enhance understanding of S&E careers in academe. Diversifying S&E faculties requires targeted policies, programs, and practices that are data driven, institutionalized, and rigorously evaluated.

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Bio

Cheryl B. Leggon, PhD, was elected as a fellow of the American Association for the Advancement of Science (AAAS) in 2007 for her work on the intersection of race, ethnicity, and gender and careers in science and engineering. In 2006, she was elected to membership in Sigma Xi. She earned her PhD in sociology from the University of Chicago and her BA in sociology from Barnard College, Columbia University. From 1985 to 1993, she was a staff officer in the Office of Scientific and Engineering Personnel at the National Research Council, National Academy of Science. Before coming to Georgia Institute of Technology in 2002, she was an associate professor of sociology and director of women's studies at Wake Forest University. Her most recent publications include "Women in Science: Racial and Ethnic Differences and the Differences They Make," in *Journal of Technology Transfer* (2006), and "Assessing Programs to Improve Minority Participation in STEM: What We Know and What We Need to Know," in *Doctoral Education and the Faculty of the Future* (with Willie Pearson, Jr.) edited by Ronald Ehrenberg (2009).