

Underrepresented Minority Women in Engineering

Women are exceedingly underrepresented in the engineering field. Despite making up 51 percent of the total population, and 57 percent of the total undergraduate enrollment, they earned only 18 percent of the awarded engineering bachelor's degrees in 2010. They also made up only 14 percent of the engineering workforce in 2009, and 13 percent of engineering faculty¹.

While they remain underrepresented, the number and percentage of women earning engineering bachelor's degrees has steadily increased over time. In 1977, 4.51 percent of engineering bachelor's degrees were awarded to women; by 2011, that percentage rose to 18.77 percent, as seen in Figure 1. However, there has been minimal growth in the percentage of engineering bachelor's degrees awarded to underrepresented minority (URM – African American, Latino, and American Indian) women, rising from 0.31 percent in 1977 to 2.94 percent in 2011.

Figure 1: Percentage of Engineering B.S. Degrees Earned by Women, 1977-2011²

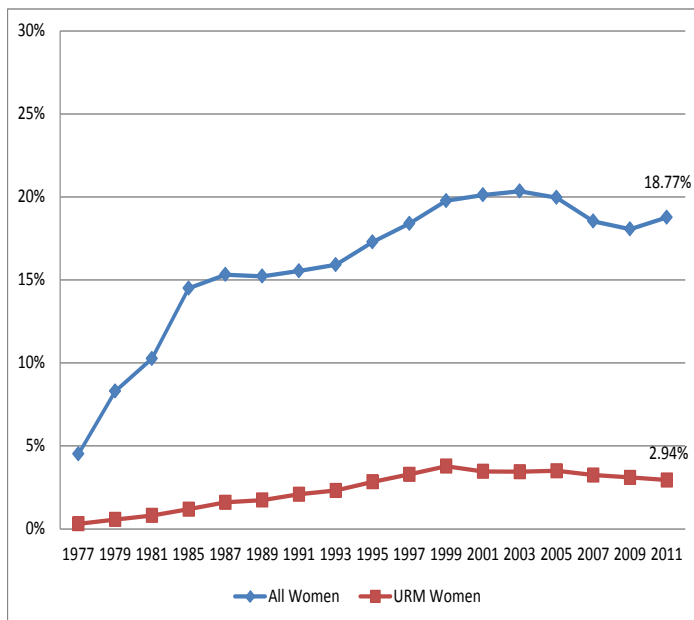
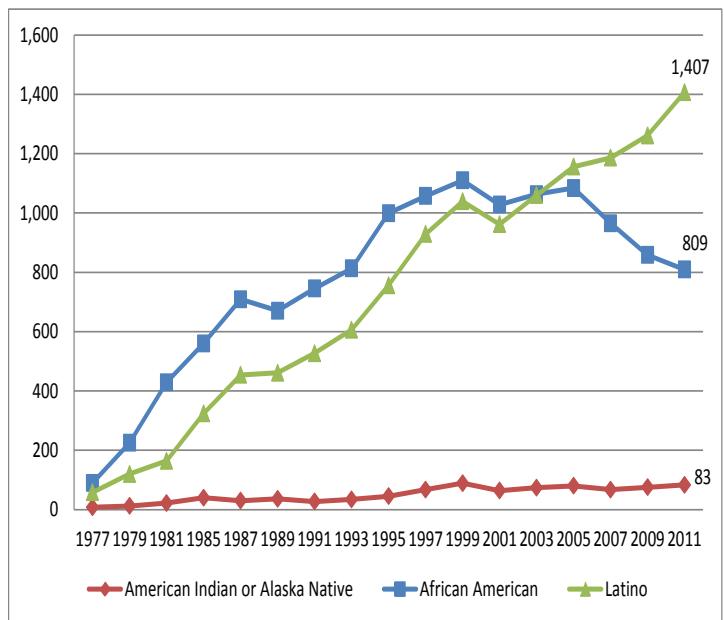


Figure 2: URM Female Engineering B.S. Degrees Awarded, 1977-2011²



In 1999, 3.78 percent of engineering bachelor's degrees were awarded to URM women, which represents the highest percentage in history. Figure 2 breaks down the number of engineering degrees awarded to each underrepresented group. The number of degrees awarded to African American women has steadily decreased over the past 14 years, going from 1,110 in 1999 to 809 in 2011. The number awarded to American Indian / Alaska Native women has remained stable, while the number awarded to Latinas has increased over time.

This small percentage of engineering bachelor's degrees being earned by URM women translates to the engineering workforce. Survey data integrated into the Scientists and Engineers Statistical Data System (SESTAT) is

weighted to represent the nearly 27 million people who have studied STEM or are working in the STEM workforce as of 2010. As seen in Table 1, this data shows that females represent only 12.77 percent of engineers, and URM females represent 1.76 percent of the engineering workforce. For science and engineering related occupations, females represent the majority, holding 56.03 percent of the jobs in this field. Despite this large number, underrepresented minority females only comprise 8.55 percent of this workforce.

Table 1: Engineering Occupations³

	Asian, non-Hispanic			White, non-Hispanic			Underrepresented Minorities			Total		
	Female	Male	Total	Female	Male	Total	Female	Male	Total	Female	Male	Total
	Weighted Count	Weighted Count	Weighted Count	Weighted Count	Weighted Count	Weighted Count	Weighted Count	Weighted Count	Weighted Count	Weighted Count	Weighted Count	Weighted Count
Engineers	47,476 3.03%	215,017 13.70%	262,493 16.73%	125,365 7.99%	997,971 63.61%	1,123,336 71.60%	27,544 1.76%	155,599 9.92%	183,143 11.67%	200,385 12.77%	1,368,587 87.23%	1,568,972
S&E Related Occupations	386,428 5.55%	401,880 5.78%	788,308 11.33%	2,917,027 41.93%	2,275,664 32.71%	5,192,691 74.64%	594,574 8.55%	380,987 5.48%	975,562 14.02%	3,898,029 56.03%	3,058,531 43.97%	6,956,560

Research has shown that Latinas and African American women have comparable persistence rates in engineering to Latinos and African American males⁴. Thus, it is evident that universities are having a difficult time recruiting a diverse body of women into their engineering programs.

Each year, the College Board releases a report that presents data on high school graduates who took the SAT. In 2012, nine percent (127,061) of test-takers stated that their intended college major was engineering. The average SAT math score among this group was 582. On average, females (M=499, SD=113) scored lower than males (M=532, SD=119) on the SAT math test. Further, data in Table 2 reveals that URM females score significantly lower than their peers on the SAT math test.

Table 2: Mean SAT Math Scores by Ethnicity⁵

Ethnicity	Female Mean	Male Mean
American Indian or Alaska Native	475	505
Asian, Asian American, or Pacific Islander	581	609
Black or African American	422	436
Mexican or Mexican American	450	484
Puerto Rican	439	468
Other Hispanic, Latino, or Latin American	445	481
White	520	554
Other	500	537
Total	499	532

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Policy Considerations

The percentage of URM women who graduate with an engineering bachelor's degree is remarkably low. This issue will not be resolved without action from several key stakeholders:

1. **K-12 Education.** The average SAT math scores seen in Table 2 suggest that an abundance of URM women are not properly prepared for an undergraduate STEM degree once they graduate from high school. Many programs have been developed that aim to increase the interest of K-12 girls in STEM. These initiatives must be evaluated and replicated if they prove effective.
2. **Higher Education.** Universities must invest in K-12 outreach programs that help develop students' interest in STEM and provide them with an introduction to their college curriculum. In addition, universities should provide mentorship to first-year STEM students, particularly for URM females, who are greatly outnumbered in this field.

Endnotes

¹ 2011 NACME Data Book: A Comprehensive Analysis of the "New" American Dilemma. http://www.nacme.org/NACME_D.aspx?pageid=205.
² NACME analysis of Integrated Postsecondary Education Data System (IPEDS) accessed via National Science Foundation's WebCASPAR database system, June 2013.
³ National Science Foundation, Division of Science Resources Statistics, Scientists and Engineers Statistical Data System (SESTAT).
⁴ Lord, S.M., Camacho, M.M., Layton, R.A., Long, R.A., Ohland, M.W., & Wasburn, M.H. (2009). Who's persisting in engineering? A comparative analysis of female and male Asian, Black, Hispanic, Native American, and White students. *Journal of Women and Minorities in Science and Engineering*, 15, 167-190.
⁵ College Board. (2012). 2012 College-Bound Seniors: Total group profile report. New York, NY: The College Board. <http://media.collegeboard.com/digitalServices/pdf/research/TotalGroup-2012.pdf>.