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National Action Council on Minorities in Engineering, Inc.

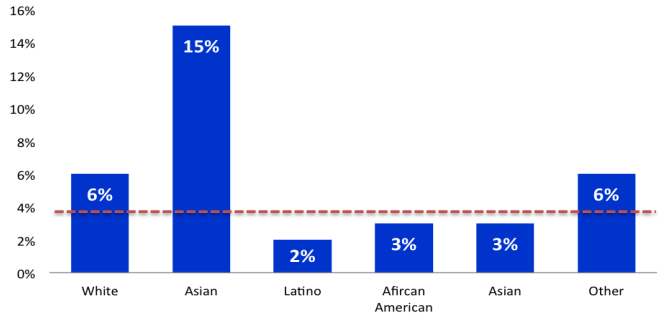
Critical Issues in Engineering Education Policy

INTRODUCTION

America's global competitiveness depends upon our ability to train the next generation of scientists, technologists, engineers, and mathematicians (STEM). Business and policy leaders are "rightly concerned that without a robust STEM workforce, we will become less competitive in a global economy."[1]

The ability of the United States to meet the STEM challenge will require significant measures on several levels, especially in pushing individuals who are underrepresented in STEM fields, such as women, minorities, and those from low-income backgrounds, to higher education STEM fields.

Figure 1. Share of STEM Jobs by Race/Ethnicity, 2009

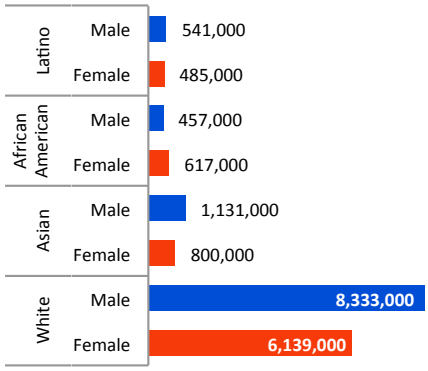


Source: U.S. Department of Commerce "Education Supports Racial and Ethnic Equality in STEM" ESA Issue Brief #05-11, Sept. 2011.

Even though women represent approximately 57 percent of the U.S. population and 52 percent of the workforce, they represent only 24 percent of the STEM workforce (2009). Data are more stark for underrepresented minorities. Of all workers, 6 percent of white workers and 15 percent of Asian workers are currently working in STEM-related jobs (Figure 1). Comparatively, only 2 percent of Latinos and 3 percent of African Americans work in STEM fields.[2] Figure 2 showcases the variation by employment of scientists and engineers by race and gender. As illustrated, not only are there large discrepencies by race, but also by gender within race. African American males, in particular, fall short in the STEM job market.

Former Lockheed Martin CEO Norman Augustine argues that 70 percent of our engineers with Ph.D.s are foreign born and that many others return to their home countries instead of staying in the U.S.[3] The U.S. Department of Commerce recently stated that STEM workers are "essential to American innovation and competitiveness in an increasingly dynamic and global marketplace."[4]

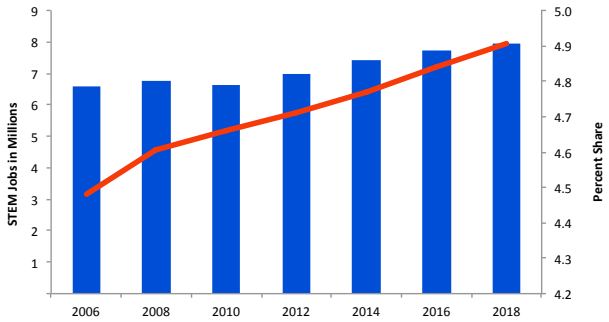
Figure 2. Demographic Characteristics of Employed Scientists and Engineers by Race/Gender 2006



Source: National Science Foundation, http://www.nsf.gov/statistics/wmpd/tables.cfm, Table 9-37.

The Georgetown Center on Education and the Workforce recently calculated that STEM occupations will grow by 17 percent between 2008 and 2018, compared to 10 percent of total jobs in the economy. The share of STEM jobs in the workforce will grow from 4.4 to 4.9 percent during that time period (Figure 3).[5] Almost two-thirds of these jobs will require a bachelors degree or higher.

Figure 3. Share of STEM Jobs in the Economy, 2018



SOURCE: Georgetown University Center on Education and the Workforce forecast of occupational growth, 2018.

THE STEM PATHWAY

The workforce reality illustrated above does not occur in a vacuum. It is the result of a systemic process which keeps students from preparing, accessing, and succeeding in STEM course work, certificate and degree programs, and, ultimately, careers.

The **National Action Council for Minorities in Engineering, Inc. (NACME)** was founded in 1974 to ensure American competitiveness in a flat world by leading and supporting the national effort to expand U.S. capability through increasing the number of successful African American, American Indian, and Latino women and men in science, technology, engineering and mathematics (STEM) education and careers. NACME Alumni hold leadership positions in industry, medicine, law, education and government. With funding from corporate and individual donors, NACME has supported over 24,000 students with more than $124 million in scholarships and other support. Currently NACME provides scholarship support to more than 1,300 college engineering students through a national network of 50 partner universities. NACME's STEM education strategy incorporates a continuum of programs and activities from middle school through workforce entry. Visit us at **www.nacme.org**.

Data from the National Assessment of Education Progress (NAEP) tell us the following (Figure 4):

- While 52 percent of fourth grade white students are proficient or above in mathematics on the NAEP assessment, only 17 percent of African American students, 24 percent of Latino students, and 22 percent of American Indian students are similarly proficient.
- By the eighth grade, proficiency has dropped for all students. Only 44 percent of white students are proficient or above, compared to 14 percent of African American, 21 percent of Latino, and 17 percent of American Indian students.

Figure 4. NAEP Mathematics Achievement Levels by Race/Ethnicity and Profiency Level, 2011

	Below Basic			At or Above Proficient		
	4th	8th	Δ	4th	8th	Δ
White	9	16	7	52	44	-8
African American	34	49	15	17	14	-3
Latino	28	39	11	24	21	-3
Asian	9	14	5	62	55	-7
American Indian	34	45	11	22	17	-5

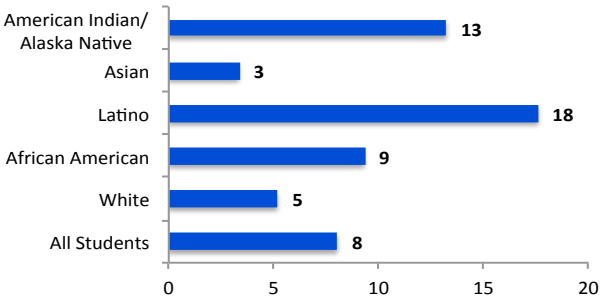
SOURCE: Mathematics 2011: NationaL Assessment of Educational Progress at Grades 4 and 8. US Department of Education. NCES 2012-458.

Exascerbating the problem is the high school dropout rates for underrepresented minorities, as illustrated below (Figure 5):

- Eighteen percent of Latinos, 13 percent of American Indians, and 8 percent of African American students between the ages of 16- and 24-years-old held dropout status in 2009, compared to 5 percent of white students.
- For underrepresented minorities, between 9 and 18 percent of students have withdrawn from the education path all together.

Inequity in college access and completion, especially in STEM-related areas, seriously impedes US competiveness. Large inequities

Figure 5. Percentage of 16- to 24-year-olds who were High School Drop-Outs, by Race/Ethnicity, 2009

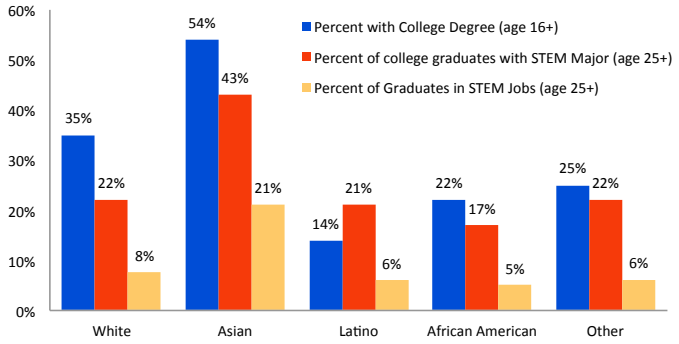


SOURCE: National Center for Educational Statistics "The Condition of Education" http://nces.ed.gov/programs/coe/indicator_sde.asp.

in college graduates are illustrated in Figure 6:

- Twenty-two percent of African American students and 14 percent of Latino students aged 16 and above earned a college degree, compared to 35 percent for whites and 54 percent for Asians.
- Of all college graduates, only 1-in-5 hold a degree in a STEM area, and less than 8 percent work in a STEM-related field.

Figure 6. Factors Affecting Likelihood of Having STEM Job by Race/Ethnicity, 2009



SOURCE: U.S. Department of Commerce "Education Supports Racial and Ethnic Equality in STEM" ESA Issue Brief #05-11, Sept. 2011.

POLICY CONSIDERATIONS

To increase America's global competitiveness, it is essential that federal and state policies provide opportunities for underrepresented minorities and others who have not traditionally prepared for nor entered the STEM arena. To do so, we encourage policymakers, educators, and business and industry leaders to pursue the following policies and practices:

1. **K-12 EDUCATION.** Infuse STEM education throughout the K-12 curriculum via active, hands-on, project-based learning, and introduce students to STEM careers, starting with pre-school with awareness activities.
2. **HIGHER EDUCATION.** Remove systemic barriers to underrepresented minorities' participation in college by addressing financial aid and admissions policies.
3. **GOVERNMENT.** Develop a national STEM workforce development policy that stretches from pre-school to Ph.D. level.
4. **BUSINESS.** Form partnerships with K-12 schools to promote STEM careers and education to underrepresented minority students, including providing STEM employees to serve as role models and mentors, offering onsite internships to students and teachers, and providing access to the latest equipment and software.

SOURCE: NACME Publication: Confronting the New American Dilemma." (www.nacme.org/user/docs/NACME%2008%20ResearchReport.pdf).

ENDNOTES

1 Georgetown Center on Education and the Workforce (http://www9.georgetown.edu/grad/gppi/hpi/cew/pdfs/stem-complete.pdf, p. 41).
2 http://www.esa.doc.gov/sites/default/files/reports/documents/educationsupportsracialandethnicequalityinstem_0.pdf.
3 http://www.forbes.com/sites/ieeeinsights/2011/10/26/engineers-public-perception-matters/.
4 http://www.esa.doc.gov/Reports/education-supports-racial-and-ethnic-equality-stem
5 Georgetown Center on Education and the Workforce (http://www9.georgetown.edu/grad/gppi/hpi/cew/pdfs/stem-complete.pdf.)