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STEM URGENCY:

SCIENCE, TECHNOLOGY, ENGINEERING AND MATHEMATICS EDUCATION IN AN INCREASINGLY UNEQUAL AND COMPETITIVE WORLD

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FOREWORD

The technology sector in the United States continued to thrive during the Great Recession. The increasing need for high-tech workers shielded the industry from the unemployment woes faced by the rest of the country. In fact, the number of workers needed by the technology industry far outpaces the number of Americans with the skills for these available jobs.

Meanwhile, many American public school students fail to graduate from high school on time. University-level graduation rates still trail many other industrialized nations, and the U.S. ranks 47th worldwide in math and science education. African Americans and Hispanic Americans, in particular, are ill-prepared for jobs in the technology sector – a particularly disconcerting prospect given the United States' changing demographics.

In *STEM Urgency: Science, Technology, Engineering and Mathematics Education in an Increasingly Unequal and Competitive World*, the Joint Center for Political and Economic Studies explores the gaps in science, technology, engineering and mathematics (STEM) education among African American and Hispanic students. We discover that those most affected by the economic recession are those who are also not being prepared for jobs in science and technology, arguing that better STEM education can guide African American and Hispanic students to higher education and employment in a rapidly-growing industry.

We hope the data in *STEM Urgency* provides an enlightening look at the disparities in STEM education in the United States and how Americans of color can greatly benefit from preparation for careers in technology.

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EXECUTIVE SUMMARY

The American economy has suffered in recent years from the Great Recession and a tepid economic recovery in its aftermath. While there is no single solution to returning the economy to a path of sustained growth, the technology sector is bound to be part of it. The technology sector suffered fewer job losses during the recession and has performed better than the rest of the economy in the past several years. Still, the technology sector faces its own challenges, as it often experiences a shortage of skilled technical workers to create new products and maintain or improve established lines of business.

There are two ways to attack the problem of the supply of skilled technical workers. One is to lower structural barriers hampering the ability of employers to retain necessary talent from overseas. This is a short-term fix, and the technology industry has used H-1B visas in recent years to address shortages by recruiting workers from overseas – mainly Asian countries. The second approach is to increase the domestic supply of workers suitable for technical employment in the technology industry. A means to that end is education; specifically, encouraging more students to study, and graduate with degrees in, science and engineering (S&E) and science and engineering-related (S&E-related) fields that will prepare them for science, technology, engineering and math (STEM) occupations.

This report focuses on the second approach. The goal is to document the gap between participation rates for African Americans and Hispanics and groups with higher rates, such as whites and Asian Americans, both in school and in the workforce. The report also puts the STEM issue in the broader context of trends suggesting an increase in economic inequality in recent years. Here we conclude that an increase in STEM employment opportunities has the potential to help reverse that trend.

Among the key findings in this report are:

- 17% of employed African Americans over the age of 25 have a college degree in a STEM-related field.
- 21% of employed Hispanics over the age of 25 have a college degree in a STEM-related field.
- 22% of employed whites over the age of 25 have a college degree in a STEM-related field.
- 43% of employed Asian Americans over the age of 25 have a college degree in a STEM-related field.

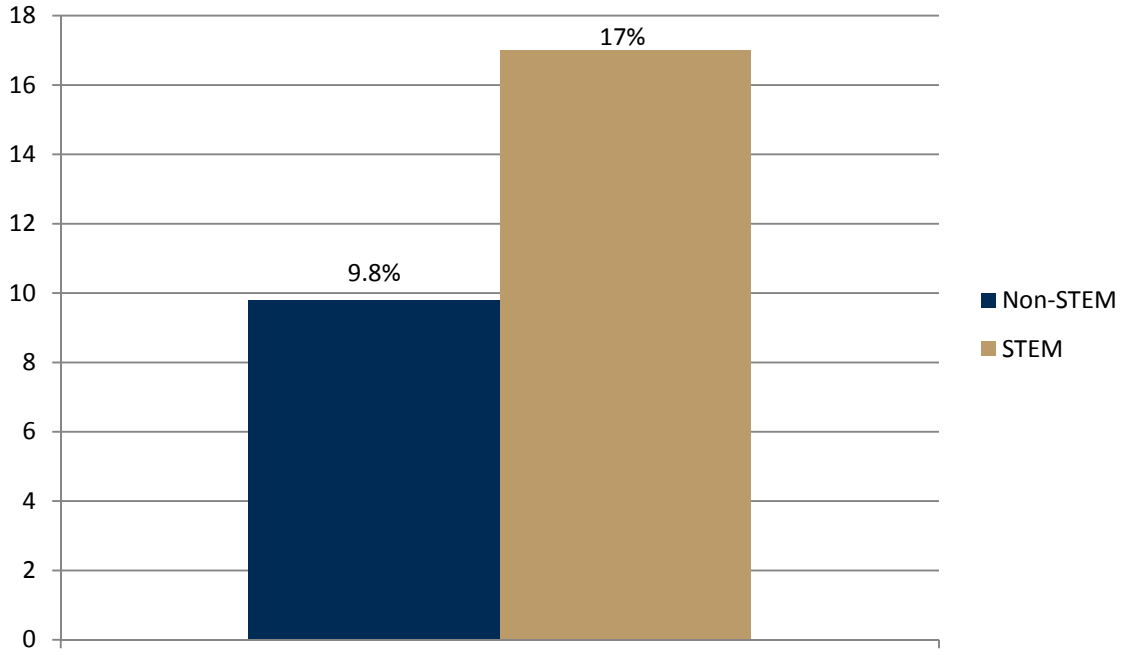
Closing the gap in college graduation rates for African Americans and Hispanics could add a significant number of people to the workforce able to do jobs that require advanced skills and are in high-growth areas of the economy. We estimate that closing the college achievement gap for African Americans and Hispanics could add as many as 140,000 new graduates in these fields, annually. That figure is derived from the fact that African Americans and Hispanics are under-represented in higher education generally and that, once they are there, graduate with degrees in S&E and S&E-related fields at a far lower rate than their white and Asian American counterparts. Specifically, based on 2009 participation rates:

- Increasing the number of African American and Hispanic college graduates in S&E fields to their overall proportion in the U.S. population would result in more than 60,000 new STEM graduates annually.
- Increasing the proportion of African American and Hispanic college graduates with S&E degrees to the rate attained by Asians alone would result in more than 48,000 new STEM graduates annually.
- Doing both – increasing the graduation rates of African Americans and Hispanics in S&E programs to their share of the population and to reflect that of Asians – would increase the number of STEM-prepared graduates to more than 140,000.

Increasing the number STEM-prepared college graduates will take collaboration between the public and private sectors, as well as investment. Business leaders clearly understand the need. A 2012 survey found that 66% of executives say education should be a very important priority for the United States, with education ranking among the very top of measures, such as tax reform or R&D investments, that respondents felt could improve American economic competitiveness. Strong majorities of executives said that college graduates need to improve their STEM-related skills to be more effective in the workforce.[1]

In addition to understanding the urgency of the problem, funding will also be part of the solution. Even in a time of tight government budgets, investments to increase the number of minority graduates prepared for STEM occupations will have payoffs for the U.S. economy. This report did not undertake the analysis to support recommendations for specific funding levels or investment approaches. However, the size of the gap the report has identified underscores the need for the development of a national strategy to invest in S&E and S&E-related education for communities of color.

FIGURE 1: PROJECTED JOB GROWTH IN STEM AND NON-STEM EMPLOYMENT (2008-2018)



Sources: Economics and Statistics Administration, *Good Jobs Now and for the Future*, 1 (Washington, D.C.: U.S. Department of Commerce, 2011); Bureau of Labor Statistics, *Science, technology, engineering, and mathematics (STEM) occupations: a visual essay* (Washington, D.C.: U.S. Department of Labor, 2011).[6]

I. THE OPPORTUNITY

Despite the economic challenges the United States faces, the technology sector has been a bright spot in the American economy. Over the past decade, the technology sector has outperformed other sectors in terms of job growth, low unemployment and wages. According to some reports, employment growth in the high-tech sector has outpaced that of other sectors by a ratio of three-to-one since 2004.[2] From the post-World War II era through 2009, the S&E workforce has grown from 182,000 in 1950 to 5.4 million.[3] Currently at 3.3%, the unemployment rate in computer and mathematics fields alone[4] is also far lower than the overall unemployment rate of 6.7%.[5]

This trend is expected to continue, as it is in all fields most dependent on STEM-prepared workers. Through 2018, job growth in these sectors is expected to outpace job growth in fields less dependent on STEM-prepared workers. While the latter set of jobs is expected to grow at a rate of 9.8% through the next five years, the jobs most dependent on STEM workers are expected to grow at a rate of 17% during the same period.[6]

DEFINING STEM

Unless otherwise indicated in this report, while there is no standard definition of "STEM," the Joint Center adopts the National Science Foundation's (NSF) definition of STEM as a set of *occupation*s which include the narrower sets of "S&E" and some "S&E-related" occupations.[7] NSF notes, "… [T]he narrow classification of S&E occupations is sometimes expanded to include S&E technicians, computer programmers, and S&E managers. This broader grouping is referred to here as STEM occupations."[8] As such, STEM comprises all occupations in which workers apply expertise and knowledge taught in all S&E degree fields; namely, biological, agricultural and environmental life sciences; computer and mathematical sciences; physical sciences; social sciences and engineering.[9]

However, STEM occupations also include some S&E-related occupations. The degree fields considered by the NSF as prerequisite for S&E-related occupations include health fields, science and math teacher education, technology and technical fields, architecture and actuarial science.[10] Accordingly, for the purposes of this report, in addition to occupations in which workers apply S&E skills, such as those listed above, STEM occupations also include science and engineering management, science and math education, architecture, science and engineering technician work and computer programming jobs in which workers apply S&E-related skills.

It should be noted that this report also cites U.S. Department of Commerce data. The Department of Commerce refers to STEM more interchangeably than NSF and, unlike NSF, groups both degree fields and occupations together in its definition of STEM. Further, the set of degree fields and occupations the U.S. Department of Commerce includes in its definition of STEM is slightly more expansive than that of the NSF report.[11]

This report also includes data from a 2011 Georgetown University study entitled *STEM: Science, Technology, Engineering, Mathematics*.[12] The Georgetown University definition of STEM differs further still from the NSF and U.S. Department of Commerce definitions, most notably in that it includes STEM workers at the sub-baccalaureate level and excludes social scientists.[13]

The issue of closing achievement gaps in degree fields that lead to STEM careers also increasingly plays a role in jobs throughout the economy, not just those strictly defined as S&E or S&E-related. For example, of the 19.2 million scientists and engineers employed in the United States in 2008, fully 22% were employed in non-S&E occupations.[14] Thirty-six percent of S&E Bachelor's degree holders work in occupations not related to S&E.[15] A recent Georgetown University study also shows STEM-prepared workers dispersed throughout the economy.[16]

Additionally, computer occupations (a subset of all of the STEM occupations referenced in Table 1) alone are already well-represented throughout many different industries, with 9% in Information Services, 12% in Financial Services, 36% in Professional and Business Services, 7% in Government and Public Education Services and 12% in Manufacturing.[17]

TABLE 1: ALL STEM EMPLOYMENT COMPOSITION OF KEY INDUSTRIES

Industry	STEM Composition
Natural Resources and Mining	4%
Construction	2%
Manufacturing	19%
Wholesale and Retail Trade	3%
Transportation and Utility Services	3%
Information Services	3%
Financial Services	9%
Professional and Business Services	37%
Private Education Services	4%
Healthcare Services	3%
Leisure and Hospitality	1%
Personal Services	1%
Government and Public Education Services	13%

Source: Carnevale, Anthony P., Nicole Smith, Michelle Melton, *STEM: Science, Technology, Engineering, Mathematics* (Washington, DC: Georgetown University Center on Education and the Workforce, October 2011).

II. THE GAP

African Americans and Hispanics are underrepresented in STEM occupations, and what participation they do have in STEM is largely concentrated in the social sciences. Currently, whites hold 75% of S&E degrees and 72% of S&E occupations in the U.S.[18] White STEM workers are highly concentrated in macrophysical systems occupations such as "forestry and conservation scientists (91%); earth, atmospheric, and ocean scientists (86%); and agricultural and food scientists (82%)."[19] Asian Americans – the largest minority among STEM workers – hold 11% of S&E degrees, 17% of S&E occupations, and are highly concentrated in computer engineering fields comprising "40% of computer hardware engineers, 30% of computer software engineers, and 23% of the related occupations of electrical and electronics engineering."[20] American Indian/Alaska Natives, blacks, Hispanics, and Native Hawaiians/Pacific Islanders together comprise 9.5% of STEM workers.[21] In the social sciences, however, scientists and engineers who are American Indian/Alaska natives, blacks, Hispanics, and Native Hawaiians/Pacific Islanders outnumber Asian Americans and together comprise "17% of sociologists and anthropologists, and 12% of psychologists" alone.[22] NSF also notes that these minorities outnumber Asian Americans as computer support specialists and statisticians at a rate of 16% and 14%, respectively.[23]

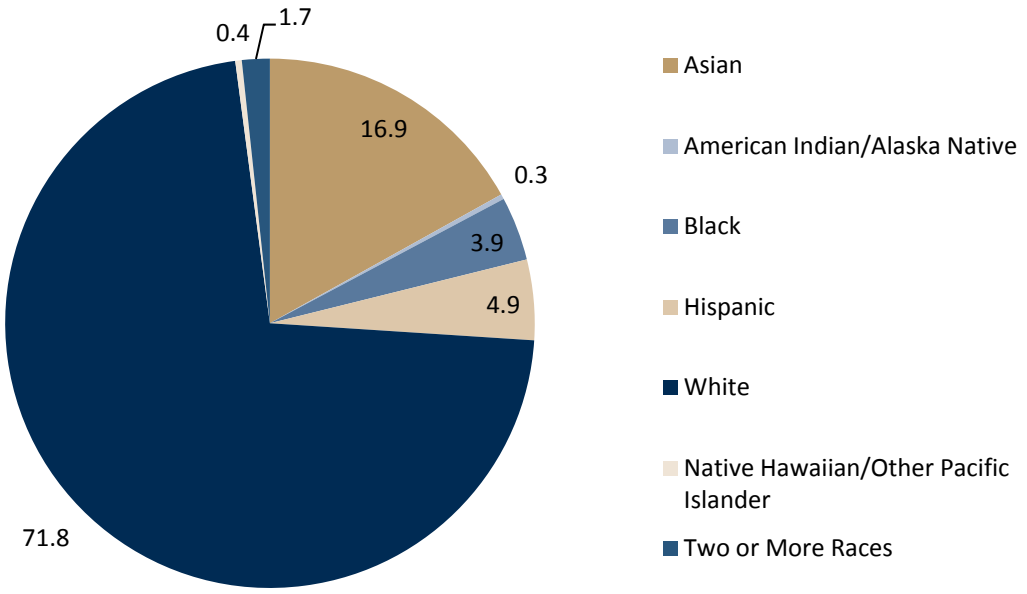
Closing these gaps should be a national priority. Increasing the proportion of 2010 black and Hispanic college graduates who earned Bachelor's degrees in S&E to 46% – the rate at which Asian American students earned Bachelor's degrees in S&E in 2010 – would have increased the number of 2010 S&E graduates by more than 48,000.[24] If the number of blacks and Hispanics who earned Bachelor's degrees in 2010 reflected their current proportion of the total U.S. population, more than 61,000 additional new STEM grads would have entered the workforce or graduate education.[25] If the number of blacks and Hispanics who earned Bachelor's degrees in 2010 reflected their current proportion of the total U.S. population *and* the proportion of black and Hispanic college graduates who earned S&E Bachelor's degrees reflected the proportion of Asian American students who earned S&E Bachelor's degrees in 2010 (46%), more than 140,000 additional new S&E grads would have entered the workforce or graduate education in 2010 alone.[26]

Despite the potential for technology and a STEM-prepared workforce to fuel economic growth across industries, the United States remains at a severe disadvantage compared to competitor nations when it comes to educational attainment overall and specifically to STEM preparedness. Some 30 years ago, the Reagan-era Department of Education released a report entitled *Nation at Risk: The Imperative for Educational Reform*. The assessment was a clarion call for policymakers to either make drastic changes in American education or risk forfeiting America's continued "preeminence in commerce, industry, science and technological innovation."[27] At the time, the report's writers found, educational standards were declining, with nearly one quarter of colleges having lower selectivity standards than they had previously.[28] Students were earning the same amount of high school credits for cooking courses as they were for science and mathematics courses.[29] Meanwhile, students in other Western (i.e. "industrialized") nations were spending three times the amount of time learning STEM-related material, such as advanced mathematics and science courses.[30]

Not much has changed. Currently, nearly one quarter (24.5%) of public high school students fail to graduate on time – this is a mere 1.8 percentage point improvement since the 1990-91 academic year.[31] Further, while the first-time university-level graduation rate among young people ages 25-34 in the U.S. has increased since 1995, it still trails the OECD average and 13 other OECD countries.[32] In 1995, 20% of young people graduated from university-level education in OECD nations.[33] This rate was up to 39% in 2010.[34] In 1995, the U.S. had a 13-point lead over the OECD average college graduation rate; by 2011, the U.S. was trailing the average by .14 of one percentage point.[35]

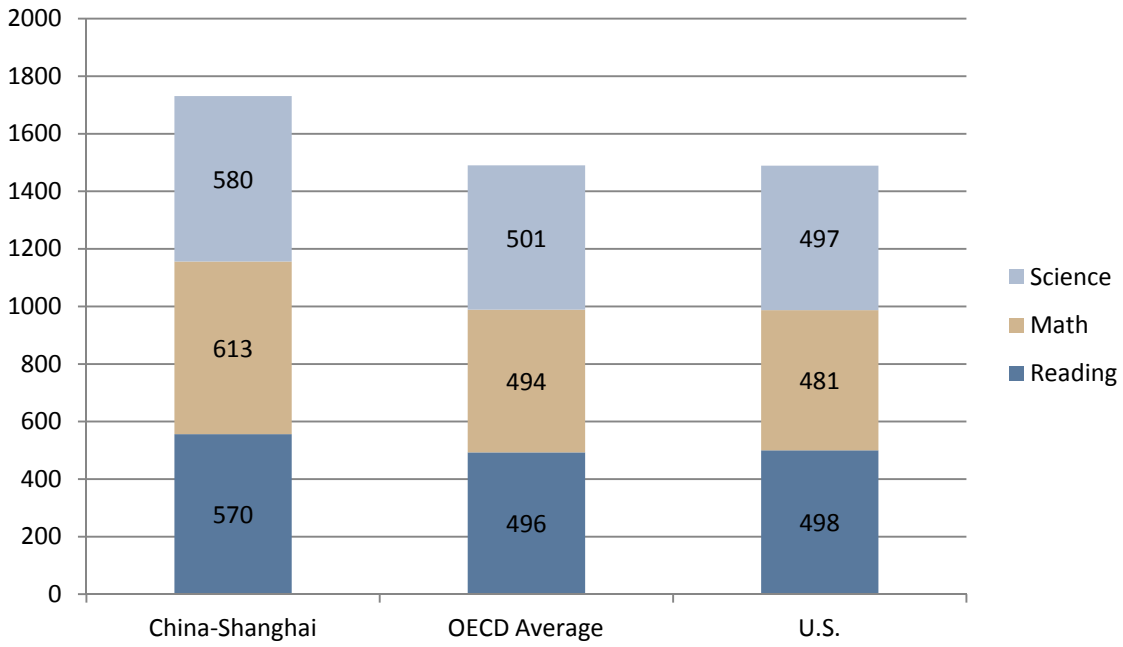
The U.S. also trails other nations in STEM education. The World Economic Forum ranks the U.S. 47th worldwide in the quality of its math and science education.[36] In addition, American 15-year-olds ranked 17th in reading, 26th in math, and 21st in science, with an average score of 498, 481 and 497, respectively, according to the Programme for International Student Assessment (PISA).[37] On the other hand, Shanghai-China ranked first in all three categories, with an average score of 570, 613 and 580.[38] This compares to an OECD average of 496 in reading, 494 in math and 501 in science.[39] The National Assessment of Educational Progress ("NAEP") found less than a third of American eighth grade students are proficient in math and science.[40] These trends indicate the country is continuing to sidestep the challenge of preparing its workforce for the increasingly competitive global economy.

FIGURE 2: RACIAL/ETHNIC COMPOSITION OF ALL SCIENCE AND ENGINEERING OCCUPATIONS



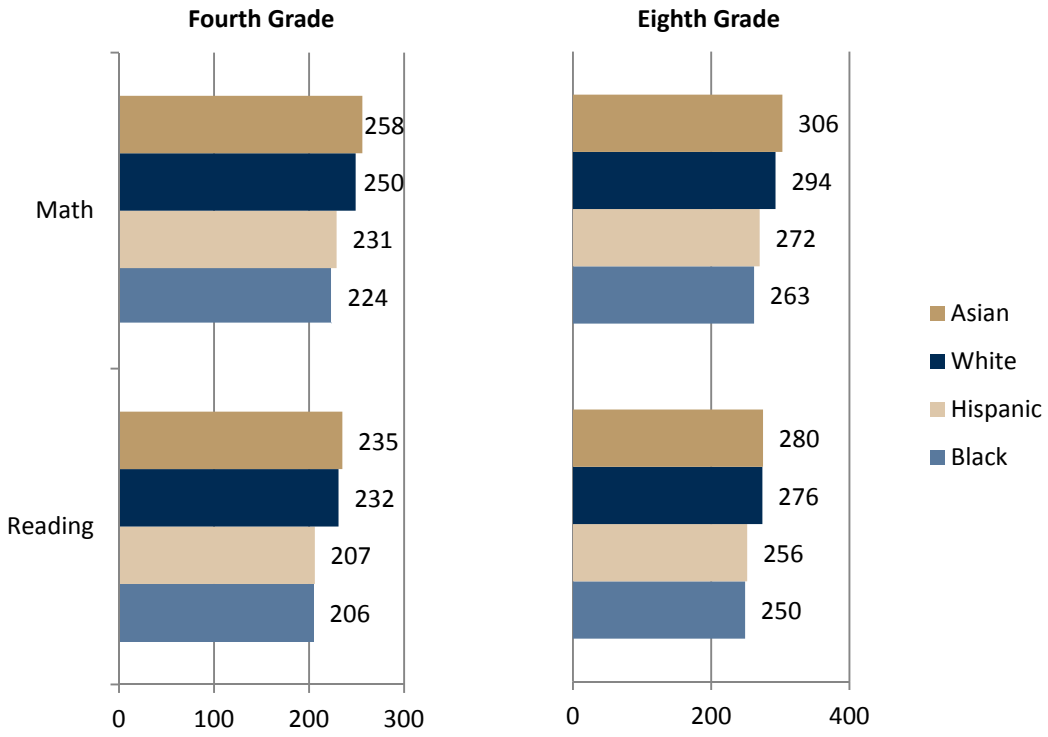
Sources: National Science Board, *Science and Engineering Indicators 2012*, 3-43 (Washington, D.C.: National Science Foundation, 2012).

FIGURE 3: COMPARISON OF PROGRAMME FOR INTERNATIONAL STUDENT ASSESSMENT (PISA) 2012 SCORES (CHINA-SHANGHAI, OECD AVERAGE AND U.S.)



Source: Organization for Economic Co-operation and Development, *PISA 2012 Results* (Paris: Organisation for Economic Co-operation and Development, 2013).

FIGURE 4: FOURTH AND EIGHTH GRADE NAEP AVERAGE TEST SCORES, 2013



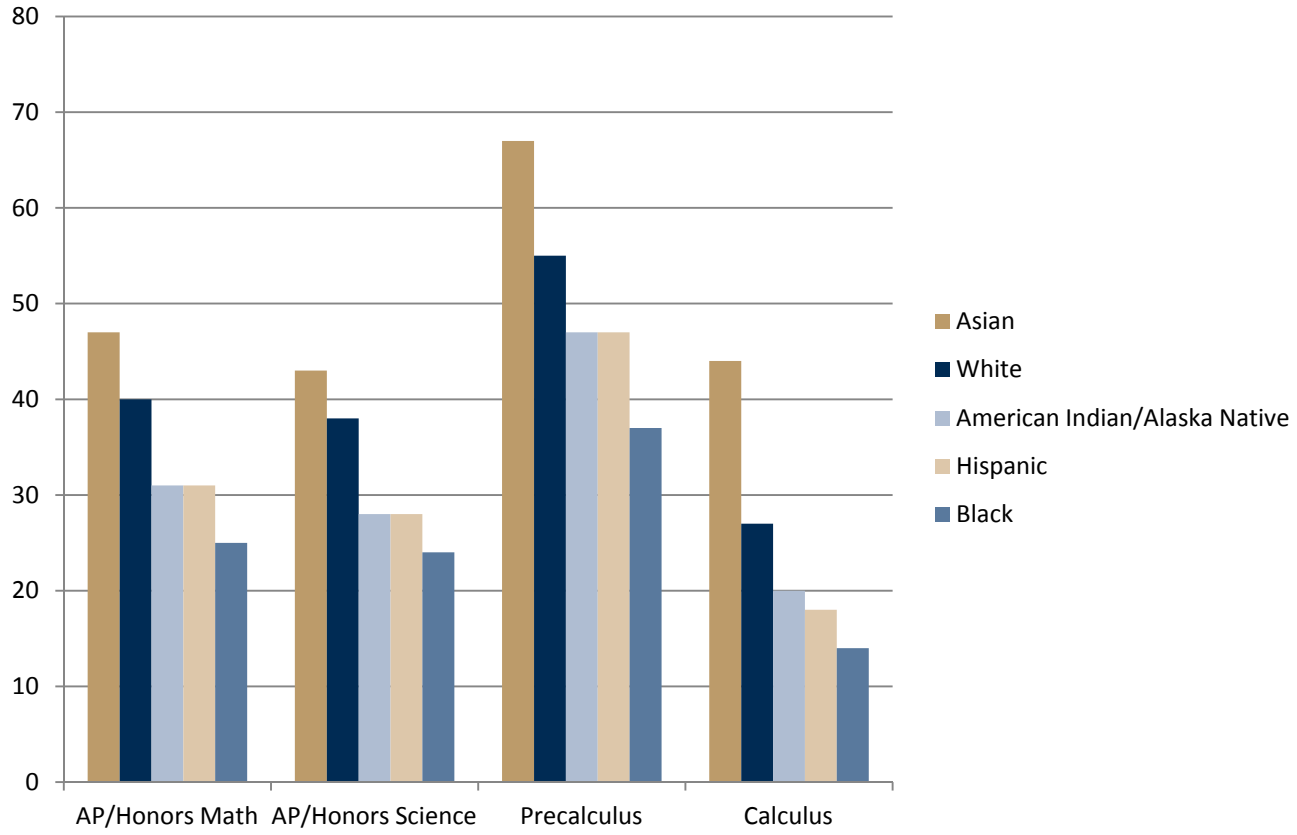
Source: National Center for Education Statistics, *The Nation's Report Card* (Washington, D.C.: National Center for Education Statistics, 2013).

While these trends are troubling for the nation overall, a disproportionate number of people of color –particularly African Americans and Hispanics – are even further away from becoming STEM-literate and having the ability to thrive in a hyper-competitive, global marketplace. This is especially disconcerting given America's changing demographics: The U.S. Census predicts the U.S. will become a majority-minority nation by 2043 and that today's minorities together will comprise 57% of the total population by 2060.[41] These groups are precisely the groups most in need of better STEM-related education.

Historically, achievement gaps are all but set by the fourth grade and show little change after that. Among students taking the National Assessment of Educational Progress (NAEP) in 2013, the average test score gaps between black and white fourth graders were 26 points for both math[42] and reading,[43] while, for eighth grade students, the gaps were 31 points for math[44] and 26 points for reading.[45] The math gap between white and Hispanic students was 19 points for fourth graders[46] and 22 percentage points for eighth graders.[47] For reading, fourth grade Hispanics scored an average of 25 points lower than their white counterparts.[48] Eighth grade Hispanics scored an average of 20 points lower.[49] Asians outperformed all other racial and ethnic groups in both grades, in both mathematics[50] and reading.[51]

These disparities intensify and persist throughout the high school years. In 2012, just 25% of African American and 31% of Hispanic students taking the SAT reported taking an AP/Honors Math course, compared to 47% of Asian, 40% of white and 31% of American Indian students.[52] Similarly, only 24% of African American and 28% of Hispanic students took an AP/Honors Science course, compared to 43% of Asian, 38% of white and 28% of American Indian students.[53] Just 37% of African Americans took pre-calculus, compared to 67% of Asian, 55% of white, 47% of Hispanic and 47% of American Indian students.[54] Just 14% of African Americans took calculus, compared to 44% of Asians, 27% of whites, 20% of American Indians and 18% of Hispanics.[55]

FIGURE 5: SAT TEST TAKERS WHO TOOK ADVANCED SCIENCE AND MATH COURSES BY RACE AND ETHNICITY



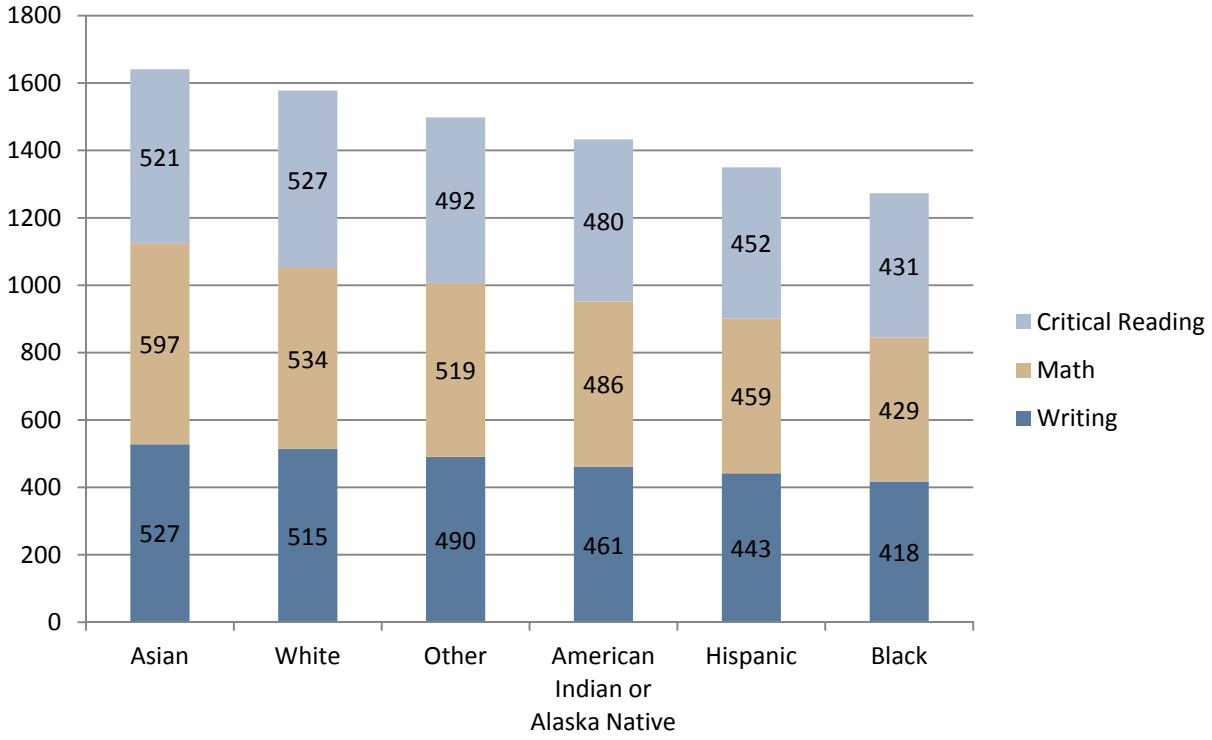
Source: The College Board, *The SAT Report on College and Career Readiness: 2012*, 31 (New York: The College Board, 2012).

In 2013, black college-bound students scored an average raw SAT score of 1,278 (Critical Reading [CR]-431, Math-429, Writing-418).[56] This is compared to an average score of 1,354 (CR-452, Math-459, Writing-443) for all Hispanics.[57] Whites scored an average raw SAT score of 1576 (CR-527, Math-534, Writing-527).[58] Asians averaged a raw SAT score of 1,645 (CR-521, Math-597, Writing-527).[59] American Indian or Alaska Natives scored a raw average SAT score of 1,427 (CR-480, Math-486, Writing-461).[60] Test takers reporting their race and ethnicity as "Other" scored a raw average SAT score of 1,498 (CR-492, Math-519, Writing-490).[61]

Further, non-Hispanic blacks and Hispanics are less likely to have earned a college degree in any field, much less a STEM-related degree. The percentages of non-Hispanic blacks and Hispanics ages 25 and over holding at least a Bachelor's degree in any field are 21% and 14.5%, respectively, compared to 51% of Asians and 34.5% of non-Hispanic whites.[62] Just 17% of non-Hispanic black and 21% of Hispanic college graduates aged 25 and over hold a STEM-related degree, compared to 43% of their Asian and 22% of their white, non-Hispanic counterparts.[63]

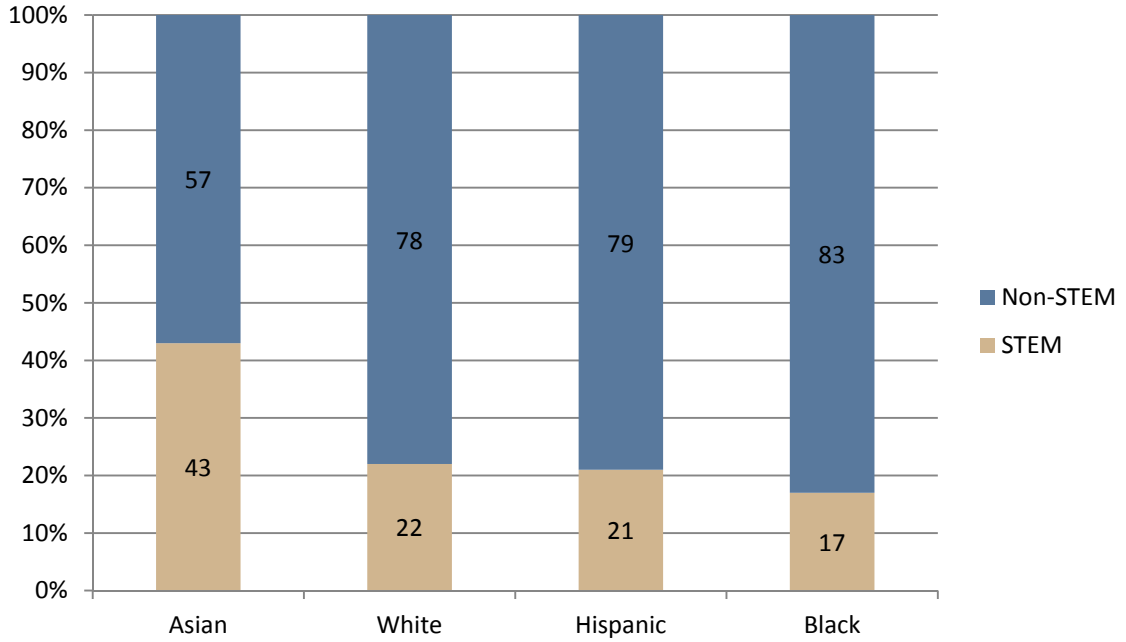
Evidence suggests that even those minority and female students who do maintain an interest in S&E and S&E-related fields throughout high school are likely to face discouragement from teachers and employers at some point in their career. For example, one study of 1,226 female, African American, Hispanic and American Indian chemists and chemical engineers found 40% of women and underrepresented minority chemists reported being discouraged from pursuing STEM-related fields at some point during their career.[64] Additionally, according to a recent President's Council of Advisors on Science and Technology (PCAST) report, just 4.1% of African American students surveyed remained in college and attained a STEM-related degree, compared to 4.8% of Hispanic, 9.3% of white and 15.9% of Asian students.[65] Further, among all students initially enrolled in a STEM-related field, just 35.1% actually earned a STEM-related degree.[66]

FIGURE 6: RAW SAT SCORES BY RACE AND ETHNICITY, 2013



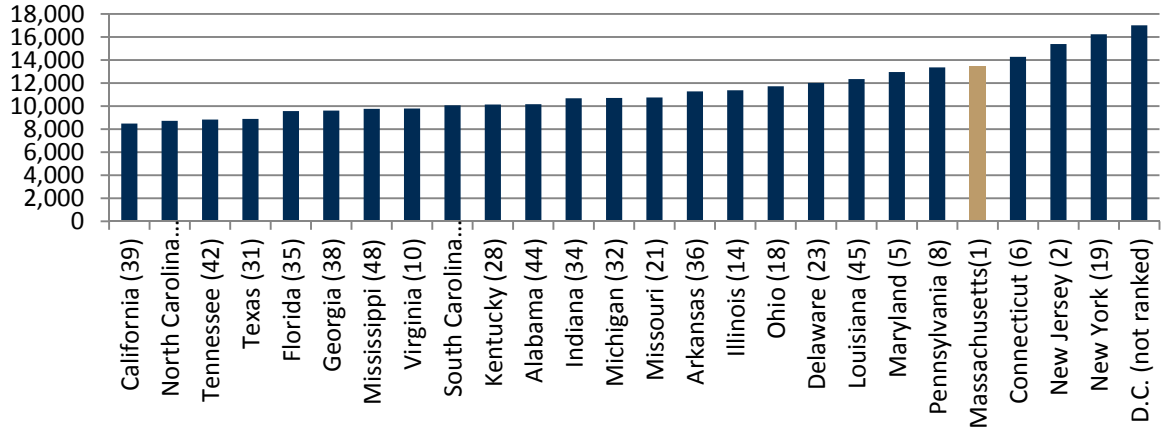
Source: The College Board, *2013 College-Bound Seniors Total Group Profile Report,* 3 (New York: The College Board, 2013).

FIGURE 7: FIELD OF BACHELOR'S DEGREE OR HIGHER, EMPLOYED PERSONS 25 YEARS AND OVER BY RACE & ETHNICITY, 2009



Source: Economics and Statistics Administration. *Education Supports Racial and Ethnic Equality in STEM*, by David Beede, et al. (Washington, DC: U.S. Department of Commerce, 2012).

FIGURE 8: ANNUAL SPENDING PER PUPIL IS LESS THAN THAT OF MASSACHUSETTS IN 21 OF THE 25 STATES WITH THE LARGEST BLACK POPULATIONS, INCLUDING THE DISTRICT OF COLUMBIA (STATE EDUCATIONAL QUALITY RANK SHOWN IN PARENTHESES)



Source: Annie E. Casey Foundation, Kids Count Data Book, 2013 (Baltimore: Annie E. Casey Foundation, 2013); Wenger, Michael and Ying Li, *Further to Go: Job Creation in African American Communities* (Washington, D.C.: Joint Center for Political and Economic Studies, April 2013).

Educators have begun to develop programmatic responses to address the key factors students cite for their discouragement from pursuing coursework relevant to STEM careers. According to the PCAST report, high-performing students cite "uninspiring coursework" as a factor affecting their motivation to continue studying STEM-related subjects and low-performing students with a "high interest and aptitude in STEM careers" cite difficulty with the math requirements of introductory courses and the "little help provided by their universities" to help them excel in these courses.[67] Other students report an "unwelcoming atmosphere from STEM faculty."[68]

To address these challenges, the PCAST report recommends better, more diverse teaching methods, including "evidence-based" teaching methods.[69] A growing body of research has shown evidence-based teaching methods to be more effective than traditional methods – such as lectures and multiple choice tests – at reaching all students, particularly the women and minorities who comprise 70% of all college students.[70] An example of such programs includes the Freshman Research Initiative at the University of Texas-Austin, which offers 25% of College of Natural Sciences freshmen the opportunity "to do cutting-edge, original, publishable research in chemistry, biochemistry, nanotechnology, molecular biology, physics, astronomy, or computer science" under the supervision of a faculty mentor.[71] A similar University of California-Davis program allows students of the College of Biological Sciences to pursue hands-on research. Participants in this program have shown greater persistence and higher GPAs in calculus and chemistry compared to a comparison group.[72]

A further consideration for policymakers is the potential impact of increased educational spending on school quality and educational outcomes. A comparison of Annie E. Casey Foundation data on expenditures per student and educational quality to a ranking of the 25 states with the highest African American populations reveals that, among those 25 states, 21 spend less per pupil than the state of Massachusetts, which does not rank among the top 25 states in African American population, but ranks first in educational quality.[73]

U.S. ASIANS IN PERSPECTIVE[a]

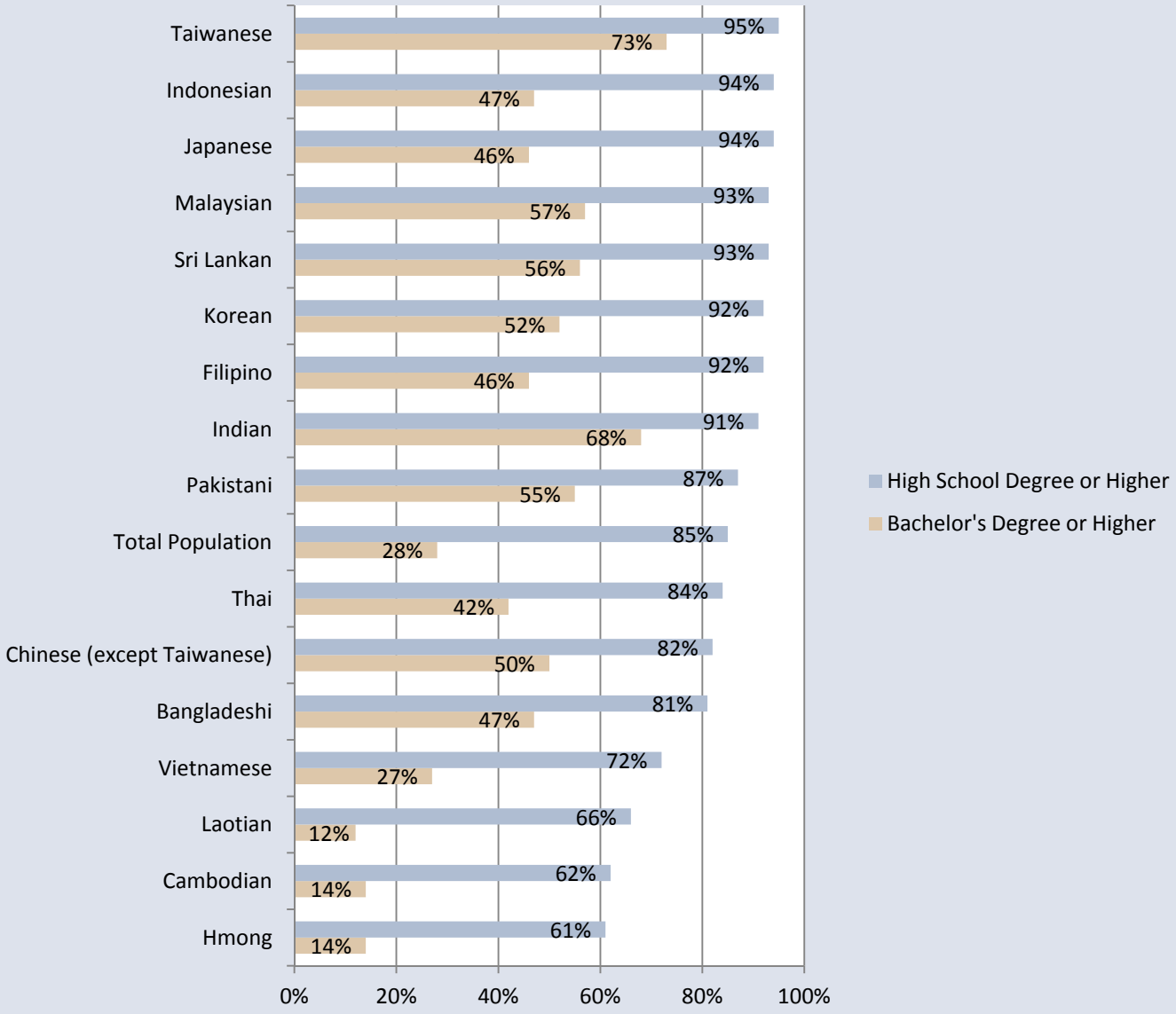
While overall statistics show higher levels of household income, wealth and educational attainment for Asian Americans, stark disparities persist among Asian ethnic groups. It is important for policymakers to remain cognizant that U.S. policies designed to close STEM-related achievement gaps will impact minorities among Asian Americans facing many of the same challenges that all underrepresented Americans face.

While U.S. Asians overall earn a median household income of $65,129, that number is skewed by higher income levels among some Asian Americans compared to others, as well as differences in Asian Americans' living arrangements compared to those of whites, blacks and Hispanics. According to Asian Americans Advancing Justice-AAJC (AAJC), 60% of Asian Americans are foreign born.[74] Further, India, Mainland China, South Korea and the Philippines are, respectively, the top four Asian nations that dominate among countries from which highly skilled immigrants who are awarded H1-B visas originate.[75] These highly skilled workers are able to command higher salaries. For example, between 2007 and 2009, the U.S. Census Bureau estimates Indian Americans and Filipino Americans earned a per capita income of $36,533 and $25,799, respectively, compared to $10,949 for Hmong and $15,940 for Cambodian Americans.[76]

Overall educational statistics pertaining to Asian Americans tend to overlook achievement gaps between Asian ethnic groups. For example, AAJC notes that, while Vietnamese Americans rank fourth in population size among Asian Americans, just 72% hold a high school diploma, compared to 95% of Taiwanese Americans.[77] Further, just 27% of Vietnamese Americans hold a Bachelor's degree, compared to 73% of Taiwanese and 68% of Indian Americans. Laotian, Cambodian and Hmong Americans earn Bachelor's degrees at a rate of just 12%, 14% and 14%, respectively. Additionally, more than a third (35.6%) of *all* foreign-born Americans aged 25 and older with an S&E degree were born in India, China or the Philippines.[78] This suggests that the skills American employers demand are concentrated among workers in India, China and the Philippines. Thus, immigrants from other Asian countries are at a preparedness disadvantage when they come to the U.S. – a disadvantage that is similar to or, in some cases, even more pronounced than that of blacks and Hispanics.

a The authors are deeply grateful to the counsel of Mr. Jason T. Lagria, Esq., Senior Staff Attorney, Asian Americans Advancing Justice—AAJC, in drafting this report.

FIGURE 9: ASIAN AMERICAN EDUCATIONAL ATTAINMENT BY ETHNIC GROUP



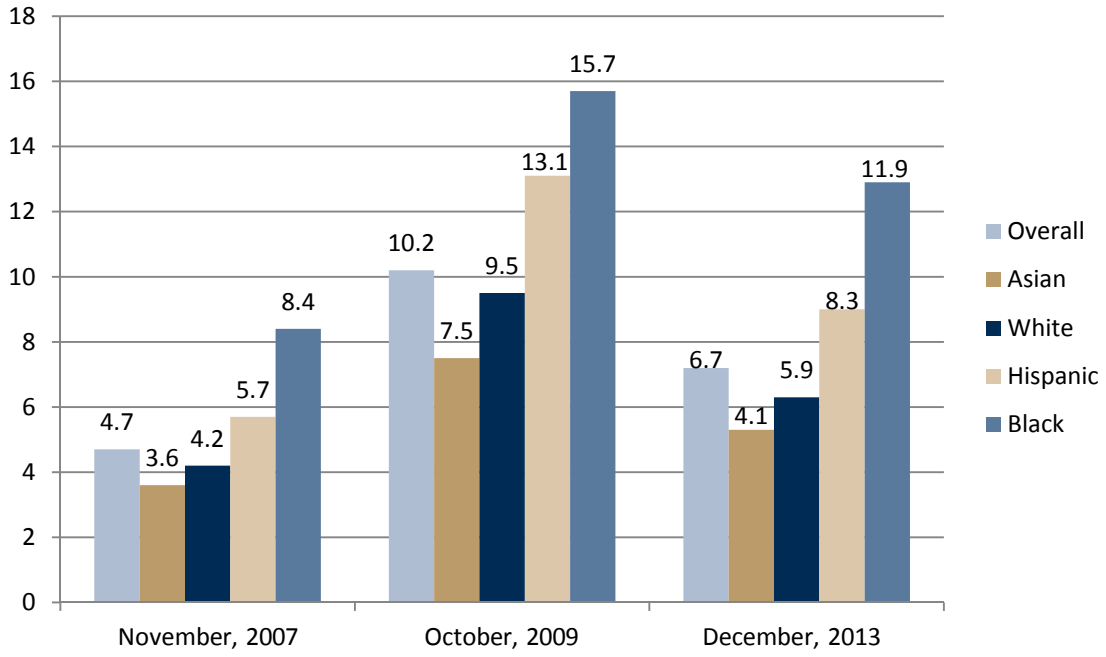
Source: Asian Americans Advancing Justice--AAJC, *A Community of Contrasts: Asian Americans in the United States*, *2011* 4, 17 (*citing* U.S. Census Bureau, *2007-2009 American Community Survey, 3-Year Estimates*) (Washington, D.C.: Asian Americans Advancing Justice—AAJC, 2011).

III. THE CONTEXT – THE ECONOMY AND COMMUNITIES OF COLOR

The gaps evident in STEM preparedness for African Americans and other communities of color persist alongside another troubling gap: unemployment. In December 2013, the overall unemployment rate was 6.7%.[79] This rate has improved at a sluggish pace since reaching its Great Recession high of 10.2% in October 2009.[80] However, it is still significantly above the 4.7% unemployment rate in November 2007, one month prior to the official beginning of the economic downturn.[81]

Nationwide, black and Hispanic unemployment was particularly high during the Great Recession relative to whites and Asians. In November 2007, the black and Hispanic unemployment rates were 8.4% and 5.7%, respectively, compared to 4.2% of whites and 3.6% of Asians.[82] At the peak of the Great Recession in October 2009, black workers faced a 15.7% unemployment rate compared to 13.1% for Hispanics, 9.5% for whites and 7.5% for Asians.[83] Today, black unemployment is at 11.9%, while Hispanic unemployment stands at 8.3%.[84] This is compared to a white and Asian jobless rate of 5.9% and 4.1%, respectively.[85]

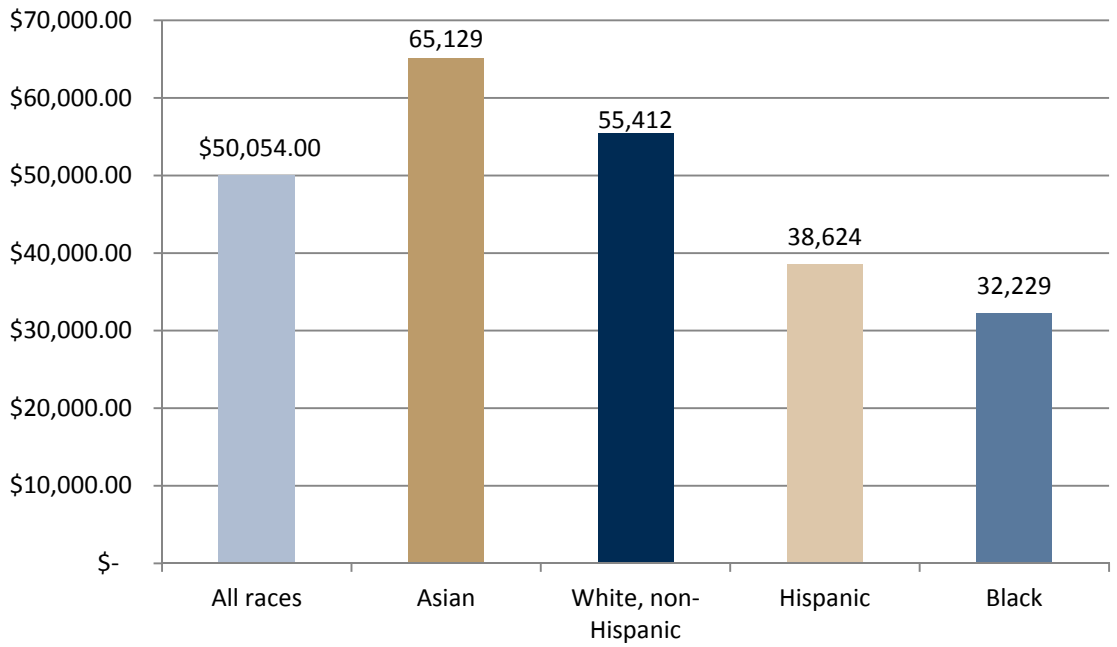
FIGURE 10: U.S. UNEMPLOYMENT BEFORE, DURING AND AFTER THE GREAT RECESSION



Source: Bureau of Labor Statistics, *The Employment Situation, November, 2007, October, 2009, and December, 2013* (Washington, D.C.: U.S. Department of Labor, 2007, 2009, 2013).

Further complicating America's economic situation, household income has also stagnated, particularly among those Americans at the bottom of the socioeconomic ladder. While the overall real median household income in the U.S. has stagnated since 1980, and certainly since the Great Recession, some researchers have argued that real income among the top 1% of earners in the country has actually increased. Between 1980 and 1999, the nation's real median household income increased by about 20%.[86] Since then, it has fallen from $53,252 in 1999 to $50,054 in 2011.[87] Average real income per family fell by 17.4% between 2007 and 2009, the steepest decline since the Great Depression.[88] By comparison, in 2011, Asian households showed the highest median household income at $65,129.[89] For whites, it was $55,412.[90] Meanwhile, Hispanics and blacks earned a median household income of $38,624 and $32,229, respectively, in 2011.[91]

FIGURE 11: U.S. MEDIAN HOUSEHOLD INCOME BY RACE AND ETHNICITY, 2011



Source: U.S. Census Bureau, *Income, Poverty and Health Insurance Coverage in the United States*, 5 (Washington, D.C.: U.S. Census Bureau, 2012).

One study estimated that real income per family grew by 1.7% overall during the recovery from the Great Recession (from 2009 to 2011). However, the real income among the top 1% of earners grew by 11.2% during the same period.[92] America's tax policy provides further income support for top earners. The top tax rate has been lowered from 75% in 1980 to 35% today.[93]

TABLE 2: REAL INCOME GROWTH DURING THE GREAT RECESSION AND THE RECOVERY

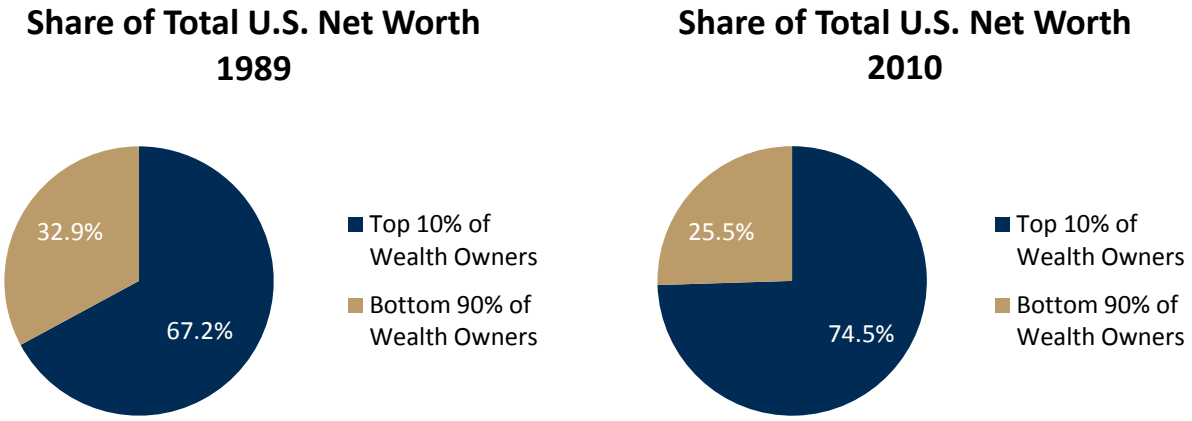
	Average Real Income Growth	Average Real Income Growth, Top 1%	Average Real Income Growth, Bottom 99%
Great Recession (2007-2009)	-17.4%	-36.3%	-11.6%
Recovery (2009-2011)	1.7%	11.2%	-.4%

Source: Saez, Emmanuel, *Striking it Richer: The Evolution of Top Incomes in the United States*, 1 (Berkeley: University of California at Berkeley, 2013).

In addition to disparities in household income, significant racial and ethnic gaps persist in accumulated household wealth (i.e. assets minus liabilities). Data accumulated over nearly three decades supports the notion that the distribution of wealth in the United States has become more unequal. According to the Federal Reserve's analysis of Survey of Consumer Finances (SCF) data, as of 2007, 74.5% of the nation's wealth is concentrated in 10% of the U.S. population.[94] In 1989, this same percentile controlled just 67.2% of total net worth in the U.S.[95]

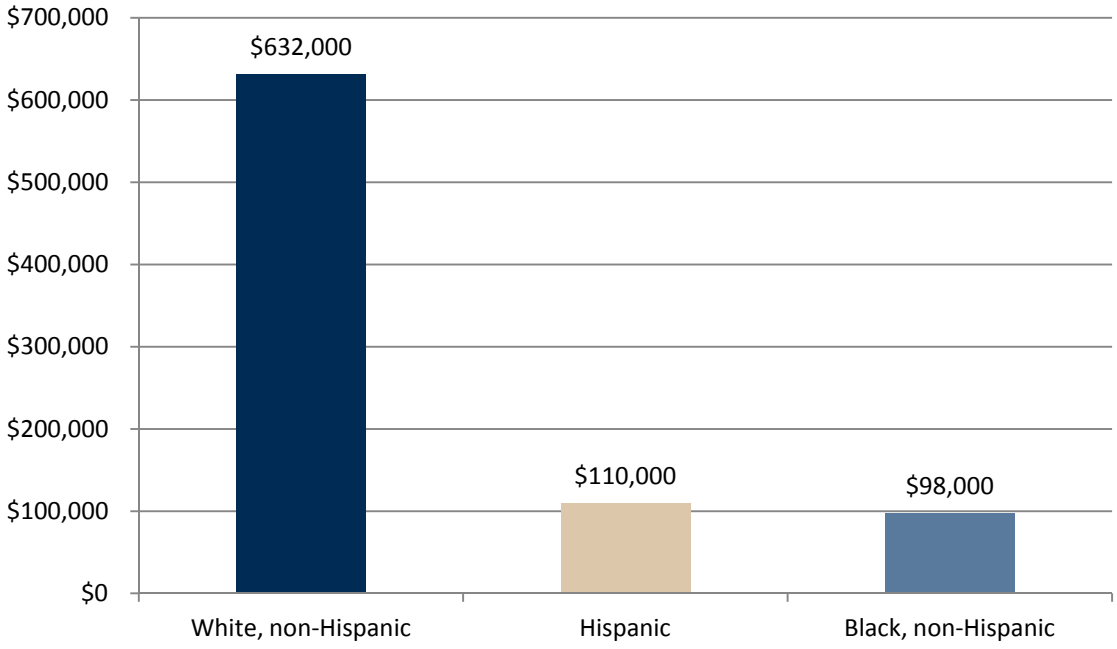
As of 2010, the average white family had accumulated six times the wealth of the average black or Hispanic family.[96] According to the Urban Institute, white families have accumulated an average of $632,000 in wealth, compared to $98,000 for black families and $110,000 for Hispanic families.[97] Further, while the Great Recession led to significant declines in wealth in families across socioeconomic lines, blacks and Hispanics were particularly hard hit.[98] Between 2007 and 2010, Hispanics saw their wealth decline by an average of 40%, compared to 31% for blacks and 11% for whites.[99]

FIGURE 12: SHARE OF TOTAL U.S. NET WORTH BY PERCENTILE OF WEALTH OWNERS



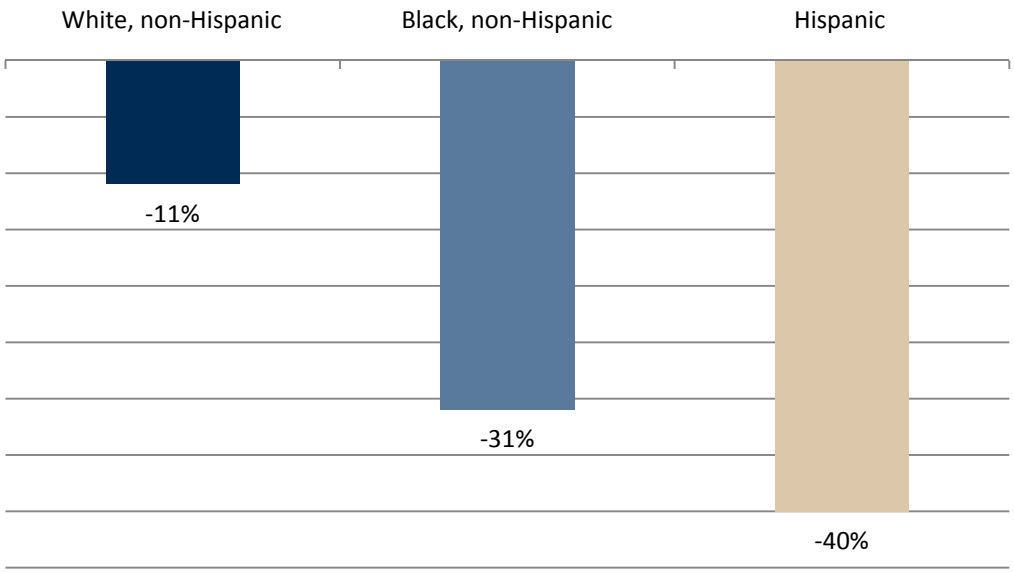
Source: Levine, Linda, *An Analysis of the Distribution of Wealth Across Households, 1989-2010,* 4 (*citing* Arthur B. Kennickell, *Ponds and Streams: Wealth and Income in the U.S., 1989 to 2007*, FEDS Working Paper 2009-13) (Washington, D.C.: Federal Reserve Board, 2009; and unpublished 2010 SCF data) (Washington, D.C.: Congressional Research Service, 2012).

FIGURE 13: AVERAGE HOUSEHOLD WEALTH BY RACE AND ETHNICITY



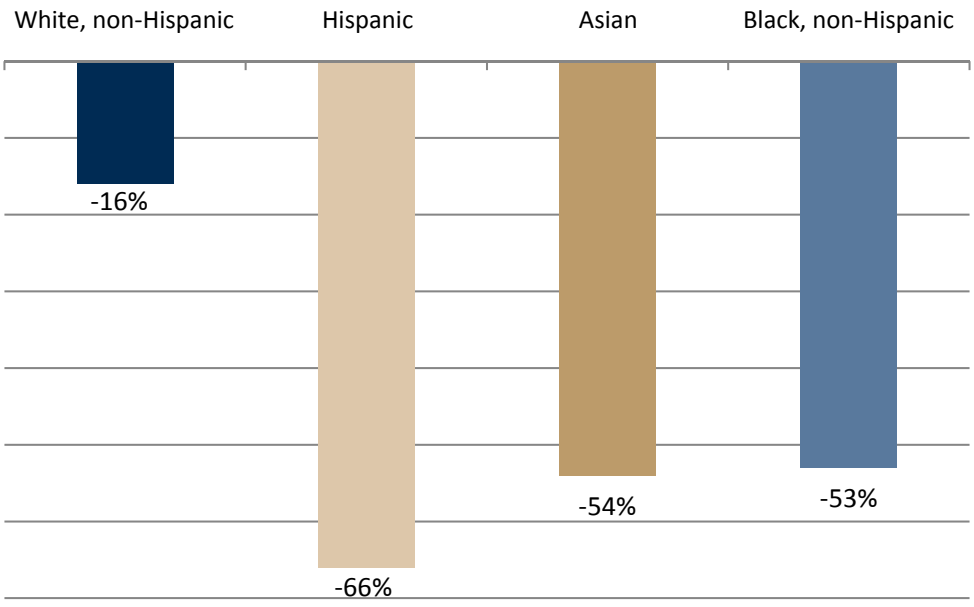
Source: McKernan, Signe-Mary, et al, *Less Than Equal: Race Disparities in Wealth Accumulation*, 5 (Washington, D.C.: The Urban Institute: 2013).

FIGURE 14: AVERAGE WEALTH LOSSES DURING THE GREAT RECESSION BY RACE AND ETHNICITY (2007-2010)



Source: McKernan, Signe-Mary, et al, *Less Than Equal: Race Disparities in Wealth Accumulation*, 2-3 (Washington, D.C.: The Urban Institute: 2013).

FIGURE 15: MEDIAN NET WORTH LOSSES BY RACE AND ETHNICITY (2005-2009)



Source: Kochhar, Rakesh , Richard Fry, and Paul Taylor, *Wealth Gaps Rise to Record Highs Between Whites, Blacks, Hispanics*, 13-14 (Washington, DC: Pew Research Center, 2011).

While average wealth is useful for illustrating the disquieting concentration of wealth along racial and ethnic lines, it inflates the net worth of the typical American because it averages the wealthiest and poorest households together. Median net worth, on the other hand, is the point at which half the population has accumulated more wealth and half the population has accumulated less. A longitudinal study of 1,700 black and white households conducted by the Institute on Assets and Social Policy from 1984 through 2009 revealed the wealth gap ballooned from $85,070 in 1984 to $236,500 in 2009.[100] According to a separate survey conducted by the Pew Research Center in 2009, the median net worth of white households surveyed was $113,149, compared to $78,066 for Asian, $6,325 for Hispanic and $5,677 for black households.[101] Further, while the Great Recession caused the median net worth of white families surveyed by Pew to decline just 16% between 2005 and 2009, the median net worth of Hispanic, Asian and black families declined some 66%, 54% and 53%, respectively, during the same period.

IV. CONCLUSION

As the preceding discussion shows, communities of color in the United States trail the national average when it comes to participation in STEM careers. This long-term pattern persists at a time when two problems face the economy. First, the technology sector, which has weathered the economic headwinds since 2007 reasonably well, faces shortages in the supply of skilled STEM workers. Second, growing economic inequality promises to have deleterious impacts on our society if left unaddressed. Individuals and families left behind might earn their way to better standards of living – but only if they have the skills to compete in a global economy. That is the opportunity STEM presents, in that STEM education gives people the wherewithal for employment in jobs that pay well.

Increasing the supply of STEM graduates therefore is likely to have significant payoffs for workers, companies, and the economy at large. Doing this will require both collaboration between the private sector, government, the philanthropic community, and the educational system. It will also take financial investment to scale initiatives that have been shown to engage students with STEM or to explore new models. Even in times when budgets are tight, finding the funding for such programs will lay the groundwork for a healthier economy and society.

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