

THE NEED FOR AMERICA'S NEXT INNOVATION GENERATION

STEM-related industries have been identified by the National Science Foundation as producing almost 50% of U.S. economic growth during the last 50 years.ⁱ The concern for the future is that:

As the Baby Boomer Generation Retires and the U.S. Population Becomes More Diverse, the United States Lacks the Skilled Workforce to Replace Engineers, Manufacturers, Tech Specialists, and Jobs in Other STEM Fields

- According to a 2000 National Science Board report, a quarter of the current science and engineering workforce—whose research and innovation generated the economic boom in the 1990s—is more than 50 years old and will retire by the end of this decade.ⁱⁱ
- Nearly one out of every two senior executives (47%) surveyed in 2007 by Robert Half International said baby boomer retirements will have the greatest impact on the workforce over the next decade. The survey contained information from 150 senior executives from the 1,000 largest companies in the United States.ⁱⁱⁱ
- According to a 2005 report from the National Association of Manufacturers, four in five American manufacturing companies (84%) say schools are not doing a good job preparing students for jobs, and more than half cite specific deficits in math and science.^{iv}
- A 2003 study of workforce issues in manufacturing conducted by the National Association of Manufacturers at the onset of a recent recession revealed that more than 80 percent of the surveyed manufacturers reported a “moderate to serious” shortage of qualified job applicants—even though manufacturing was suffering serious layoffs.^v
- A 2007 report by the Sloan Center on Aging and Work at Boston College found that almost 60% of employers report that recruiting competent job applicants is their biggest human resources challenge.^{vi}
- A 2009 survey by Manpower Inc. found that engineering jobs are the toughest to fill in the United States—ahead of nurses, skilled trades, teachers, sales representatives, technicians, drivers, IT staff, laborers, and machinists and machine operators.^{vii}
- Women and underrepresented groups make up one-half to two-thirds of the population of the United States and comprise the nation's new majority, yet they are not proportionately represented in STEM fields:
 - White males comprise nearly 70% of the science and engineering workforce but just over 40% of the overall workforce. White females make up about 35% of the overall workforce but no more than 15% of the science and engineering workforce.^{viii}
 - Similar disproportion holds true for African Americans, Hispanics, Native Americans, and persons with disabilities, who make up 24% of the population but only 7% of the science and engineering workforce.^{ix}
- In February 2009, the Information Technology and Innovation Foundation's (ITIF) Atlantic Century report ranked the United States sixth out of 40 leading industrialized nations in innovation competitiveness. A March 2009 Boston Consulting Group study ranked the United States eighth out of 110 countries...ITIF's report examined the rate of change in innovation capacity over the last decade for 40 countries and found the United States ranked dead last in improvements across a range of 16 key metrics in human capital, innovation capacity, entrepreneurship, IT infrastructure, economic policy, and economic performance.^x
<http://www.itif.org/files/democracy-ezell.pdf>

Universities Lack Engineering Majors

- A 2005 National Business Roundtable report states that to remain competitive in the global marketplace, the United States needs to graduate 400,000 science, engineering, mathematics, and technical four-year degrees annually. We are currently graduating 265,000.^{xi}
- According to data compiled in 2007 by the National Science Board, graduate and undergraduate student populations in engineering and the physical sciences—despite a recent upturn—remain below levels reached in the early 1990s.^{xii}
- A 2007 American Society for Engineering Education report finds:
 - Bachelor's degrees awarded in engineering declined for the first time since the 1990s, ending seven years of growth. The 73,315 degrees conferred in 2006–07 reflect a 1.2% decline over the previous year.^{xiii}
 - Engineering master's degrees slid for the second consecutive year to 36,983. This represents an 8.8% decline from 2005.^{xiv}
 - Only 18.1% of engineering bachelor's degrees went to women in 2006–07, the lowest share since 1996.^{xv}
 - Despite comprising more than 27% of the U.S. population, African American and Hispanic students account for only 11% of engineering bachelor's degrees awarded to U.S. students. The percentages decline at the graduate levels. African Americans received 4.6% of master's degrees and 3.6% of doctorates in engineering in 2007, while Hispanics received 5.2% of master's degrees and 3.5% of doctorates in engineering.^{xvi}
- In 2005, a National Academy of Sciences report found that:
 - The United States ranks 16th of 17 nations in the proportion of 24-year-olds who earn degrees in natural science or engineering as opposed to other majors.^{xvii}
 - Those undergraduates who switch from science and engineering majors to other majors “are often among the most highly qualified college entrants, and they are disproportionately women and students of color.”^{xviii}
- In a recent survey of more than 270,000 college freshmen conducted by the Higher Education Research Institute at UCLA, only 7.5% said they intended to major in engineering—the lowest level since the 1970s.^{xix}
- In the United States, 62% of doctoral degrees in engineering went to foreign nationals in 2006, compared with 50% in 2000, according to a recent report from the American Society for Engineering Education.^{xx}
- According to a 2009 report published by the National Bureau of Economic Research, the proportion of foreign-born PhD recipients in science and engineering nearly doubled from 27% in 1973 to 51% in 2003.^{xxi}

America Is Slipping Overall—Not Just in Math and Science

- According to projections by the directorate for education of the Paris-based Organisation for Economic Co-operation and Development (OECD), India will produce more than twice the number of American and European college graduates combined by 2015. China will have even more.^{xxii}
- According to the OECD, as recently as 1998, the United States still ranked first in percentage of 25- to 34-year-olds with at least a bachelor's degree, but by 2006 it had dropped to 10th.^{xxiii}

- The OECD found that between 2000 and 2005, out of 23 countries, the United States was the only country that showed no increase in the percentage of its population obtaining a postsecondary degree.^{xxiv}

U.S. Middle and High Schoolers Trailing International Peers in Math and Science

- In 2005, a National Academy of Sciences report found that:
 - Only 29% of 4th grade students, 32% of 8th grade students, and 18% of 12th grade students performed at or above the proficient level in science.^{xxv}
 - Almost 30% of high school mathematics students and 60% of those enrolled in physical science have teachers who either did not major in the subject in college or are not certified to teach it.^{xxvi}
- The scores from the 2006 Programme for International Student Assessment (PISA) showed that U.S. 15-year-olds trailed their peers from many industrialized countries. The average science score of U.S. students lagged behind those in 16 of 30 countries in the Organisation for Economic Co-operation and Development, a Paris-based group that represents the world's richest countries. The U.S. students were further behind in math, trailing counterparts in 23 countries.^{xxvii}
- Compared with 57 highly developed countries, the United States ranks 29th in science and 31st in math in the PISA results.^{xxviii}
- A 2007 American Institutes for Research report found that students in Singapore and several other Asian countries significantly outperform American students on math and science tests.^{xxix}
- Nearly half of 8th graders scored at the advanced level in math in Taiwan, Korea, and Singapore, compared with 6% of U.S. students, according to a 2008 report from Trends in International Mathematics and Science Study.^{xxx}

Footnotes

- ⁱ National Science Foundation
- ⁱⁱ 2000, National Science Board
- ⁱⁱⁱ 2007, Robert Half International
- ^{iv} 2005, National Association of Manufacturers, “2005 Skills Gap Report—A Survey of the American Manufacturing Workforce”
- ^v 2003, National Association of Manufacturers
- ^{vi} 2007, Sloan Center on Aging and Work at Boston College
- ^{vii} 2009, Manpower Inc.
- ^{viii} 2001, Council on Competitiveness
- ^{ix} 2000, Land of Plenty: Diversity as America’s Competitive Edge in Science, Engineering and Technology
- ^x 2009, Information Technology and Innovation Foundation, Atlantic Century; 2009, Boston Consulting Group
- ^{xi} 2005, National Business Roundtable
- ^{xii} 2007, National Science Board
- ^{xiii} 2007, American Society for Engineering Education
- ^{xiv} 2007, American Society for Engineering Education
- ^{xv} 2007, American Society for Engineering Education
- ^{xvi} 2007, American Society for Engineering Education
- ^{xvii} 2005, National Academy of Sciences
- ^{xviii} 2005, National Academy of Sciences
- ^{xix} Higher Education Research Institute
- ^{xx} American Society for Engineering Education
- ^{xxi} 2009, National Bureau of Economic Research
- ^{xxii} Organisation for Economic Co-operation and Development
- ^{xxiii} Postsecondary Education Opportunity, November 2007; Upper Secondary and Tertiary Graduation and Attainment in OECD and Partner Countries:1996 to 2005; OECD, Education at a Glance 2008: OECD Indicators
- ^{xxiv} Postsecondary Education Opportunity, Upper Secondary and Tertiary Graduation and Attainment in OECD and Partner Countries; OECD, Education at a Glance 2008: OECD Indicators, Indicators A1-A2
- ^{xxv} 2005, National Academy of Sciences
- ^{xxvi} 2005, National Academy of Sciences
- ^{xxvii} 2006, Programme for International Student Assessment (PISA)
- ^{xxviii} Programme for International Student Assessment, “Executive Summary,” April 12, 2007
- ^{xxix} 2007, American Institutes for Research
- ^{xxx} 2008, Trends in International Mathematics and Science Study