Achieve, Inc.

math works

Americans Need Advanced Math to Stay Globally Competitive

No student who hopes to compete in today's rapidly evolving global economy and job market can afford to graduate from high school with weak mathematical skills, which include the ability to use logic, reason, and solve problems. The benefits associated with improving the math performance of American students also extend to the larger U.S. economy.

Our students lag far behind other industrialized nations in math skills.

- U.S. math standards, assessments and textbooks are less focused and rigorous than those in top-performing nations.[1] By the end of 8th grade, what passes for the U.S. math curriculum is two years behind the math being studied by eighth graders in other countries.[2]
- America's 15-year-olds were outperformed by 23 other nations in math on a 2009 assessment.[3]
- We like to think our top students are the best in the world, but that's not the case either. On the 2009 assessment, our best math performers ranked 13th compared with top math students internationally.[4]
- Too few students are developing strong math skills. Fewer than 8 percent of American 15-year-olds have sophisticated math skills they can apply to solve real-world problems. Across developed nations that percentage is nearly twice as large and, in top-performing countries like Singapore and Norway, it is three to four times as large.[5]
- The U.S. is failing to produce enough engineers to complete. In 2008, the U.S. had about 70,000 students graduate college with an engineering degree. South Korea had about 77,000 and Japan about 95,000 engineering graduates, despite both countries having less than half the population of America.[6]
- Students in other countries simply take mathematics more seriously: One third of students in Singapore participated in math competitions. Comparatively, 20 percent of England students and only 9 percent of U.S. students participated in math competitions in 2010.[7]

STATE LEADERSHIP

While American students may still be lagging in math and science in comparison to their international peers, a number of states are taking major steps to close that gap:

- All 50 states and the District of Columbia have adopted math standards aligned with postsecondary and business expectations.
- 21 states and the District of Columbia require students to complete advanced math, Algebra II, to graduate from high school.
- 43 states and the District of Columbia are working to develop assessments that will let students know if they are academically ready for college and careers while still in high school.

Achieve, 2013

Requiring more students to take advanced math would boost America's economic competitiveness and wealth.

- Between 2008 and 2018, STEM (science, technology, engineering and mathematics) jobs are projected to grow by 17 percent; non-STEM jobs are projected to grow by 9.8 percent.[8]
- About 88 percent of America's most celebrated inventors and entrepreneurs from the last century had (at least bachelor's) degrees in engineering, physics, chemistry, computer science, or medicine, demonstrating a clear link between education requiring a foundation in mathematics and innovation. 71 percent of U.S.'s top entrepreneurs had a bachelor's degree or above in the mathematics or science fields as well.[9]
- Economists estimate that if the U.S. could improve its math and science achievement so that its students become globally competitive, the U.S. gross domestic product could eventually grow by an additional 36 percent.[10]

ENDNOTES

1 Organization for Economic Cooperation and Development. (2007). OECD Economic Surveys: United States. Paris, France: OECD Publications. (p. 115)

2 Schmidt, W. (2003, February 4). "Presentation to Mathematics and Science Initiative." Retrieved from www.ed.gov/print/rschstat/research/progs/mathscience/schmidt.html

3 Organisation for Economic Co-operation and Development (OECD). 2010. *Lessons from PISA for the United States, Strong Performers and Successful Reformers in Education*. Paris, France. http://www.oecd.org/pisa/46623978.pdf

4 Top math performers defined as those performing at the 90th percentile in each nation. Organisation for Economic Co-operation and Development (OECD). 2010b. *Lessons from PISA for the United States, Strong Performers and Successful Reformers in Education*. Paris, France. http://www.oecd.org/pisa/46623978.pdf

5 Organization for Economic Cooperation and Development. (2007, December). *PISA 2006: Science Competencies for Tomorrow's World—Briefing Note for the United States*. Paris, France: Author.

6 National Science Foundation, *Science and Engineering Indicators 2012*, Table 2-33, downloaded in spreadsheet form from http://www.nsf.gov/statistics/seind12/append/c2/at02-33.pdf.

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9 Baumol, William J. et al (Fall 2009). The Superstar Inventors and Entrepreneurs: How Were They Educated? The Journal of Economics & Management Strategy, Vol 18. Issue 3. http://onlinelibrary.wiley.com/doi/10.1111/j.1530-9134.2009.00227.x/full

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