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### Math Matters

by [Eric Hanushek](#) and [Paul E. Peterson](#)

Another reason to care about how well American schools teach math: a country's math skills are directly tied to its future wealth. By **Eric A. Hanushek** and **Paul E. Peterson**.

"We know what it takes to compete for the jobs and industries of our time," President Obama said last year. "We need to out-innovate, out-educate, and outbuild the rest of the world." Yet despite the economic crisis facing the country, the U.S. educational system remains frozen in place, unable to adapt to contemporary global realities.

In the latest international tests administered by the Organization for Economic Cooperation and Development (OECD), 32 percent of U.S. public- and private-school students in the class of 2011 were deemed proficient in mathematics. This placed the United States thirty-second among the sixty-five participating nations. U.S. students ranked between Portugal and Italy and far behind South Korea, Finland, Canada, and the Netherlands, to say nothing of the city of Shanghai, with its 75 percent proficiency rate.

We became aware of the seriousness of the problem after we equated, with the help of colleagues, the test scores of the class of 2011 on the latest international test (when this class was in tenth grade) with its prior eighth-grade scores on the National Assessment of Educational Progress (NAEP), an official U.S. test that both assesses performance of U.S. students and sets the standard for proficiency.

Linking these tests also allowed us to compare the performance of students in each state with that of students in other countries. The results are scary. Even in Massachusetts, with its renowned collection of public and private schools, students reach only the level attained by students in the entire nations of Canada, Japan, and Switzerland. Massachusetts, the only state with a majority of students (51 percent) above the proficiency mark, trails well behind students in South Korea and Finland, as well as those in top-performing Shanghai.

***The math proficiency of students in New York is equivalent to that of students in debt-ridden Portugal and Spain.***

The percentage proficient in the state of New York (30 percent) is equivalent to that achieved by students in debt-ridden Portugal and Spain. California, the home of highly skilled Silicon Valley, has a math proficiency rate of 24 percent, the same as bankrupt Greece and just a notch above struggling Russia. By the time we get down to New Mexico and Mississippi, we are making comparisons with Serbia and Bulgaria.

Obama, to his credit, has highlighted the problem repeatedly. But too many state education officials have done their best to obfuscate the low performance of their students. Under the educational accountability rules set down by the federal No Child Left Behind law, each state may set its own proficiency standard, and most have set their standards well below the world-class level. As a result, most state proficiency reports grossly inflate the percentage of students who are proficient, if we account for the fact that our students need to compete not just with others from the same state but also with those across the globe.

#### **NO ROOM FOR FALSE COMFORT**

When not obfuscating the problem, apologists explain away the dismal results with misleading arguments. Some point to the country's large immigrant and disadvantaged populations, which, to be sure, do pose difficult educational challenges. Proficiency rates among African-Americans and Hispanics are very low (11 and 15 percent, respectively). But if one compares only the white students in the United States with all students in other countries, the United States still falls short: only 42 percent are proficient, which would place them at seventeenth in the world compared with all of the students in other nations. The only positive sign is the majority of Asian-American students in the United States (52 percent) who score at or above the proficiency level.

When our results were first released, one school-board member in Loudoun County, a wealthy suburb of Washington, D.C., explained away the results thus: "In many countries, poor-performing children are filtered out of high school, whereas in the United States we test all our students, both great and not so great. So the comparison is not on a level playing field." That might have been true some decades ago, when only a few countries followed the United States' emphasis on universal education and thus left many students out of school and unavailable for testing. But today the United States actually graduates a lower proportion of students from high school than the average developed country, eliminating any claim that this country is testing a broader range of the youth population.

Some also take false comfort in the belief that it takes only a limited number of high-flying students to fill the jobs at Google, Facebook, IBM, and all the other businesses and professions that need highly skilled talent. The United States is still great at producing the advanced students needed to power economic growth, it is thought.

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But the United States is not doing any better by its very best students than by the rest of them. Only 7 percent of U.S. students perform at the advanced level in math, putting the country significantly behind twenty-five other nations. Forty-five percent of the students in Shanghai are advanced in math, as are 20 percent in South Korea and Switzerland. Fifteen percent of the students score at or above the advanced level in six other key countries: Japan, Belgium, Finland, the Netherlands, New Zealand, and Canada. In all of them, the percentage achieving at the advanced level is more than twice that of the United States.

Still others say the low math scores are offset by a better record in reading. Admittedly, only ten countries have a significantly higher proficiency rate than the United States. If not the world leader, the U.S. record is at least better than average. Nonetheless, the set of skills most needed for sustained growth in economic productivity—and the skills in shortest supply today—are those rooted in math competencies. Our future scientists and engineers—the engine of U.S. innovation—come from the ranks of those with high math skills. While Silicon Valley could possibly be fueled by importing skilled workers from abroad, we should not continue to count on this in today's globalized world. Even if we could, it is hardly fair to our own young people to count them out of the country's best jobs.

## VERY DIFFERENT FUTURES

According to our best calculations, the United States could enjoy a remarkable increment in its annual per capita GDP growth by enhancing the math proficiency of its students. Increasing the percentage of proficient students to the levels attained in Canada and South Korea would increase the annual U.S. growth rate by 0.9 percentage points or 1.3 percentage points, respectively. Since long-term average annual growth rates hover between 2 and 3 percentage points, that increment would lift growth rates by between 30 and 50 percent.

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When translated into dollar terms according to the historical patterns, we see very different futures for the United States, depending on whether or not our schools are improved. If one calculates increases in national income from projections over an eighty-year period (providing for a twenty-year delay before any school reform is completed and newly proficient students begin their working careers), the present value of gains amounts to some \$75 trillion for reaching the performance levels of Canada. These additions can be compared with our current GDP of \$15 trillion or the \$1 trillion spent to stimulate the economy out of recession.

It is easy for political leaders to myopically put off considerations of effective school reform. The economic benefits from reform would not be felt immediately, as it takes time for an educated generation to become a productive workforce. But just as the continuing debt crisis, if not fixed, will escalate out of control only over the longer term, so the best available solution to the education crisis—a high-functioning, constantly improving educational system—could raise the level of human capital to the point where resources would be available to address much of this future debt crisis. In the simplest terms, the impending fiscal crises with Social Security and Medicare are most effectively dealt with by enhanced growth of the economy, growth that will not be achieved without a highly skilled workforce.

In the words of Charles Vest, the former president of the Massachusetts Institute of Technology: "The enemy I fear most is complacency. We are about to be hit by the full force of global competition. If we continue to ignore the obvious task at hand . . . our children and grandchildren will pay the price."

Now is the time for a breakthrough.

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