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Study questions U.S. shortfall in math, science

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SAN FRANCISCO — It's been said often: Uninterested U.S. students aren't keeping up in science, technology, engineering and math, ultimately leading to a decline in skilled workers and U.S. competitiveness.

But new research contradicts the conventional wisdom, asserting that U.S. students are doing well compared to their foreign counterparts. Moreover, the U.S. is educating a sufficient number of scientists and engineers to maintain its current global competitiveness, according to a [Urban Institute report](#).

International test rankings for U.S. students are often cited as evidence of national math and science weakness, and these data inform national educational policy. But the tests themselves are flawed, said Hal Salzman, senior research associate at the Washington-based organization and co-author of the report.

U.S. students have taken more math, science and foreign language courses over the past ten years than in previous decades, the study found. In 1990, only 45 percent of high school students took chemistry. By 2004, the percentage had risen to 60 percent.

The proportion that hit the math books for three years jumped from 49 percent in 1990 to 72 percent in 2004, while those taking math for four years increased from 29 percent to 50 percent.

SAT math and science scores showed similar gains, according to the Institute's report, "Into the Eye of the Storm: Assessing the Evidence on Science and Engineering Education, Quality, and Workforce Demand."

But the skills that testing evaluates may not be the ones needed for innovation in a global economy. "Japan, Singapore and [South] Korea do have the kind of education that leads to [better] test performance, but does that lead to more innovation, better jobs and a better economy?" Salzman asked.

For example, Singapore is promoting a national "creativity initiative" because the Asian city-state's leaders realize the need to de-emphasize its narrow educational approach, Salzman said. But for now, he added, it makes little sense to compare math and science scores in tiny Singapore with the sprawling U.S.

Indian policy makers have argued against connecting overall educational success to economic performance. The study notes that the Indian subcontinent has a 39-percent illiteracy rate and high school enrollment of under 50 percent. It owes its success to a small percentage of its citizens, Salzman said. "The use of average rates across a diverse group of nations and diverse populations is of limited use in drawing conclusions about global standing economically or educationally," the report concluded.

There is support for the criticism of testing methods, even from those who disagree with the study's conclusions. "When you're testing a broader selection, it's going to put the U.S. at a disadvantage," said George Haley, director for the Center for International Industry Competitiveness at the University of New Haven.

Lower-performing students reduce the U.S. average. In other countries, they wouldn't even be eligible to take the tests, Haley said.

But Haley takes issue with the study's broader conclusion that the U.S. isn't falling behind in math and science education. Other recent studies show that the very top percentage of U.S. students is beginning to drop in comparison to students from other countries, he said.

"The problem arises with the comparison of our top-performing students to those in other countries," Haley said.

There's another element to consider in the education debate: the nature of U.S. society. "The U.S. stands alone in having more challenges to its educational system than any of the advanced industrial countries," Salzman said.

For one thing, there's a stronger relationship between a school's economic situation and its success, or what Salzman called the "zip code determines education quality" phenomenon. Other countries do a better job of compensating within a school system for students' disadvantages, according to Salzman.

"This is what tends to get lost" in the debate, he said.

The report also questions whether there is indeed a shortage of U.S. engineering graduates. "The standard labor market indicators do not indicate a shortage," Salzman asserted, adding that a shortage would result in lower unemployment for engineers and rapidly [increasing wages](#), similar to what occurred during the dot-com era, he said.

The U.S. science and engineering workforce currently stands at 4.8 million, according to the study.

From 1993 to 2002, U.S. colleges awarded some 380,000 science and engineering bachelor's degrees, over 70,000 master's degrees and, on average, nearly 20,000 engineering doctorates.

"Rather than a supply problem, we probably have a demand problem," Salzman said Tuesday (Nov. 6).

The math and science backgrounds of foreign and U.S. students appear similar, at least at one top U.S. engineering school. While acknowledging that his students may not represent a true cross section of a typical U.S. high school, Joe Helble, dean of the Thayer School of Engineering at Dartmouth College, said he sees surprising uniformity.

"When I look at incoming graduate students at Dartmouth and I compare the ones who are U.S.-educated and those [educated overseas], I don't see huge differences," he said.

What Helble sees "are differences in creativity. I would say that the U.S. students are among the most creative and innovative."

Although some Asian students may have better raw quantitative skills, that doesn't necessarily make them better engineers or scientists, Helble said. "You have to look at their ability to tackle a problem without a clear solution."

Some Dartmouth engineering grads end up in other fields, including financial services and investment jobs where they are valued for their ability to think quantitatively and analyze technologies, the Dartmouth dean noted.

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