SCHOOL ACHIEVEMENT

Asia and Europe Top in World, But Reasons Are Hard to Find

Forget the hours spent watching television or doing homework. Disregard levels of spending and the latest technology. A new international assessment of student achievement in science and mathematics finds that those measures don't correlate with achievement—or underachievement—in science and math among precollege students around the world. The Third International Mathematics and Science Study (TIMSS), a massive project involving more than half a million students, five grade levels, 30 languages, and 45 countries, did find that seventh- and eighth-grade students in Asia and Eastern Europe, as a group, lead the world. But the study reveals no clearly marked path to high achievement.

"There is no simple answer to this complex problem," says Albert Beaton, a professor of education at Boston College and the international director of the study. "More teacher training, more use of calculators, more classroom time, more homework—none of those by themselves explain what's happening."

In the latest reports, released on Wednesday, Singapore comes out on top among 41 countries in both math and science, followed by the Czech Republic, Korea, and Japan. The United States is slightly below average in mathematics and slightly above average in science. South African students bring up the rear in both subjects.

While they don't provide easy answers, the data debunk many myths about student achievement. For example, while those who watched more than 5 hours of television a day did worse than fellow students in the same country who spend less time in front of the tube, students around the world watch about the same amount.

What does make a difference, believes statistician William Schmidt of Michigan State University, who headed the U.S. TIMSS, is how the material is taught. His recent review of the TIMSS countries found that an unfocused curriculum encourages U.S. teachers to teach too many topics and deprives students of a chance to learn a subject in-depth (*Science*, 18 October, p. 335). That theory finds support in another report, released Wednesday by the National Center for Educational Statistics, that found that U.S. mathematics classes are not as challenging as Germany's or Japan's, and that top-ics are not covered as thoroughly.

But teaching practices in the countries at the top are not ideal, either. Korea has the largest average class size in the study, but highly motivated students and the need to prepare for major exams in the ninth grade more than compensate for that apparent obstacle, says JinGyu Kim, a researcher at the Korean National Board of Educational Evaluation. "It's what we call the examination wars," says Masao Miyake, of Japan's National Institute for Education Research. Jana Strokava, TIMSS coordinator for the Czech Republic, attributes her country's achievement scores to the high priority the subjects receive and to the "traditional, rigid" way in which they are taught.

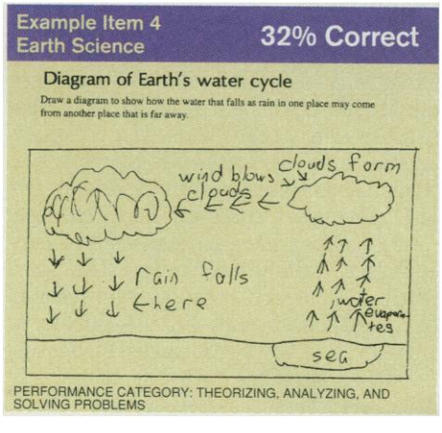
Next year, the survey will release results of a test that required students to draw conclusions from experiments, and Strokava predicts her country's students will not do as well. Results will also be issued for grades 3 and 4 and the final year of secondary school. Although those data should be useful, Ina Mullis, an education professor at Boston College, believes that the answer to what works is already pretty clear. She says high achievement "usually comes down to good old-fashioned hard work."

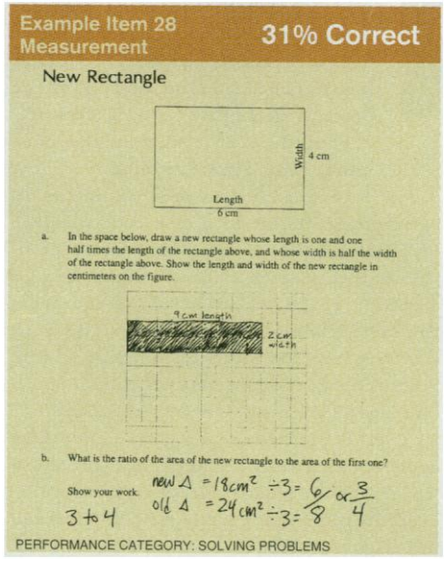
–Gretchen Vogel

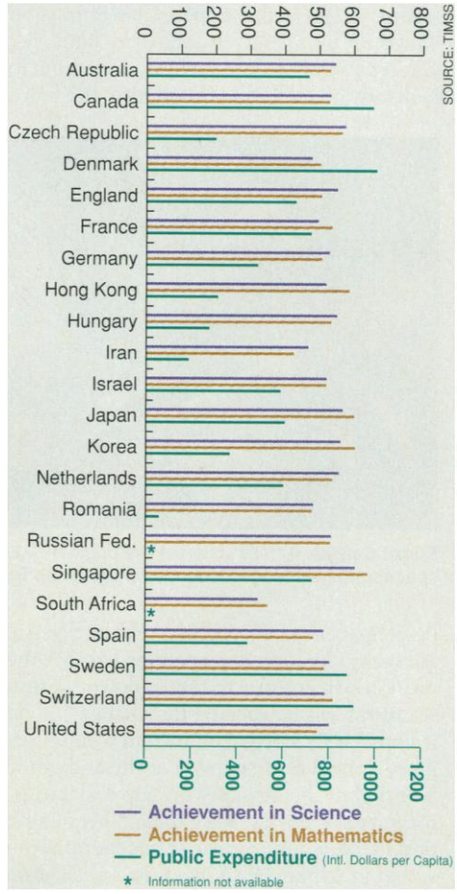
What the Study Found

- Boys in about 75% of the countries did significantly better than girls in science; in math they led in about 15% of the nations tested. In no country did girls significantly outperform boys.
- U.S. students did better than average in environmental issues, earth science, and life science.
- In every country, the home environment has a significant influence on success. A dictionary, a computer, and a dedicated place to study in the home were important factors.
- In every country, the better educated the parent, the more successful the child.
- Students in the high-performing countries of Japan, Korea, and Hong Kong took the least amount of credit for their success.
- Students in the high-performing Czech Republic ranked last when asked if they enjoyed mathematics, physics, or chemistry.

SOURCE: TIMSS







Priceless education. Per capita spending was one of many factors that did not correlate with student achievement in the TIMSS project.