

## Cover

IS AMERICA  
LOSING ITS  
EDGE ?

The U.S. still leads the world in scientific innovation. But years of declining investment and fresh competition from abroad threaten to end our supremacy

By **MICHAEL D. LEMONICK**

## Cover

Looking for a Lab-Coat Idol  
By [REBECCA WINTERS KEEGAN/](#)  
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Many of this country's naturally gifted scientists--its most inquisitive, observant, persistent citizens--share a handicap: they can't read yet. They also can't play with matches, focus microscopes or see over lab tables. "Children love to explore the natural world. They love to make sense out of it," says Carlo Parravano, director of the Merck Institute for Science Education, which trains teachers in New Jersey and Pennsylvania. "By fourth grade, we squash that curiosity with the way we teach science."

The years from Baby Einstein to AP physics are an increasing source of worry for corporations like Merck and for colleges and universities, which see a shrinking pipeline of talented U.S. students pursuing the sciences. Without a Sputnik to galvanize the nation, and with an emphasis on testing in reading and math, the nation's already ill-equipped science teachers have been fighting for the attention of students, principals and policymakers. The policymakers, it seems, are starting to listen. After calling it imperative in his State of the Union speech that U.S. students receive a "firm grounding in math and science," President George W. Bush is expected to unveil \$380 million in science-education initiatives in his 2007 budget this week. "The [Department of Education] slogan was 'Reading first,' and then they had 'Math now.' Well, I guess it's 'Science finally,'" says Gerald Wheeler, executive director of the National Science Teachers Association.

It's not that U.S. students' math and science scores are plummeting. Since 1995, fourth-graders have maintained their scores, and eighth-graders have slightly improved theirs, according to the 2003 "Trends in International Mathematics and Science Study."

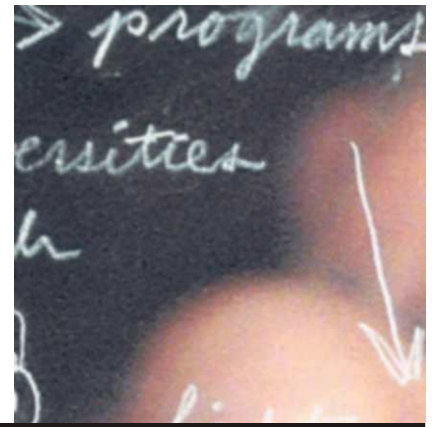
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But other places, like England, Hong Kong and New Zealand, are improving faster, and some, like Singapore and Japan, are miles ahead. Even eighth-graders in much poorer



countries like Estonia and Hungary outperformed their U.S. peers, who came in ninth of the 44 nations on the science portion of the test.

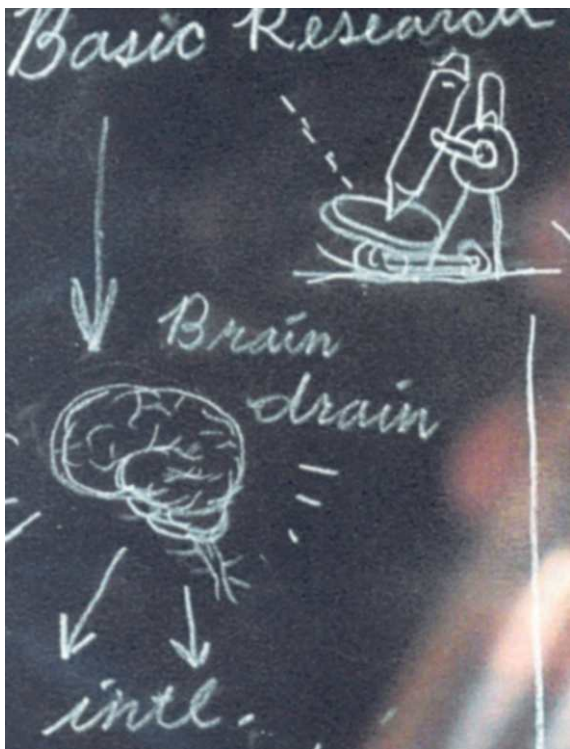
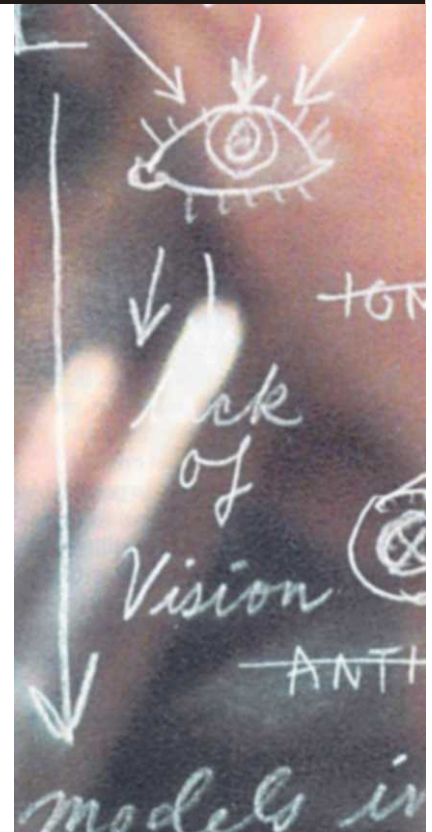
Perhaps even more important than the struggle of U.S. students to keep pace with their international peers is their failure to keep up in enthusiasm for the subject. At 2004's Intel International Science and Engineering Fair in Portland, Ore., the world's pre-eminent precollege science event, Intel chairman Craig Barrett asked China's Education Minister how many students there take part in regional science fairs. "When he said 6 million kids, it was a moment of reflection," says Barrett. In the U.S., about 50,000 take part in the fairs. Stanford University president John Hennessy is worried about a lack of role models, among other things. "We have [TV] shows



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about doctors, lawyers, politicians. Where are our role models of scientific innovation?" asks Hennessy. "We need Eddie the Engineer or Sam the Scientist."

The science role models most students know best are their teachers. But science teachers who are both passionate and prepared are scarce. U.S. high school students have just a 40% chance of studying chemistry with a teacher who majored in the subject, according to a 2005 report from the National Academy of Sciences. By contrast, they have a 70% likelihood of studying English with an English major. Often, educators at the elementary level never liked science in the first place. That's in part because science enthusiasts, who start at about \$32,000 in a public school teaching job, are lured to careers in the business world. "Corporate America is eating its feed corn," says Wheeler. Women who excel in science today, he says, have career options that weren't open to them in the Sputnik era, a victory for equality but a loss for schools. "Teachers are so frightened of these subjects that they transmit the fear to the children," says former Merck CEO P. Roy Vagelos. "These kids are afraid of science."



A teacher must feel confident in the subject to veer from the rote learning that turns so many students off. At Frick Middle School in Oakland, Calif., science teacher Caleb Cheung turned seventh-graders into inquisitive crime-scene investigators when he introduced a unit last fall on cells and microscopes.

Students arrived in class to find an empty birdcage and a ransom note--someone had apparently kidnapped Cheung's pet doves, Herbert and Angel. For the next six weeks, the young detectives analyzed fingerprints, interviewed witnesses and compared hair and fabric samples under microscopes to find the perpetrator.

In Cheung's school district, as in many others across the country, science instruction has been losing out in some grades to math and language arts, the subjects that are currently tested under the federal No Child Left Behind law. U.S. elementary school kids spend an average of just 16 minutes a day on science, and that's dwindling to zero in many schools. "Teachers have reported to us that their principals have walked into their classrooms and said, 'Stop teaching science,'" says Wheeler. Even teachers who

are eager and equipped often face daunting curricular goals--U.S. science texts usually cover many more topics than international ones do. "Compared to the rest of the world, we're a mile wide and an inch deep," says Wheeler.

There are some signs of hope on the pedagogical horizon.

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Beginning in the 2007-08 school year, No Child Left Behind will require states to start testing in science in three grades. "There's gonna be a large snapping sound as schools suddenly remember they do have to teach science after all," says Wheeler. In his speech, Bush said he would like to train 70,000 high school teachers to lead advanced-placement courses in math and science, nearly tripling the number of such teachers, and expanding access for low-income students to those rigorous courses. Another of Bush's plans would bring 30,000 math and science professionals to teach in classrooms through an Adjunct Teacher Corps program. Educators and industrialists who have long been pushing for action say they want to see the fine print of Bush's proposal. "There were a lot of hoorays from the business world," says Bill Swanson, CEO of Raytheon, a defense company that offers schools \$1 million in math grants each year. "But I'm concerned about what's going to happen in that fourth- to eighth-grade range. If you lose a kid then, it's awfully hard to get him back into science in high school."

While Washington is just getting on board with science education, some programs that originated outside the Beltway are flourishing. The University of Texas at Austin's UTeach graduates 70 students a year with teaching certificates and bachelor's degrees in a science or math, and those aspiring teachers are more than twice as likely to stay in the eight-year-old degree program as other science students. A crucial element of the program's success, says co-director Michael Marder, is giving students classroom experience in their first year. "The best way to convince talented young people to teach," says Marder, "is to give them an opportunity to try it."

—*With reporting by Amanda Bower/ San Francisco*

