

from the March 23, 1999 edition

Science ed under the microscope

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BOSTON—

When you're one of the last to cross the finish line in a key race, it's time to reassess. Was it just a bad day or should you look for a different sport?

But quitting isn't an option when the race is science education. Ever since the Soviet Union beat the United States into space in 1957, American students' science achievement has been under intense scrutiny.

Yet American students are still struggling behind their international counterparts – and it's prompting a major review of how kids are being taught and by whom.

"It's no longer OK to depend on the 2 percent of students who are science whizzes," says Lee Herring of the National Science Foundation. "The accelerating pace of change is mandating that individual citizens be more flexible intellectually."

And that means a populace with better science skills.

By the middle grades, students are losing interest in science and by their senior year only about half have completed four years of science. Only one-quarter enroll in physics. These conclusions came out of last year's Third International Math and Science Study (TIMSS). While US fourth-graders were near the top, 12th-graders dragged in at a dismal 19th out of 21 countries in the test (ahead only of Cyprus and South Africa).

These results are particularly troubling given the breakneck clip of scientific and technological advancement, says Mr. Herring.

As a result, science education has been tossed in the petri dish for closer examination. From the wide body of research being conducted by all manner of groups – national educational organizations, universities, independent research groups – a few messages are consistent:

*To engage students, learning needs to be more hands-on.

*Teachers need more support, training, and incentive.

*The nation needs to adhere to a cohesive, consistent, and rigorous set of science-education standards.

*US science curricula cover too many topics.

But in the classroom where the reports, policies, and official recommendations are just so much background static, many teachers are simply trying to change student perceptions of science.

"I try to teach the kids that they are scientists," says fourth-grade teacher Mary Lynn Wright from Bellows, Vt. "They think of it as having to be 55 and in a white coat."

Ms. Wright and about 50 other teachers and counselors convened last summer for a workshop at Smith College in Northampton, Mass., on ways to support gender equality in the classroom. The gender gap in science is another issue facing educators – while women are making strides, they're still underrepresented in the sciences.

"I'll hear the girls in the hall saying, 'I'm not good at it,' " Wright adds.

There's widespread consensus that the most effective way to help all students is through more hands-on learning.

Raynaldo Montero, an eighth-grader who attends public school in Lawrence, Mass., is participating in an after-school enrichment program through Phillips Academy in Andover. The program is aimed at boosting science skills through interactive projects.

"Here, you get to catch stuff. You get to do stuff," he says while constructing a Lego car complete with battery-powered engine. "And you understand it better."

Science class at school, Raynaldo complains, is where you do "boring stuff," like vocabulary and videos.

Seventh-grader Alicia Gravel, who's deep in a project about rabbits – markers and poster board spread around her – says, "They make it fun here. It doesn't make you want to fall asleep."

But on the national level, the focus on teachers is intensifying.

A recent report from the National Science Foundation called good teaching a "vein of gold. To mine it, we'll have to pay more to attract and keep the best."

The report also called for strong preparation and measurable standards, citing that as many as 25 percent of teachers didn't major or minor in the subject they're teaching.

In response to the need for more preparation, the National Science Teachers Association (NSTA) launched "Building a Presence for Science" four years ago. The campaign is focused on changing the way science is taught through support and professional development for teachers.

But the NSTA says its No. 1 push – and the framework for "Building a Presence" – is the National Science Education Standards released by the National Research Council in 1995.

The standards are a set of principles and goals intended to serve as a model for schools nationwide.

As an illustration of the NSTA's commitment to these principles, at its annual convention (March 25-28 in Boston) it will focus on the standards and how to make them a classroom reality. Mr. Herring says that standardizing educational goals is essential – especially given the increased mobility of American society. But the national standards "haven't really caught on" yet.

In the meantime, critics say more needs to be done to move beyond traditional teaching methods.

"One of the biggest problems they discovered through the TIMSS study is that US science texts cover a ton a material, but are shallow," says Herring. "They put everything under the sun in there, and then the teachers feel they have to teach everything." With increased support for teachers and a recalibrating of teaching methods, the solution to American science woes might not be so far off.

Smith conference participant Jane Kennedy, an elementary school teacher, remembers what fired her interest in science. "I had this fourth-grade teacher whose whole room was filled with aquariums and terrariums," she says. "It was great. I love science. I still do. "