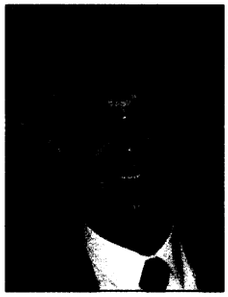
(continued from page 793)

in mid-January. The worry for some labs is that they will not come up with enough sexy proposals to recoup their 5% contribution to the fund. One center—DESY, Germany's particle physics lab in Hamburg—has even asked to be exempted from the Strategy Fund until 2002. DESY's problem is that nearly all its budget is committed years into the future to operate its large international projects, such as the HERA electron-proton collider. If DESY fails to win an exemption, says director Bjørn Wiik, it would have to shut down HERA and other projects for 3 or 4 months per year.



R. STONE

Big psychological change. MPG President Hubert Markl.

Also new to peer review is a group of 10 universities, including Cologne, Leipzig, and Ulm, which are participating in a pilot program to have panels of outside scientists vet science spending in the portion of their budgets funded by state government. In the past, these universities would negotiate their budgets directly with local officials. "It was clear they would get it every year," says MDC's Kettenmann, who serves on a panel reviewing the University of Leipzig. Now, he says, "we have the possibility for the very first time to peer review part of the basic budget of a university."

Another, longer term policy shift—coming from the institutes themselves—is to give lab directors more control over how to spend their funds. Currently, the government spells out for each institute how much of its budget it can devote to different types of expenditures, from construction of new facilities to personnel—down to every last position. Markl and other science leaders are now negotiating with officials in the research and finance ministries over changes in the 1999 budget that should give more decision-making to the labs. "We will be freer to move around our resources ... to say, 'Let's not buy this machine, but employ new people,' " says Markl.

And some new hiring is sorely needed, because the federal government has enforced a 2% reduction in federally funded staff in all its institutes over the past several years that has crippled efforts to employ new researchers. "In my 5 years here, I've been given one permanent position" for a new staff scientist, says Hans Specht, director of the Institute for Heavy Ion Research (GSI) in Darmstadt. Adds Treusch, "There's a danger of petrification because there's little chance to engage young people." The national labs' Strategy Fund should help here too, as grant winners will be able to offer scientists temporary jobs.

Thus far, researchers have not protested too vigorously against the government's reforms. "Many people are not yet sufficiently feeling the crisis," MDC's Ganten says. But a more painful triage may be in store in future years if the economic situation does not improve. "We have to have the courage to close things that aren't competitive," says Wiik. "Bad science is worse than no science," he says.

–Richard Stone

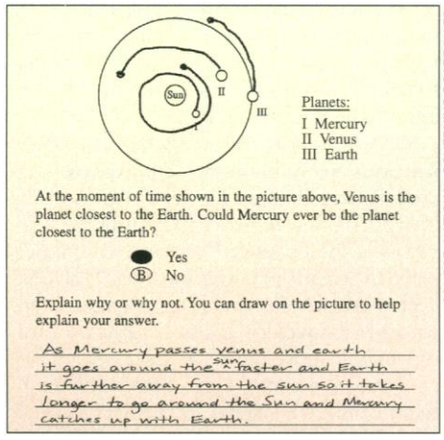
SCIENCE EDUCATION

Students Don't Measure Up to Standards

A new test designed to assess U.S. schoolchildren's understanding of science, rather than just their knowledge, has produced disappointing news: Fewer than 30% of those who took the test demonstrated the basic competence expected of students in their grade. But science education leaders say the exam is a step in the right direction, and it may help guide classroom teachers toward more effective science teaching.

The test was part of the National Assessment of Educational Progress (NAEP), which gauges student progress in several subject areas, including reading, mathematics, and geography. This year's science test is a far cry from the multiple-choice exams most U.S. schoolchildren are used to. Students spent 80% of the 90-minute science test answering open-ended questions and performing and analyzing experiments. Fourth graders, for example, were asked to describe differences and similarities in the life cycles of grasshoppers and butterflies. Eighth graders had to estimate the salt concentration in a water sample by comparing the height of a pencil floating in distilled water, a 25% salt solution, and the unknown sample. And 12th graders were challenged to describe a test—other than tasting or smelling—that could distinguish between samples of ocean water and fresh water. Students were rated against a fixed set of standards instead of the "national norm"—the overall average performance.

The results, analyzed in a report* by the independent National Assessment Governing Board, which sets policy for NAEP, paint a bleak picture. More than 70% of the 130,000 students tested—a representative sample from each state—failed to reach the "proficient" level in science, defined as "competency in challenging subject matter," and nearly a quarter failed to achieve the "partial mastery" of the basic level. Only 3% reached the advanced level, which indicates "superior performance" beyond the expected grade level.



SOURCE: NATIONAL GOVERNING BOARD/NAEP

Right answer. Only 20% of eighth graders got full credit for a complete explanation.

"The test will send an extremely strong message to schools" that in-depth understanding of science is important, says Audrey Champagne, a professor of chemistry and education at the State University of New York, Albany, and one of the authors of the report. She says the test measures whether students are meeting standards proposed by national organizations, including the American Association for the Advancement of Science (AAAS), which publishes *Science*, and the National Research Council—standards that by most accounts have reached few classrooms. George Nelson, associate director of AAAS's Project 2061, a science education reform effort, agrees. "The NAEP test was really built to probe the kind of learning we're talking about on the standards," he says, and the results suggest "that change is necessary."

The lackluster performance seems to conflict with the much-touted results of the Third International Mathematics and Science Study (TIMSS)—an international exam on which U.S. fourth graders were bettered only by Korea, and eighth graders were above the international average (*Science*, 22 November 1996, p. 1296; and 13 June, p. 1642). But Martin Orland of the Department of Education's National Center for Education Statistics says, "TIMSS shows that the U.S. is slightly above the international average, while the NAEP data say that there is a large proportion of students who don't achieve the levels we'd like to see."

But those levels are not out of reach, Champagne insists. The test "provides a very realistic goal for science education in the U.S.," she says. "We could do a lot worse than teaching to this test."

–Gretchen Vogel

* The full text of the report is at www.nagb.org/scirpt97.pdf.