members of the NRC committee note. While physicists at the Stanford Linear Accelerator Center (SLAC) and Japan's KEK laboratory have been working in close concert on a design that uses conventional radio-frequency cavities to accelerate the electrons, Germany's DESY lab is hard at work on a plan that uses superconducting technology. That's a bad omen for future collaboration, some say. "Each lab gets committed to its own technology," explains Michael Riordan, assistant to the director at SLAC. "You have this kind of technological inertia."

Overcoming that inertia, and bringing all the labs together, may take the creation of a "world HEPAP," says Peter Rosen, DOE's associate director for high-energy and nuclear physics. It may have to come soon. Already, DESY director Bjorn Wiik has made the rounds at towns near Hamburg to build support for an underground tunnel that could house the NLC. Wiik says he is simply preparing the ground for DESY's proposal. But many say that raising the issue of the NLC's site at this early stage is risky, because each lab is likely to want the new accelerator in its own backyard. "I have to say, quite frankly, it's not good for international collaboration," says Rosen.

–David Kestenbaum

GLOBAL MATH-SCIENCE TEST

Northern Europe Tops in High School

The Winter Olympics are over, but this week many of the countries at the top of the medals chart could claim another victory in worldwide competition: Their high school students were the top performers in the latest results from the Third International Mathematics and Science Study (TIMSS). Unfortunately for the United States, its solid standing in Nagano was not replicated on TIMSS. Instead, U.S. high school seniors performed near the bottom in general science literacy, were second to last in advanced mathematics, and brought up the rear in advanced physics. The results "debunk the myth that our best and brightest are still the best in the world," says Larry Suter of the U.S. National Science Foundation's education directorate. "There is no evidence here that any of that is true."

The new results are the third in a series of international assessments of student performance in mathematics and science. The first showed Singapore, Japan, Korea, and the Czech Republic at the top of the heap among seventh- and eighth-grade students (*Science*, 22 November 1996, p. 1296). The second test, for third- and fourth-graders, featured the same countries, plus strong showings by Hong Kong in mathematics and the United States in science (*Science*, 13 June 1997, p. 1642). Asian countries did not participate in the latest assessment, however, citing the intense pressure on their students in the senior year to prepare for college entrance exams. "We naturally were disappointed," says TIMSS international study director Albert Beaton of Boston College. "My guess is they would have done very well."

The latest report includes the results of three tests. An assessment of general mathematics and science literacy—given to students from both academic and vocational tracks—included questions on basic algebra, proportionality, estimation, life science, physical science, and earth science. A second test assessed students in advanced mathematics courses [those in precalculus, calculus, or advanced placement (AP) calculus in the United States]. And a third assessed students taking advanced physics (either physics or AP physics in the United States). The Netherlands and Sweden scored highest on the general literacy exam, while France and the Russian Federation outpaced 14 other countries on the advanced mathematics test. Norway, Sweden, and the Russian Federation had the highest scores among the 16 countries whose students took the advanced physics exam.

Although educators praise the latest findings, they provide few simple answers about why some countries do better than others. As with the other exams, top scores did not correlate directly with any of the factors commonly associated with student performance. Students in high- and low-scoring countries spent about the same amount of time in math and science classes, had similar amounts of homework, and watched about the same amount of television. "The study just doesn't have a lot of new insights into why," Suter says.

The new test also found that, once again, boys scored better than girls did. The differences were not consistent in all countries, however, ranging from 17 points in the United States to 57 points in Norway. That result "will make an uproar in this country," says Svein Lie, a science education professor at Oslo University and head of Norway's TIMSS project.

Pressed for possible factors contributing to his country's high ranking, Lie notes that Scandinavian students typically start school a year later than most of the rest of the world and are a year older when they graduate. Barbara Wennerholm of the National Agency for Education in Stockholm, Sweden, points to the homogeneity of the Swedish system, in which students on vocational tracks have the same science teachers as those on academic tracks.

For U.S. officials, the results reinforce the unhappy lessons of the earlier tests. A recent analysis of the elementary and middle-school results shows that U.S. students decline in almost all subject areas between the fourth and eighth grades. As a result, says William Schmidt of Michigan State University in East Lansing, "you have to do remarkable work at the high school level to make up for that."

–Gretchen Vogel

MATHEMATICS AND SCIENCE LITERACY

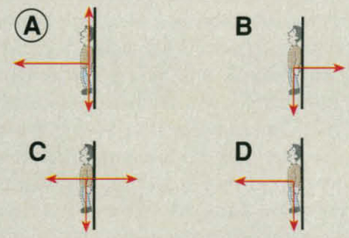
Country	Mean score	
The Netherlands	559	Significantly above
Sweden	555	
Iceland	541	
Norway	536	
Switzerland	531	
Denmark	528	
Canada	526	
New Zealand	525	
Austria	519	
Australia	525	Average
Slovenia	514	
France	505	
Germany	496	
Czech Republic	476	
Hungary	477	Significantly below
Russian Fed.	476	
Italy	475	
United States	471	
Lithuania	465	
Cyprus	447	
South Africa	352	
Average	**500**	

SOURCE: IEA/TIMSS, 1995–96

Northern highlights. Scandinavia dominates general literacy test, with the U.S. well below average and Asia not participating.

The figure below shows a special sort of amusement park ride. As the ride starts to rotate about its central axis, the floor drops slowly but the rider does not. The rider is pressed against the rough inside wall of the rotating cylinder and remains at rest with respect to the wall. The rider's feet are not in contact with the floor.

Which one of the following diagrams best represents the real forces acting on the rider?



SOURCE: TIMSS

Feeling the pressure. Only 20% of advanced physics students gave the correct answer.

* The full report, including sample problems, is available at http://wwwcsteep.bc.edu/timss