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Which Students Are Worst At Science?

Critics say comparisons among nations are flawed.

By GINA KOLATA

VERY few years, a new study rolls out announcing once again that American students know less math and science than even students in the poorest countries. And every time, the reports result in a national orgy of self-flagellation and cries for new rounds of reform in American

schools.

The latest comparison, conducted by the Educational Testing Service of Princeton, N.J., and involving 20 countries, will be reported on Feb. 3. The betting is that the United States will, as always, rank at or near the bettom.

bottom.

But this time, a growing and vocal collection of revisionists has begun arguing that the comparisons are invalid. The entire United States population, they contend, is consistently being compared with other countries' elites. No wonder Americans are

elites. No wonder Americans are found wanting.

These critics stress that they in no way mean they find nothing to improve in American schools. But, they say, it is disingenuous to use interna-tional comparisons to whip up the population to demand school reforms. "The rankings of nations in inter-

national test comparisons are meaningless," said Dr. Iris Rotberg, a program administrator at the National Science Foundation who is on leave to work as a senior scientist at the RAND Corporation's Institute on Education and Training in Washing-

Dr. Harold Hodgkinson, the direc-tor of the Center for Demographic Policy in Washington and a former director of the National Institute of Education, said that the tests were flawed and not very helpful.

Dr. Daryl Chubin, a senior associate at the Congressional Office of Technology Assessment in Washington, said, "The international compari-

on, said, The international compari-sons have been over-interpreted.
"In this country and in particular in this era of educational ferment, anyone who has new numbers will use them to champion an argument," he added. "We're talking about the

he added. "We're talking about the rhetorical use of rank numbers. In the absence of good data, you get along with whatever you can."

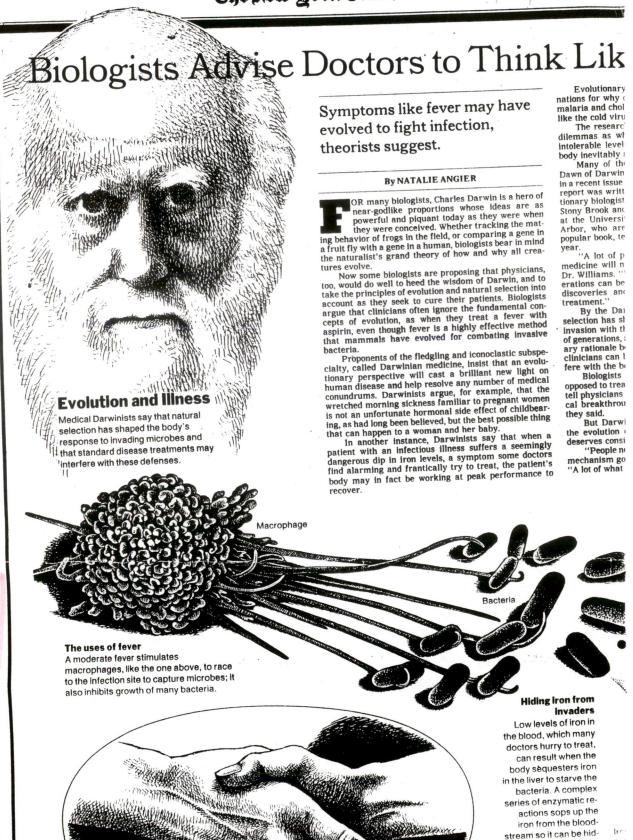
Proponents of the tests argue that the comparisons are useful benchmarks and that it would be a mistake to throw away discomforting findings because of methodological obstacles.

Archie Lapointe, the director of assessment at the Educational Testing Service, said that the criticisms have "a kernel of truth." But, he said, the data show what sort of achievement is possible, albeit often among the very best, selected students, and give

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Which Nation's Students Are Worst at Science?

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In response to its critics, Mr. Lapointe said, the Educational Testing Service is being "much more careful about how we report the data." For example in the forthcoming report it will explicitly describe the different student populations in the body of the text rather than in footnotes and as text rather than in footnotes and appendices, as was done previously. "Every time we say Israel, we will say, in parentheses, Hebrew schools," he said, to convey to readers that most Arab students were not included.

Dr. Diane Ravitch, Assistant Secretary of Education for Educational Research and Improvement, warned that it was dangerous to dismiss the international comparisons. "None of the assessments are perfect, that's true," she said, but that is no excuse for disregarding them. Every time an assessment is done, she said, "U.S. students have placed at or near the bottom.

"The consistency is so strong that you cannot ultimately ignore it and say it means nothing," she added. "When you come up with the same results time and time again, you have to say there's something there."

Dr. Harold Stevenson, a psychology professor at the University of Michi-gan, agreed. "One of the things that is convincing is that there have been so many studies with different populations, different cities, different tests and they consistently came out in the same direction," he said. Dr. Stevenson, who conducts a study comparing children's math and science achievement in selected cities in the United States, China and Japan, added that he finds that "U.S. children are be-hind as early as the first grade."

His view was supported by Albert Shanker, the president of the Ameri-can Federation of Teachers. "It would be appropriate to raise this question if we had reason to believe that American students are doing well and all of a sudden international comparisons come along and say we are at the bottom," he said. "But I think it's silly to try to shoot holes in international comparisons when there is a huge body of evidence that we are doing terribly.

Among the recent implicit and ex-plicit uses of international compariplicit uses of international comparisons are President Bush's stipulation, as an educational goal, that the United States should rise to first place in the math and science comparisons by the year 2000. A 1989 report calling for reforms in mathematics education, put out by the National Reseach Council, stated: "Children can succeed in mathematics. Many do in other countries and some do so in this other countries and some do so in this

Critics say that the international tests of mathematics and science achievement have all suffered from what Dr. Hodgkinson called the "major problem." By high school, most countries have already dropped the poorer performers from their schools. American bith school stucountries have already dropped the poorer performers from their schools. American high school students thereby end up being compared with other countries' select few.

"If you are comparing 16-year-olds "If you are comparing 16-year-olds you are going to compare the top 70 to 80 percent of Americans with maybe the top 30 percent in European countries," Dr. Hodgkinson sald. "If a nation has only the top 5 percent in the comparison, it will do a lot better than any other nation's top 70 percent."

Some Schools Are Excluded

There is an uneven playing field even when younger groups are com-pared, Dr. Hodgkinson noted. He said that many countries vie for top hon-ors in these international compari-

2 Comparisons and Caveats Critics of international comparisons that find American high school students far behind in science and math tests say a large majority of American students are tested, while testing of their foreign counterparts frequently includes only elite students. MATH performers **PROFICIENCY** Average scores for 13-year-olds who took International Assessment of Educational Progress test in 1988. New Brunswick (French): 514.2 567.8 Korea Quebec (French)1 511.7 543.0 509.9

United Kingdom² British Columbia 539.8 Quebec (English)1 535.8 504.3 New Brunswick (English) 529.0 Ontario (French) 481.5 Ontario (English) United States 473.9

Only four Canadian provinces assessed; separate authors for English-speaking students.
Only students who took the test in Castillan included in data analysis.
Only English-speaking students from England. Sootland and Wales tests from Inner London Educational Authority excluded.

Sources: Ins Rothberg (pyramids); Educational Testing Service (table)

Some experts say consistently poor scores in the U.S. cannot be ignored.

sons by purposely excluding schools or districts or groups of students who they know will pull their scores down. "In many countries, to look good is very good for international prestige," he said. "Some restrict the students taking the test to elite schools."

Dr. Harold Howe, a senior lecturer Dr. Harold Howe, a senior lecturer emeritus at Harvard University who was the United States Commissioner of Education from 1965 to 1968, agreed. "Every country is highly motivated to make themselves look as good as possible," he said. "It is very hard in an international population where you don't control the detailed process of selecting the sample and administering the test to be sure that the process is watertight."

Mr. Shanker argued, however, that many tests of younger students do reflect representative samples of students in different countries.

Dr. Rotberg said that different countries varied substantially in the way that mathematics and science are taught. "In European countries, students who will go on to universities specialize right away," she said. They study mathematics and science intenstudy mannermates and science inten-sively in high school rather than tak-ing a broad range of courses. "This means there is a relatively small group of students and a very demand-ing curriculum," she said. "That will show up on test scores."

Karel van Wolferen, the author of

"The Enigma of Japanese Power," said it should be no surprise that Japanese students do well on standardized tests. Only a small propor-tion who pass qualifying tests go on to tion who pass qualifying tests go on to the top high schools, where they spend their time training for college entrance exams, he said. Mr. van Wolferen, who recently established the Institute for Independent Japa-nese Studies in Washington, said that Japanese students "are educated— or trained, I would hardly call it edu-cation—to pass exams."

Memories of Sputnik

The international comparisons began in the 1960's, when Americans had Sputnik fresh in their minds and were afraid they would lose the space race to the Soviet Union. They were conducted by the International Association for the Evaluation of Education tional Achievement, a group based in the Netherlands. These tests, Dr. Rotberg pointed out, compared the 80 percent of Americans who attended high school with 9 percent of West Germans, 13 percent of students in the Netherlands and 45 percent in Sweden who attended the highly academy who attended the highly academy was a support of the state of the s demic and selective final years of high school in the 1960's. "It is not surprising that U.S. students did not do well in these comparisons," she said 25.

More recent comparisons by the international association have similar drawbacks, Dr. Rotberg said. For example, she said, in a 1987 report, Japan ranked first among 20 countries in eighth-grade mathematics achievement and Hong Kong ranked in the middle of the various countries. assessed. But, she said, by 12th grade, when 15 countries are compared, Hong Rong ranked first.

The reason, Dr. Rotberg proposes, is not so complicated: by 12th grade,

Hong Kong has eliminated all but 3 percent of its students from taking mathematics, while in Japan, 12 perrecent of students take mathematics in 12th grade. So, Dr. Rotberg said, Hong Kong's elite is being compared with broader ranges of students in other countries, making its pre-emi-nence inevitable.

Some American scientists say they have long been suspicious of international comparisons because the re-sults belie their own observations. Dr. Ponzy Lu, a chemist at the University of Pennsylvania who went to high school in England and did postdoctor-al work in Germany, said that he saw no evidence of American inferiority in science when he assessed students who study under him.

Foreign students have to meet

much higher standards than Ameri-

In Israel, reports on tests exclude pupils in Arab schools.

cans to enter American graduate schools, he said. At the University of schools, he said. At the University of Pennsylvania, Americans who score at the 50th percentile on their Graduate Record Exams are usually admitted, while foreign students must have scores above the 90th percentile, Dr. Lu said. But even so, the foreign students range from "absolutely awards" in the foreign students range from "absolutely awards" which ful to fantastically good," which means, Dr. Lu said, that "the stan-dardized test scores don't mean

Emphasizing the Basics

Dr. Rotberg agreed and cautioned that Americans' love of testing can result in a misplaced emphasis in teaching information that is easy to test in multiple-choice exams.

"I think that focusing on tests will make it much more difficult to make changes that need to be made," Dr. changes that need to be made," Dr. Rotberg said. In particular, she advo-Rotterg said. In particular, sne advo-cated placing more emphasis on teaching students basic concepts of science, scientific methodology, how to understand the science behind ma-jor issues in public policy — like arguments over global warming — and how to do independent research. Dr. Hodgkinson said the emphasis

on international comparisons masked the fact that many American schools were in fact doing a good job. The top 10 percent of American students are scoring 14 points higher on the Scho-lastic Aptitude Tests than they were 10 years ago, he said. There has been no decline in Graduate Record Examination scores, he said, adding that "if high schools are doing so miser-ably, you would hardly expect col-leges to recoup that."

Dr. Howe expressed concern at the assumption often made by politicians and educators that if test scores are low, then the problem is in the schools and can be fixed by yet another round. and can be fixed by yet another round of curriculum reform or infusion of

Low test scores, "are not just a measure of schools," he said. "They are a measure of the entire society. he environment in the home and the kinds of social and medical services available to kids are extremely important in affecting the kinds of lives these children are able to lead and the kinds of scores they get.

"The main problem with the school reform movement in the United States is that we have the basic as-sumption that we can fix the schools so the schools can fix the kids, no matter what is wrong with the family and the community.