

INTERNATIONAL MATH-SCIENCE COMPARISON FINDS U.S. BETTER IN SCIENCE

From U.S. Dept. of Education

■(WASHINGTON) According to the most thorough international study of math and science education ever conducted, U.S. students are above average in science and below in math.

"Pursuing Excellence: A Study of U.S. Eighth Grade Mathematics and Science Teaching, Learning, Curriculum and Achievement in International Context," released this week by the U.S. Education Department's National Center for Education Statistics, reports U.S. scores in both math and science as not significantly different from those of England or Germany. In science, among participating G 7 countries — America's major economic and political allies — only Japan scored significantly higher than the U.S. [G 7 countries include the United Kingdom, Canada, France, Germany, Japan and Italy. Italy did not participate in the test.]

Overall, American students are above average in life sciences and environmental issues, average in fractions, algebra and physics, but struggle with measurement and geometry.

"If we see the news in the report as simply a horse race story of who finished first and who finished second we miss the point," said U.S. Secretary of Education Richard W. Riley. "The issues are much deeper — the content and rigor of what we are teaching — how we go about teaching — the fact that we continue to shortchange America's teachers by not giving them the preparation and help they need to do the best job possible in the classroom. One of the clear messages of this report is that we need to take a good, hard look at what we teach and how we teach math."

Among the findings drawn from the Third International Mathematics and Science Study (TIMSS):

- eighth grade mathematics classes in the

U.S. are not as advanced and not as focused as those in Japan and Germany;

- topics taught in U.S. eighth grade mathematics classrooms are at a seventh grade level by international standards;

- the content of U.S. mathematics classes requires less high level thought than classes in Germany and Japan;

- U.S. mathematics teachers' typical goal is to teach students how to do something, while Japanese teachers' goal is to help them understand mathematical concepts.

The international comparison suggests a general improvement in U.S. science from a 1991 assessment that placed American students below average, though the tests and the set of participating nations have changed. U.S. mathematics performance, however, remains slightly below the international average.

Riley said states and local school districts should review and toughen their academic standards, and cited materials prepared by the National Council of Teachers of Mathematics as an example of how to improve the teaching of math.

According to the report, U.S. teachers are generally familiar with the tougher standards suggested by the council, but it appears that other nations, notably Japan, are doing a better job of actually teaching tougher material. Based on videotapes of actual classroom instruction, the researchers found that U.S. math classes still largely focus on how to solve problems, while Japanese teachers do a much better job at helping students understand the concepts behind the solutions.

Riley said the department will sponsor a series of regional and state workshops on the results of the study, with an emphasis on successful practices that illustrate more rigorous content and teaching methods. Riley also said the department will prepare and send a summary of the report to business and education leaders and the nation's local PTA chapters. The department also will work with communities and states, as well as the National Science Foundation, the National Academy of Sciences, and the nation's math and science teachers to share what works to boost achievement.

The study found that common culprits such as television watching and lack of time devoted to study could not account for the below average U.S. math scores. Heavy TV watching was found to be about as common in Japan — one of the highest scorers — and U.S. students actually spend more class-

room time on math and science than students in both Japan and Germany.

Riley said colleges and universities should examine how teachers are prepared and suggested that guidelines from the National Commission on Teaching and America's Future be considered as a "blueprint" of how to proceed. The commission has called for high standards, more opportunities for apprenticeships, mentoring by master teachers and work schedules that permit ongoing professional development.

"Every student should enter middle school and junior high school with a firm grasp of arithmetic," Riley said, "but clearly employers want problem solvers, people who have mastered the basics and can apply that knowledge to new situations. Our math curriculum in middle schools and junior high schools lacks focus and too much class time is spent memorizing formulas at the expense of understanding useful concepts."

Other findings in the TIMSS report include:

- There was little difference in how U.S. boys and girls scored in both math and science;

- Japanese teachers have more opportunities to discuss teaching related issues with their colleagues than do U.S. teachers;

- U.S. teachers assign more homework and spend more class time discussing it than teachers in Germany and Japan. U.S. students report about the same amount of out of school math and science study as their Japanese and German counterparts;

- U.S. teachers generally receive more formal education, but not as much hands on training and daily support for quality teaching as their Japanese colleagues;

- Although most U.S. math teachers report familiarity with reform recommendations, few apply the key points in their classrooms.

Additional TIMSS reports, examining the math and science achievement of fourth and 12 grade students, are being prepared. In all, nearly 500,000 students participated in TIMSS — 40,000 in the U.S.

Printed copies of the report are available while they last from the National Library of Education at 1/800/424/1616. The report also will be available from the U.S. Government Printing Office.

"If you think education is expensive — try ignorance."

Derek Bok

Inhofe, continued from page 5

being hit with huge tax bills they are not expecting. The bill Inhofe and others will introduce in January when Congress returns will simply make clear that family farmers may continue to receive the tax benefits which Congress originally intended them to have. Under the cash method of accounting, using installment sales for their deferred payment commodities, farmers will not be liable for tax payments until the year in which the payments are received.