

## **PISA 2006 Results in Mathematics**

The 2006 Programme for International Student Assessment (PISA) results released on December 4 concentrated on science, with a brief update in the math literacy skills of 15-year-olds who are at an age when compulsory schooling ends in most countries. The 2003 PISA looked in detail at mathematics, and the 2009 assessment will again highlight mathematics. The PISA differs from other assessments by measuring students' knowledge in the context of everyday situations and their ability to take what they know and apply it to unfamiliar problems.

PISA is a program of the Organisation for Economic Cooperation and Development (OECD). The OECD is composed of 30 developed countries, which, together with 27 partner countries whose students took the 2006 test, make up 90 percent of the world economy. More than 400,000 students took the test in 2006, which has been given every three years since 2000.

PISA 2006 results ranked U.S. students 25th out of 30 OECD countries in mathematics. This ranking places them lower on average than their counterparts in the participating countries in both math literacy and problem solving. The difference between the U.S. mean score in 2003 (483) and 2006 (474) is not statistically significant. What has changed is that the performance of students in other countries is improving while U.S. students' performance remains static. The PISA mean for OECD countries was set in 2003 at 500 and is the benchmark against which mathematics performance is measured in PISA 2006.

Pushing this trend is that students in other countries are graduating and attending college at higher rates, while rates for U.S. students are declining in both.

In today's global environment, international comparisons are relevant because Americans are in competition with workers around the world. American businesses and economists are increasingly aware that the quality of U.S. workers will determine the future viability of the American economy.

In the 2006 PISA, mathematics was reduced to 120 minutes from 210 minutes given to the subject in 2003, providing an update rather than an in-depth analysis.

The information gathered from PISA 2006 supports the National Council of Teachers of Mathematics' philosophy that students who learn mathematics with understanding are better prepared to solve problems that they may face in real-life situations than students who have not fully grasped mathematics concepts.

### **Talking Points for PISA**

- In 2006, U.S. students earned a lower average score in mathematics literacy and problem solving

than students in OECD countries. U.S. students had a mean score of 474 while the OECD average was 498 points. The difference between the U.S. mean score in 2003 (483) and 2006 is not statistically significant.

- The U.S. had a below-average proportion of top performers, with only 7.7 percent of 15-year-olds reaching at least level 5 on the mathematics scale, compared to an average 13 percent for the other OECD countries. These higher achievers are the most likely to pursue careers in science or math.
- The percentage of U.S. students performing at low proficiency levels was higher than the average for students of OECD member countries. Twenty-eight percent of U.S. students demonstrated very low proficiency in math, performing at levels that can limit an individual's ability to participate in society and the labor market.
- In 35 of the 57 countries participating, male students outperformed female students. In the United States, males outperformed females at level 4 and above. Data detailing the differences can be found in the results for PISA 2003 and will again be provided in the PISA 2009.

## What else can we learn from PISA?

Institutional tracking is closely related to socioeconomic background in its impact on student performance. The earlier students were tracked, the stronger the impact of socio-economic background on performance. Schools that placed students by ability for all subjects had lower student performance, on average, than schools that did not.

An adequate supply of teachers and educational resources across countries are associated with positive student outcomes, but these effects level out after taking socioeconomic background into account, since students from more advantaged socioeconomic backgrounds tend to get access to more resources.

The most important benchmark for U.S. students is how they compare to students in other countries as we are in a global economy.

## Additional Information

PISA Web site: [www.pisa.oecd.org](http://www.pisa.oecd.org)

<http://portal.mxlogic.com/redir/?kXLLczxNEVd7bNJeXXOrbVEVo76M0iQGrVlxM073t-LuXarxEVhjKrKrcC97DORmwaxqgL00jqgbPXxJ54QszHlfef6zASOCr2Mqc21EwjLtMQg0LWdDPEq89gd40TI0vGXelG6V-7PM76Qjr9JeXXOrbXNEVodUC82wfAxSziQ>

US Web site: [www.nces.ed.gov/surveys/PISA/index.asp](http://www.nces.ed.gov/surveys/PISA/index.asp) <http://portal.mxlogic.com/redir/?1jK-YOe76zAQsL6QXLL9ILCzBwsr01gJZeZ3yjdjekrypYJj016z0xw5Y3Pt-LuXarxEVhjKrKrcC97DORmwaxqgL00jqgbPXxJ54QszHlfef6zASOCr2Mqc21EwjLtMQg0LWdDPEq89gd40TI0vGXelG6V-7PM76QPr9JeXXOrbXNEVodUC82wfAxSziQ>

Sample items: [www.nces.ed.gov/surveys/PISA/Items.asp?SectionID=2](http://www.nces.ed.gov/surveys/PISA/Items.asp?SectionID=2)  
<http://portal.mxlogic.com/redir/?1jK-YOe76zAQsL6QXLL9ILCzBwsr01gJZeZ3yjdjekrypYJj016z0xwrfRqs3OgNZFOH0d3zAPt-LuXarxEVhjKrKrcC97DORmwaxqgL00jqgbPXxJ54QszHlfef6zASOCr2Mqc21EwjLtMQg0LWdDPEq89gd40TI>

[OvGXelG6V-7PM76Sjr9JeXXOrbXNEVodUC82wfAxSziQ>](#)

## **What can U.S. math teachers do with the PISA information?**

PISA has collected a variety of background information on 15-year-olds. Teachers may be interested in the student questionnaire and responses posted at the PISA Web site.

Although the PISA results for 2006 are focused on science, much of what is said about students' socioeconomic status, gender, race/ethnicity, and expectations holds true for students of mathematics.

PISA results also provide information on immigrant status and student performance and the role parents can play in raising student performance and moderating the impact of socioeconomic background.

Particularly relevant for teachers is the information on school management and the involvement of stakeholders in decision making and its effect on student performance.

Details and selected items in mathematics from PISA 2006 can be viewed in the PISA 2006 Science Competencies for Tomorrow's World, Volume 1: Analysis, beginning on page 304. Teachers might find it useful to give the items to their students and to discuss the students' solutions.

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