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## TIMSS 2007:

### ASIAN STUDENTS ARE TOP PERFORMERS IN MATH AND SCIENCE ACCORDING TO LARGEST-EVER GLOBAL ASSESSMENT OF STUDENT ACHIEVEMENT RELEASED TODAY BY BOSTON COLLEGE RESEARCHERS

- **Study Assessed Student Achievement at Fourth and Eighth Grade Levels Across Nearly 60 Countries;**
- **Students from Singapore, Chinese Taipei Are High Achievers Across Both Disciplines and Grade Levels; Hong Kong SAR, Japan and Korea Also Are High Performers;**
- **Positive Attitudes, Supportive School Environments and Resources Targeted for Math and Science Learning Seen as Key Factors to Achievement at Both Grade Levels**

CHESTNUT HILL, MA (12-9-08) – Students from Asian countries were top performers in math and science at both the fourth and eighth grade levels, according to the most recent reports of the Trends in International Mathematics and Science Study (TIMSS), released today by the study's directors Michael O. Martin and Ina V.S. Mullis of Boston College.

**In mathematics, at the fourth grade level,** Hong Kong SAR and Singapore were the top performing countries, followed by Chinese Taipei and Japan. Kazakhstan, the Russian Federation, England, Latvia, and the Netherlands also performed very well. **In mathematics achievement at the eighth grade,** Chinese Taipei, Korea, and Singapore were followed by Hong Kong SAR and Japan. There was a substantial gap in average mathematics achievement between the five Asian countries and the next group of four similarly performing countries, including Hungary, England, the Russian Federation, and the United States.

In science, students from Singapore and Chinese Taipei were top performers at both grade levels. **In science achievement at the fourth grade,** Singapore was

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the top performing country, followed by Chinese Taipei and Hong Kong SAR. Japan, the Russian Federation, Latvia, England, the United States, Hungary, Italy, and Kazakhstan also performed very well. **At the eighth grade in science,** Singapore and Chinese Taipei again had the highest average achievement, followed by Japan and Korea. England, Hungary, the Czech Republic, Slovenia, Hong Kong SAR, and the Russian Federation also performed well.

TIMSS is one of the world's most influential global assessments of student achievement in math and science. With more than 60 participants and 425,000 students assessed, TIMSS 2007 also is the largest study of student math and science achievement in the world. Each country sampled approximately 4,000 students in 150 schools. [Note: a list of participating countries is at the end of this release.]

The TIMSS 2007 report also provides data at the fourth and eighth grades for those countries that also participated in TIMSS 1995, 1999 and 2003.

"One of the great strengths of TIMSS is the ability to monitor progress in educational improvement over time," said TIMSS Directors Michael O. Martin and Ina V.S. Mullis of Boston College. "Such trend information is crucial in helping policy makers understand the impact of decisions about investment in education, curricular reform, and initiatives to improve instruction."

As with previous TIMSS reports, TIMSS 2007 data provide invaluable international benchmarks that can be used to help define world-class performance in mathematics and science at the middle or lower-secondary school level. Beyond comparisons in mathematics and science test scores, they said, the reports provide a wealth of information on educational policies and practices around the world, as well as on gender performance, home environment, curriculum and instructional approaches and teacher preparation in math and science.

Key findings include:

#### **COUNTRIES REACHING AN INTERNATIONAL "ADVANCED" BENCHMARK**

- Across both disciplines, Asian countries had the highest percentages of students reaching the Advanced International Benchmark, representing fluency on items involving the most complex topics and reasoning skills.
- In mathematics, remarkable percentages of students reached the Advanced International Benchmark. In particular, at the fourth grade, Singapore and Hong Kong SAR had 41 and 40 percent of their students, respectively, achieving at or above the mark. At the eighth grade, Chinese Taipei, Korea, and Singapore had 40 to 45 percent of their students achieving at or above it. The median percentage of students reaching this Benchmark was 5 percent at the fourth grade and 2 percent at the eighth grade.

- In science, the highest performing countries at the fourth grade -- Singapore and Chinese Taipei -- had 36 and 19 percent of their students, respectively, achieving at or above the Advanced International Benchmark. At the eighth grade, Singapore and Chinese Taipei had 32 and 25 percent of their students, respectively, achieving at or above the Benchmark. The median percentage of students reaching this Benchmark was 7 percent at the fourth grade and 3 percent at the eighth grade.

#### **TRENDS IN ACHIEVEMENT**

- At the fourth grade, in both mathematics and science, more countries showed improvement in 2007 than declines. Steady improvement since the first TIMSS in 1995 was shown by a range of countries.
- At the eighth grade, the pattern was less pronounced. Although close to a dozen countries showed improvements, most countries either showed little change or declined.

#### **ACHIEVEMENT BY GENDER**

- At the fourth grade, the differences in achievement between boys and girls were negligible in approximately half the countries in both mathematics and science. In the remaining countries, girls had higher achievement in about half and boys had higher achievement in the other half.
- At the eighth grade, the differences in achievement between boys and girls were negligible in about one third of the countries. In the remaining countries, girls had higher achievement than boys in more countries, especially in mathematics.

#### **HOME ENVIRONMENT**

- Across both subject areas and grade levels, students who reported speaking the language of the test at home had higher average achievement.
- At the eighth grade, higher levels of parents' education and the presence of books, computers and Internet access in the home were associated with higher average mathematics and science achievement.

## **STUDENT ATTITUDES**

- At both grades and in both subject areas, students with more positive attitudes toward these subjects, who reported a higher level of self-confidence in learning mathematics and science, and placed a higher value on them as important to future success, also had higher achievement.

## **SCHOOL ENVIRONMENT AND CURRICULUM**

Across both subjects and grade levels, on average:

- At both fourth and eighth grades, achievement was highest where principals and teachers had a positive view of the school climate, including high levels of teacher job satisfaction, high expectations for student achievement and parental support.
- Achievement was highest among students attending schools with more than 90 percent of students having the language of the test as their native language.
- Achievement was higher among students who attended schools that reported few attendance problems, few shortages or inadequacies in resources.
- There was a positive association between achievement and students' perception of being safe in school.
- Most countries reported having a national curriculum, and that preparation in how to teach it was part of pre-service education.

## **TEACHER PREPARATION**

- In both subjects, at both the fourth and eighth grades, the majority of students were taught mathematics by teachers in their 30s and 40s. Although about one fourth of the students internationally were taught by teachers 50 or older, relatively few students were taught by teachers younger than 30.
- Supplying schools with teachers well prepared to teach mathematics and science appears to be an increasing problem, especially at the fourth grade. At the eighth grade, most teachers had studied mathematics or science and reported feeling very well prepared to teach the topics in the TIMSS assessment. In contrast, teachers at the fourth grade reported little specific training or specialized education, especially in science. Just half the students had teachers who reported feeling very well prepared to teach the TIMSS science topics.

## **ABOUT TIMSS**

TIMSS, the Trends in International Mathematics and Science Study, is the largest assessment of international student achievement in the world and was the first to provide data about trends in math and science achievement over time.

TIMSS is a project of the International Association for the Evaluation of Educational Achievement (IEA) headquartered in Amsterdam, and is directed by the TIMSS & PIRLS International Study Center at Boston College in collaboration with a worldwide network of organizations and representatives from the participating countries.

TIMSS 2007 is the fourth in a continuing cycle of international mathematics and science assessments conducted every four years. TIMSS assesses achievement in countries around the world and collects a rich array of information about the educational contexts for learning mathematics and science.

The TIMSS 2007 report involved more than 60 participants: it contains science results for 37 countries and 7 benchmarking participants at the fourth grade and for 50 countries and 7 benchmarking participants at the eighth grade. Each country sampled approximately 4,000 students in 150 schools. Trend data are provided at the fourth and eighth grades for those countries that also participated in 1995, 1999, and 2003.

To inform educational policy in the participating countries, TIMSS also routinely collects extensive background information that addresses concerns about the quantity, quality and content of instruction. TIMSS 2007 offers detailed information about mathematics and science curriculum coverage and implementation, as well as teacher preparation, resource availability and the use of technology.

### **TIMSS 2007 PARTICIPANTS**

Participating countries: Algeria, Armenia, Australia, Austria, Bahrain, Bosnia and Herzegovina, Botswana, Bulgaria, Chinese Taipei, Colombia, Cyprus, Czech Republic, Denmark, Egypt, El Salvador, England, Georgia, Germany, Ghana, Hong Kong, Hungary, Indonesia, Iran, Israel, Italy, Japan, Jordan, Kazakhstan, Korea, Republic of Kuwait, Latvia, Lebanon, Lithuania, Malaysia, Malta, Mongolia, Morocco, Netherlands, New Zealand, Norway, Oman, Palestinian National Authority, Qatar, Romania, Russian Federation, Saudi Arabia, Scotland, Serbia, Singapore, Slovak Republic, Slovenia, Sweden, Syrian Arab Republic, Thailand, Tunisia, Turkey, Ukraine, United States, Yemen.

Benchmarking entities include the provinces of Alberta, British Columbia, Ontario and Quebec in Canada; Dubai (United Arab Emirates); Basque Country in Spain, and Massachusetts and Minnesota in the United States.

**MEDIA NOTE:** The full TIMSS 2007 reports will be available on-line at Boston College's TIMSS & PIRLS International Study Center web site at [timss.bc.edu](http://timss.bc.edu) or by calling 617-552-1600. To arrange interviews with study co-directors Michael O. Martin or Ina V.S. Mullis, or to obtain charts, please contact Patti Delaney at the Boston College Office of Public Affairs at 617-552-3352 or email [delaneyp@bc.edu](mailto:delaneyp@bc.edu).