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Lynch School of Education, Boston College

As global study TIMSS turns 20, new results show East Asian students continue to outperform peers in mathematics

Achievement rises, gender gaps narrow, and schools are safer, reports IEA's TIMSS & PIRLS International Study Center at Boston College

Chestnut Hill, Mass. (11/29/2016) — Singapore, Hong Kong SAR, Korea, Chinese Taipei, and Japan continue outperforming all participating countries in mathematics at the fourth and eighth grades, maintaining a 20 year edge according to results released today from TIMSS, the longest running, large scale international assessment of mathematics and science education in the world.

Between the top performing countries and the next highest performers there was a pronounced gap, of 23 points at the fourth grade and 48 points at the eighth grade, according to the quadrennial assessment directed by Drs. Ina V.S. Mullis and Michael O. Martin at IEA's TIMSS & PIRLS International Study Center at Boston College.

Those East Asian countries were strong in science as well, but the results were more varied. **In fourth grade science**, Singapore, Korea, Japan, and the Russian Federation had the highest achievement, and **in eighth grade science** it was Singapore, Japan, Chinese Taipei, Korea, and Slovenia.

More than 600,000 students around the world participated in TIMSS 2015 and TIMSS Advanced 2015, an analysis of secondary school students in STEM programs. TIMSS has been administered every four years since 1995, and is sponsored by the International Association for the Evaluation of Educational Achievement (IEA) in Amsterdam. TIMSS Advanced was conducted in 1995, 2008, and 2015.

TIMSS 2015 results were published online today, marking the sixth installment of the Trends in International Mathematics and Science Study that assessed 60 countries and benchmarking regions. By reaching its 20 year milestone, TIMSS earns the distinction of establishing the longest trend line of any international education assessment.

Over the short term and the longer 20 year period, TIMSS 2015 shows achievement trends are up, with more countries registering increases than decreases in both grades and subjects.

“The positive trends indicate education is improving worldwide, and it's not at the expense of equity between high and low achieving students,” said Mullis. “Remarkably, many

countries have been able to boost TIMSS scores across the achievement continuum and some have reduced achievement gaps as well.”

The TIMSS Advanced 2015 results, also published today, were less favorable. TIMSS Advanced monitors **students in their final year of secondary school** who have taken advanced courses in STEM subjects. Over the 20 years there were some declines and no improvements in the nine countries assessed.

In 2015, the TIMSS Advanced students struggled to reach the TIMSS International Benchmarks of achievement. Only relatively small percentages of these most able students performed at a high level.

Other highlights include:

- More students than ever were **able to reach the highest levels of achievement** — more than 40 percent in fourth grade mathematics and science, and more than 30 percent at eighth grade.
- **Gender gaps have narrowed.** The 20 year trends show longstanding differences favoring boys in mathematics and science have been reduced, especially in science and especially at the eighth grade. Results from TIMSS Advanced show a considerable narrowing of the gender gap in physics, perhaps reflecting the developments at earlier grades. Unfortunately, more boys than girls still enroll in advanced mathematics and physics.
- **Curricula have changed** across the globe over the 20 years of TIMSS. Preprimary programs often include curricular guidelines in mathematics and science, and topics once covered in higher grades are now taught in lower grades. Fourth grade mathematics often includes data and statistics, and fourth grade science has shifted from general study of students’ environments to life science, physical science, and Earth science.
- **An early start in education** has a lasting effect through the fourth grade. Higher achievement was tied to students who attended at least three years of preprimary programs, and whose parents often engaged with them in early numeracy and literacy activities before beginning primary school.
- **Students liked their instruction — a lot.** At the fourth grade, 94 percent of students found their teaching engaging, and 84 percent at the eighth grade did.
- **Students start out confident** in mathematics and science at the fourth grade, but that feeling erodes by the eighth grade — where about 40 percent of students report they were not confident in those subjects.
- **Most students felt they fit in** at school — 96 percent at fourth grade and 91 percent at eighth grade.
- **With the emergence of cyberbullying,** school-related bullying is a growing concern, with 45 percent of fourth grade students reporting being bullied monthly or weekly, and 37 percent at the eighth grade. Among those reporting weekly incidents, achievement was markedly lower.
- **Schools are safer places overall,** however. The proportion of students attending “very safe and orderly schools” increased from less than half in 2007 to

approximately two-thirds in 2015. Teachers in 14 countries reported primary schools were more safe and orderly in 2015 than in 2011, and that schools were only less so in three countries.

- **Teachers are satisfied in their jobs**, according to those who teach more than 90 percent of students at both grades.

TIMSS data enables participating countries to make evidence-based changes in educational policy. Officials have used TIMSS to monitor education systems' effectiveness in a global context, identify gaps in resources and opportunities, pinpoint areas of weakness, and measure the impact of new initiatives.

The TIMSS & PIRLS International Study Center is housed at the Lynch School of Education at Boston College, where researchers coordinate thousands of international staff, contractors, and collaborators — from government officials to researchers to teachers — in order to carry out an assessment that fairly and accurately measures educational outcomes despite the world's multiplicity of languages, cultures, ethnicities, races, and available resources.

“We have the common goal of improving education, and we don't have any political agenda,” said Martin. “We also work to give people what they want — from designing the tests and what they measure, to how to report the results.”

The results of TIMSS 2015 and TIMSS Advanced 2015 will be available at:
<http://timss2015.org/>

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