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Trends in International Mathematics and Science Study (TIMSS) 2015

Summary of Findings

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Background

TIMSS is the largest international study of mathematics and science education in the history of comparative studies. It is conducted under the auspices of the International Association for the Evaluation of Educational Achievement (IEA). TIMSS consists of an international test of student achievement in mathematics and sciences, and it probes into different factors that account for student achievement through a set of questionnaires. Over 582,000 Primary 4 and Secondary 2 students from 57 countries/regions and 7 benchmarking participants participated in TIMSS 2015.

The Hong Kong component of TIMSS is conducted by the Faculty of Education of the University of Hong Kong. In Hong Kong, 3,600 Primary 4 students from 132 primary schools and 4,155 Secondary 2 students from 133 secondary schools participated in the study. Schools and classes were randomly selected. Schools, mathematics teachers and science teachers of the sampled students were asked to complete a school questionnaire and a teacher questionnaire. Students were required to complete a test booklet and a student questionnaire. Parents/guardians of Primary 4 students were also asked to complete a home questionnaire.

Content domains tested at Primary 4 are:

Mathematics:	1. Number	2. Geometric Shapes and Measures	3. Data Display
Science:	1. Life Science	2. Physical Science	3. Earth Science

Content domains tested at Secondary 2 are:

Mathematics:	1. Number	2. Algebra	3. Geometry	4. Data and Chance
Science:	1. Biology	2. Chemistry	3. Physics	4. Earth Science

Cognitive domains tested at both grades for both subjects:

1. Knowing 2. Applying 3. Reasoning

Hong Kong Results of TIMSS 2015

<u>Mathematics Achievement</u>

Primary 4

- TIMSS scale score: 615
- International ranking: 2nd (no significant difference in achievement among the first 3 places)
- Significant improvement over the performance in 1995, 2003 and 2011 but no significant difference from the performance in 2007
- Percentage of students reaching the "Advanced" International Benchmark: 45%
  → A significant increase of 8%, 23% and 28% over the performance in 2011, 2003 and 1995 respectively
- Percentage of students reaching the lowest benchmark: 100% (after rounding)
- Gender difference in achievement: boys' achievement is significantly higher than girls' achievement

Secondary 2

- TIMSS scale score: 594
- International ranking: 4th (no significant difference in achievement among third to fifth places)
- Significant improvement over the performance in 1995 and 2007 but no significant difference from the performance in 1999, 2003 and 2011
- Percentage of students reaching the "Advanced" International Benchmark: 37%
  → A significant increase of 6% over the performance in 2007 and 2003, 9% and 14% over the performance in 1999 and 1995 respectively
- Percentage of students reaching the lowest benchmark: 98%
- Gender difference in achievement: No significant difference

Science Achievement

Primary 4

- TIMSS scale score: 557
- International ranking: 5th (no significant difference in achievement among fifth to eighth places)
- Significant improvement over the performance in 1995, 2003 and 2011 but no significant difference from the performance in 2007
- Percentage of students reaching the "Advanced" International Benchmark: 16%
  → A significant increase of 7%, 9% and 11% over the performance in 2011, 2003 and 1995, respectively
- Percentage of students reaching the lowest benchmark: 98%
- Gender difference in achievement: boys' achievement is significantly higher than girls' achievement

Secondary 2

- TIMSS scale score: 546
- International ranking: 6th (no significant difference in achievement among fifth to eighth places)
- Significant improvement over the performance in 1995, 1999, 2007 and 2011 but a significant decrease in performance compared to the performance in 2003
- Percentage of students reaching the "Advanced" International Benchmark: 12%
  → A significant increase of 5% over the performance in 1999 and 1995
- Percentage of students reaching the lowest benchmark: 96%
- Gender difference in achievement: boys' achievement is significantly higher than girls' achievement

Background and Attitudes

- The GNP per capita of Hong Kong increased from US$31,570 in 2011 to US$40,320 in 2015
- Public expenditure on education: 4% of Gross Domestic Product (GDP)
- Average age of Primary 4 students tested: 10.1 years old
- Average age of Secondary 2 students tested: 14.2 years old
- Home with more resources for learning is associated with higher mathematics and science achievement
- Hong Kong students' values of mathematics and science and their confidence in learning the two subjects are rather low. There are more Primary 4 students with positive attitudes towards mathematics and science than students at Secondary 2, however, the percentages of students having positive attitudes towards mathematics and science are generally lower than the international averages in both grades.