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Trends in International Mathematics and Science Study (TIMSS) 2019

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 580,000 Primary 4 and Secondary 2 students from 64 countries/regions and 8 benchmarking participants participated in TIMSS 2019 worldwide.

In Hong Kong, 2,968 Primary 4 students from 139 primary schools and 3,265 Secondary 2 students from 136 secondary schools participated in the computer-based assessment of the study (eTIMSS). 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 take the assessments and complete 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. Measurement and Geometry	3. Data
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 Probability
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 2019

Mathematics Achievement

Primary 4

- TIMSS scale score: 602
- International ranking: 2nd (no significant difference in achievement among the second to fourth places)
- A significant improvement over the performance in 1995 and 2003 but a significant decrease in performance when compared to the performance in 2015. No significant difference from the performance in 2007 and 2011
- Percentage of students reaching the "Advanced" International Benchmark: 38%
  → A significant increase of 16% and 21% over the performance in 2003 and 1995, respectively
  → A significant decrease of 7% over the performance in 2015
- Percentage of students reaching the lowest benchmark: 100% (after rounding)
- Gender difference in achievement: No significant difference

Secondary 2

- TIMSS scale score: 578
- International ranking: 5th (significantly lower than the first four places)
- A significant decrease in performance when compared to the performance in 2015. No significant difference from the performance in 1995, 1999, 2003, 2007 and 2011
- Percentage of students reaching the "Advanced" International Benchmark: 32%
  → A significant increase of 9% over the performance in 1995
- Percentage of students reaching the lowest benchmark: 96%
- Gender difference in achievement: No significant difference

Science Achievement

Primary 4

- TIMSS scale score: 531
- International ranking: 15th (no significant difference in achievement among the ninth to twentieth places)
- A significant improvement over the performance in 1995 but a significant decrease in performance compared to the performance in 2003, 2007 and 2015. No significant difference from the performance in 2011
- Percentage of students reaching the "Advanced" International Benchmark: 8%
  → A significant increase of 3% over the performance in 1995
  → A significant decrease of 8% and 6% over the performance in 2015 and 2007, respectively
- Percentage of students reaching the lowest benchmark: 96%
- Gender difference in achievement: No significant difference

Secondary 2

- TIMSS scale score: 504
- International ranking: 17th (no significant difference in achievement among the fourteenth to twentieth places)
- A significant decrease in performance when compared to the performance in 1999, 2003, 2007, 2011 and 2015
- Percentage of students reaching the "Advanced" International Benchmark: 9%
  → A significant decrease of 4% over the performance in 2003
- Percentage of students reaching the lowest benchmark: 85%
- Gender difference in achievement: No significant difference

Background and Attitudes

- The GNI per capita of Hong Kong increased from US$41,180 in 2015 to US$50,840 in 2019 (data.worldbank.org)
- Public expenditure on education: 4.4% (estimates for 2019 (www.edb.gov.hk)) of Gross Domestic Product (GDP) and 20.6% of total government expenditure (estimates for 2019 (www.edb.gov.hk)
- Average age of Primary 4 students tested: 10.1 years old
- Average age of Secondary 2 students tested: 14.1 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 of both grades.