



Understanding the Trends in Math and Science Study (TIMSS)

A Closer Look at Filipino Students' Functional Literacy in Math and Science

Based on the three rounds of the Trends in Math and Science Study or TIMSS conducted in 1995, 1999, and 2003, Filipino grade four and second year high school students are grappling with their math and science knowledge and skills showing time and again that their math and science functional literacy is on the decline.

Functional literacy in math and science means learners are able to use their knowledge and skills in these subjects to solve problems and inquiry tasks with an even greater goal of being able to navigate through simple and complex life challenges for their own and their community's development.

University of the Philippines professor Dr. Michael Tan in his newspaper column pointed out how the Philippines fared in the TIMSS 2003. For the fourth graders, the Philippines ranked 23rd among 25 countries in both math and science. Test results for the 8th graders (equivalent to second year high school) show that the Philippines is at the 40th rank in math and 41st in science among 45 countries.

Among the Asian countries that participated Chinese Taipei (Taiwan), Hong Kong SAR, Indonesia, Japan, Republic of Korea, Malaysia, and Singapore the Philippines had the lowest scores for both 4th and 8th grade science and math.

TIMSS at a Glance

University of the Philippines College of Education Dean Dr. Vivien Talisayon, also the national research coordinator for TIMSS in the Philippines, describes TIMSS as a multinational data collection effort. Conducted every four years, TIMSS is under the auspices of the

International Association for the Evaluation of Educational Achievement (IEA) based in Amsterdam and managed by Boston College in the USA.

Sampling was handled by Statistics Canada; data processing was done in Hamburg, Germany; IEA supervised translation of tests and questionnaires; and Educational Testing Service in New Jersey, USA, took care of data analysis.

The National Center for Education Statistics in the USA was only for the USA data in the same way that in the Philippines, the TIMSS 2003 project was financed by the Department of Education and Department of Science and Technology, and managed by the University of the Philippines College of Education, in collaboration with UP National Institute for Science and Mathematics Education Development and Integrated School.

TIMSS at Work

TIMSS is designed to help countries all over the world improve student learning in mathematics and science by presenting educational achievement data at the fourth and eighth grades. After surveying and testing large samples, TIMSS reports trends in performance over a four year cycle with extensive background information such as student, teacher, and school variables to address concerns about the quantity, quality, and content of instruction.

The tests are designed to probe into students' problem solving and inquiry tasks and how students are able to integrate information in various math and science fields. The tests were similar throughout the world, with efforts made to adjust for cultural differences. Preparations are underway for the next round of TIMSS which will take place in 2007



Significance of the TIMSS

Dr. Talisayon encourages teachers and education leaders to maximally utilize the TIMSS data and statistics to find ways to improve the teaching and learning of math and science

Understanding the TIMSS data can guide teachers on what dimensions of their teaching should they improve on. They can examine areas and test items (skills and concepts) where students scored lowest and implement interventions, specifically, addressing these weaknesses and monitor the effect on student achievement of the class, school, and division.

Dr. Talisayon suggests one intervention is to teach beyond memorization and continually expose students to TIMSS-like questions i.e., items requiring understanding and analysis of tables and graphs, etc.

Dr. Tan, for his part, sees the TIMSS as a data mine that could help education stakeholders pinpoint issues for policy reforms. He also recommends the assessment of TIMSS data to know “how functional our literacy is” and how it will affect our competitive edge for the overseas labor market.

Eventually, the TIMSS data, if carefully analyzed, can probe into learning problems rooted in teaching methods, textbooks, and the teachers' own grasp of the subjects. Hopefully, these steps would lead to finding remedial measures to answer these concerns.

Benchmarks

To guide educators, researchers, and policy makers on designing the curriculum and class instruction, TIMSS 2003 enumerates the international benchmarks of mathematics and science achievement for grades 4 and 8. The tables below show the desired skills/competencies/achievement of grade 8 students under the advanced international benchmarks for both math and science.

Advanced International Benchmark for Mathematics

Grade 8 students can:

- Organize information, make generalizations, solve non-routine problems, and draw and justify conclusions from data.
- Compute percent change and apply their knowledge of numeric and algebraic concepts and relationships to solve problems.
- Solve simultaneous linear equations and model simple situations algebraically.
- Apply their knowledge of measurement and geometry in complex problem situations.
- Interpret data from a variety of tables and graphs, including interpolation and extrapolation.

Advanced International Benchmark for Science

Grade 8 students can:

- Demonstrate a grasp of some complex and abstract science concepts.
- Apply knowledge of the solar system and earth features, processes, and conditions
- Apply understanding of the complexity of living organisms and how they relate to their environment.
- Understand the concepts of electricity, thermal expansion, sound structure of matter, and physical and chemical properties and changes.
- Show understanding of environmental and resource issues.
- Understand some fundamentals of scientific investigation and can apply basic physical principles to solve questionnaire problems.
- Provide written explanations to communicate scientific knowledge.

References

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Trends in Mathematics and Science Study website
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Unesco Institute of Statistics website.
www.uis.unesco.org/ev.php

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