TIMSS 2019

Data Collection Completed!

Ina V.S. Mullis and Michael O. Martin
IEA General Assembly
Ljubljana, Slovenia
October 8-11, 2019
Overview of TIMSS 2019
24 Years of Trends

• 64 countries, 6 benchmarking entities
• More than half transitioned to eTIMSS!
• Mathematics and science assessments
  – 28 item blocks, 400 items/grade
  – Each for eTIMSS and paper
• eTIMSS includes Problem Solving and Inquiry tasks (PSIs)
  – 4 blocks each grade – 2 mathematics, 2 science
Countries Participating

Albania  Armenia  Australia  Austria  Azerbaijan  Bahrain  Belgium (Fl.)  Bosnia and Herzegovina  Bulgaria  Canada  Chile  Chinese Taipei  Croatia  Cyprus  Czech Republic  Denmark  Egypt  England  Finland  France  Georgia  Germany  Hong Kong SAR  Hungary  Iran  Ireland  Israel  Italy  Japan  Jordan  Kazakhstan  Korea  Kosovo  Kuwait  Latvia  Lebanon  Lithuania  Macedonia  Malaysia  Malta  Montenegro  Morocco  Netherlands  New Zealand  Northern Ireland  Norway  Oman  Pakistan  Philippines  Poland  Portugal  Qatar  Romania  Russian Federation  Saudi Arabia  Serbia  Singapore  Slovak Republic  South Africa  Spain  Sweden  Turkey  United Arab Emirates  United States

Benchmarking Participants

Ontario, Canada  Quebec, Canada  Moscow City, Russia  Madrid, Spain  Abu Dhabi, UAE  Dubai, UAE

4th grade: 50 + 6
8th grade: 40 + 5
TIMSS 2019 Data Collection
Oct – Dec 2018
Southern Hemisphere
March – June 2019
Northern Hemisphere
Data Collection – Enormous Undertaking

eTIMSS and paperTIMSS

- 600,000 students assessed
- 20,000 schools

Paper-to-e bridge for eTIMSS countries

- 90,000 students
- 3,000 schools
Scoring and Scoring Training

- Each constructed response item has a unique scoring guide – about 700 scoring guides
- Updated based on field test results and reviews
- Training materials prepared
- Southern hemisphere scoring training
  - Cape Town, Nov 2018
- Northern hemisphere scoring training
  - Limassol, March 2019
Translation and Verification

- Countries translated international instruments
- IEA Amsterdam verified the translations
- TIMSS & PIRLS International Study Center verified layout
- Resource intensive endeavor
  - eTIMSS, paperTIMSS, bridge
  - eTIMSS translation system worked well, but IEA Hamburg had to customize the eTIMSS player for many countries – big effort!
Survey Operations and Data Management

• Series of manuals to support key stages
  – Scoring constructed response items, and using IEA Hamburg’s Coding Expert software
  – Creating and submitting the TIMSS 2019 data files

• IEA Hamburg working closely with countries to clean and process data files

• NRCs completed a Survey Activities Questionnaire
International Quality Control Program

• TIMSS & PIRLS International Study Center and IEA Amsterdam recruited and trained 71 International Quality Control Monitors
  – Visited 15 schools/grade in each country
  – Observed and documented administration sessions

• Nearly all observation records and document received
  – Indications that data collection went extremely well
Data Analysis and Reporting

• Developed International Report outline and analysis specifications
  – 200 exhibits since last October 2018

• Working on populating exhibits with background data
  – NRC Meeting December 2019, Agadir, Morocco
  – Exhibits with background data will be reviewed by NRCs

• Sampling adjudication – Feb 2020
Data Analysis and Reporting

• Achievement scaling
  – Informed by Item Equivalence Study in 2017
  – Developed scaling plan for linking eTIMSS and paperTIMSS while maintaining trends to previous TIMSS assessments
  – Reviewed by TEG and ETS experts
  – Scaling will be conducted by TIMSS & PIRLS International Study Center - Mar-Apr 2020
  – Independent replication by ETS psychometricians
Looking Ahead

• Draft chapters of International Report
• NRCs and PEC review
  - Jun 2020, NRC meeting in Prague
• *TIMSS 2019 Encyclopedia*, November 17,
• Release International Results Dec 8, 2020
  - *Methods and Procedures in TIMSS 2019* also available
• Special thematic report on Problem Solving and Inquiry tasks
• Release International Database Feb 2021
Thank You!
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TIMSS 2023 Completes Transition to e-Assessment

- Second stage of two-stage process
  - Half the countries transitioned to eTIMSS in 2019
  - Process completed with TIMSS 2023
  - Countries transitioning in 2023 will administer paper bridge booklets

- As many countries as possible do eTIMSS
  - Paper option available based only on trend items
  - No new items developed for paper
Capitalizing on the Benefits of e-Assessment

• Integrate Problem Solving and Inquiry (PSI) tasks
  – Extended scenario-based tasks and science investigations
  – Only administered with eTIMSS in 2019

• More emphasis on PSIs
  – Degree an aspect of updating the assessment frameworks
Capitalizing on the Benefits of e-Assessment - cont

- Incorporate reporting process data into international reports – timing and event data
- Use timing and event data to examine response patterns
  - Test taking strategies
  - Approaches to problem solving and inquiry
    - Evidence of strategy; more or less successful strategies
  - Disengaged students
Begin Moving Toward Adaptive Assessment - Group Adaptive Approach

- Better align with achievement of our student populations
- Two levels of booklet difficulty
  - More Difficult booklets (**Difficult** and **Medium** blocks)
  - Less Difficult booklets (**Medium** and **Easy** blocks)
- All countries take all booklets, but in varying proportions
Adapting the Assessment to Countries’ Student Populations

• Higher performing countries
  – Proportionally more of the more difficult booklets

• Lower performing countries
  – Proportionally more of the less difficult booklets

• Goal is better match between assessment difficulty and student achievement in each country
Adapting the Assessment

- 600: 70% More Difficult, 30% Less Difficult
- 500: 50% More Difficult, 50% Less Difficult
- 400: 30% More Difficult, 70% Less Difficult
Advantages of Group Adaptive Design

• Better measurement at all achievement levels
• All countries will participate in the same assessment
  – No need for “Less Difficult” mathematics assessment at 4th grade
• More student engagement
• Less student frustration
• Possibility of targeting subpopulations
Innovative Item Types

• Videos and animations
• Creating various types of graphs
• Freehand drawing
• “Show your work”
  – Drawing and text
  – Text and symbols
Make a Geometric Shape
Make a Pie Chart
Sebastian asked his friends about their favorite seasons. He recorded the data in a table.

<table>
<thead>
<tr>
<th>Season</th>
<th>Number of Friends</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td>9</td>
</tr>
<tr>
<td>Winter</td>
<td>4</td>
</tr>
<tr>
<td>Spring</td>
<td>10</td>
</tr>
<tr>
<td>Summer</td>
<td>13</td>
</tr>
</tbody>
</table>

Sebastian started making a bar graph of the data. Complete the missing bar, bar label, and title.
An art teacher cut large sheets of paper into fourths. She gave each of her 13 students one of the fourths. How many large sheets of paper did she need? Use words or pictures to explain your answer.

She needs 4 sheets.
The formula for finding the volume \( V \) of a cylinder with radius \( r \) and height \( h \) is \( V = \pi r^2 h \).

What will happen to the volume of a cylinder of a given height if you multiply the radius by 1.5?

- [ ] It will increase 1.5 times.
- [X] It will more than double.
- [ ] It will double.

Explain your answer.

\[
V = \pi r^2 h, \text{ so} \\
V = 3.14 \times (1.5r \times 1.5r) \times h \\
V = 3.14 \times 2.25r^2 \times h \\
The volume will be 2.25 times more.
TIMSS 2023

28 Years of Trends

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