TIMSS 2023 Progress Report

Matthias von Davier & Ann Kennedy

64th Annual Meeting of the IEA General Assembly

September 23-28, 2023

Overview of the TIMSS 2023 Schedule

2021	Frameworks and instrument development
2022	Field Test and finalizing instruments
2023	Data collection and processing
2024	Data analysis and reporting

A bird's eye view of TIMSS 2023

The 8th cycle of TIMSS completes the transition to a fully digital assessment. 56 countries and six benchmarking systems are participating in the 4th-grade assessment, while 42 countries and five benchmarking systems are participating in the 8th-grade assessment. Nearly all countries are participating in the digital assessment, a paper-based version featuring only trend items is available. TIMSS 2023 provides almost three decades of trend data in mathematics and science.

TIMSS 2023 Participants

Australia
Azerbaijan
Albania (4)
Armenia (4)
Austria (8)
Bahrain
Belgium (Flemish) (4)
Belgium (French) (4)
Bosnia and Herzegovina (4)
Bulgaria (4)
Brazil
Canada (4)
Chile
Chinese Taipei
Cote D'Ivoire (8)
Czech Republic
Denmark (4)

England
Finland
France
Georgia
Germany (4)
Hong Kong SAR
Hungary
Iran, Islamic Rep. of
Iraq (4)
Ireland
Israel (8)
Italy
Japan
Jordan
Kazakhstan
Korea, Rep. of
Kosovo (4)
Kuwait

Latvia (4)
Lithuania
Macao SAR (4)
Malaysia (8)
Malta (8)
Montenegro (4)
Morocco
Netherlands (4)
New Zealand
North Macedonia (4)
Norway
Oman
Palestine (8)
Poland (4)
Portugal
Qatar
Romania
Saudi Arabia

Serbia (4)
Singapore
Slovak Republic (4)
Slovenia (4)
South Africa
Spain (4)
Sweden
Türkiye
United Arab Emirates
United States
Uzbekistan

Benchmarking Participants

Ontario, Canada
Quebec, Canada
Kurdistan, Iraq
Abu Dhabi, UAE
Dubai, UAE

Administered TIMSS at both Grade 4 and Grade 8

TIMSS 2023 Participants – Grade 4

Australia
Azerbaijan
Albania (4)
Armenia (4)

Bahrain
Belgium (Flemish) (4)
Belgium (French) (4)
Bosnia and Herzegovina (4)
Bulgaria (4)
Brazil
Canada (4)
Chile
Chinese Taipei

Czech Republic
Denmark (4)

England
Finland
France
Georgia
Germany (4)
Hong Kong SAR
Hungary
Iran, Islamic Rep. of
Iraq (4)
Ireland

Italy
Japan
Jordan
Kazakhstan
Korea, Rep. of
Kosovo (4)
Kuwait

Latvia (4)
Lithuania
Macao SAR (4)

Montenegro (4)
Morocco
Netherlands (4)
New Zealand
North Macedonia (4)
Norway
Oman

Poland (4)
Portugal
Qatar
Romania
Saudi Arabia

Serbia (4)
Singapore
Slovak Republic (4)
Slovenia (4)
South Africa
Spain (4)
Sweden
Türkiye
United Arab Emirates
United States
Uzbekistan

Benchmarking Participants

Ontario, Canada
Quebec, Canada
Kurdistan, Iraq
Abu Dhabi, UAE
Dubai, UAE

Administered TIMSS at both Grade 4 and Grade 8

28 Years of Trends

TIMSS 2023

IEA **TIMSS & PIRLS** International Study Center Lynch School of Education BOSTON COLLEGE

TIMSS 2023 Participants – Grade 8

Australia
Azerbaijan

Austria (8)
Bahrain

Brazil

Chile
Chinese Taipei
Cote D'Ivoire (8)
Czech Republic

England
Finland
France
Georgia

Hong Kong SAR
Hungary
Iran, Islamic Rep. of

Ireland
Israel (8)
Italy
Japan
Jordan
Kazakhstan
Korea, Rep. of

Kuwait

Lithuania

Malaysia (8)
Malta (8)

Morocco

New Zealand

Norway
Oman
Palestine (8)

Portugal
Qatar
Romania
Saudi Arabia

Singapore

South Africa

Sweden
Türkiye
United Arab Emirates
United States
Uzbekistan

Benchmarking Participants
Ontario, Canada
Quebec, Canada
Kurdistan, Iraq
Abu Dhabi, UAE
Dubai, UAE

Administered TIMSS at both Grade 4 and Grade 8

TIMSS 2023

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TIMSS 2023 Participants – Paper Assessment

South Africa

Morocco

Iran, Islamic Rep. of
Iraq (4)

Bulgaria (4)

Benchmarking Participants

Ontario, Canada

Quebec, Canada

Kurdistan, Iraq

Abu Dhabi, UAE

Dubai, UAE

Cote D'Ivoire (8)

Administered TIMSS at both Grade 4 and Grade 8

Some Advantages of Participation in TIMSS at both the 4th and 8th grade:

- The TIMSS 4th and 8th grade questionnaires share many common context variables. These can be used to reveal shifts in students' attitudes towards math and science over time.
- A study funded by the American Educational Research Association (Braun, von Davier, & Chen, 2023) utilizes this pseudo-longitudinal design to predict average achievement changes using shifts in attitudes and other contextual factors.

TIMSS 2023 Activities and Accomplishments since September 2022

- Instrument Translation for (Main) Data Collection, Layout, and Functionality Verification
- Survey Operations, Sampling, and Data Management Activities
- TIMSS 2023 Data Collection
- International Quality Control Monitoring Program
- Scoring Training and Scoring
- Automated Scoring
- Analysis and Report Planning

Instrument Translation for Main Data Collection, Layout, and Functionality Verification

- Quality Assurance Through Verification
- Multiple Language-Specific Versions
- Linguistic and Functional Review
- Organized Translation and Layout Checks
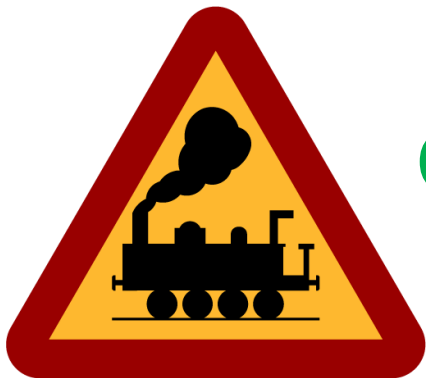
ON TRACK AND COMPLETED

Survey Operations, Sampling, and Data Management Activities

- Guidance through Survey Operation Procedures
- Comprehensive Coverage

  - sampling,

  - test preparation

  - quality control

  - data management

- Paper-based Assessment Support
- Collaborative Sampling Approach

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TIMSS 2023 Main Data Collection

Instruments – Fully Digital

- Grade 4: 167 mathematics and 174 science items

- Grade 8: 183 mathematics and 202 science items

- Student, home, teacher, and school questionnaires

Country Participation*

Grade 4	54 countries 5 benchmarking participants	90 different country/language versions
Grade 8	42 countries 3 benchmarking participants	66 different country/language versions

TIMSS 2023 Main Data Collection

- Northern Hemisphere Data Collection began March 2023
- Data Collection Largely on Track
- Southern Hemisphere Data Collection began August 2023
- Timely Data Submission on the Horizon
- Effective Collaboration and Resolution
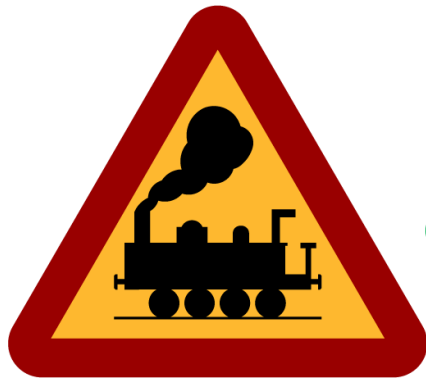
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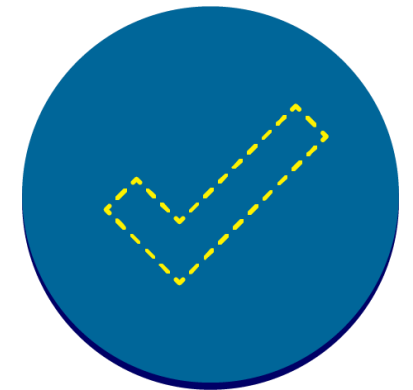
TIMSS 2023 Quality Control Monitoring

- Quality Control for Consistency
- Independent Monitoring System
- Transition of Responsibility to IEA August 2022
- Efficient Monitoring Process and Collaboration
- Active Observations Underway

ON SCHEDULE AND COMPLETED (NH) OR UNDERWAY (SH)

TIMSS 2023 Scoring Training and Scoring

- Multiple Item Types in TIMSS Assessment Scoring
- Scoring Guide Development with Partners
- Comprehensive Scoring Training and Support
- Continuous Improvement and Updates
- Online Scoring System Utilization
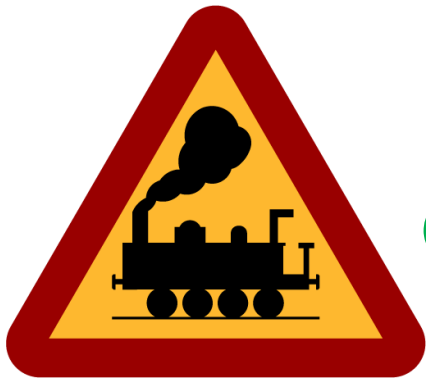
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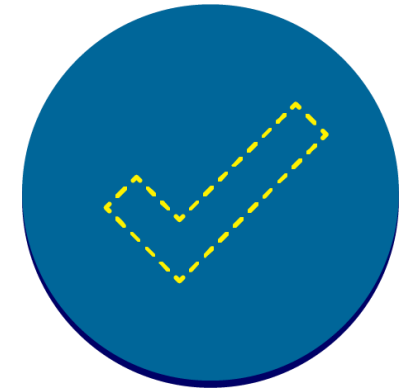
TIMSS 2023 Digital Assessment Automation

Digital Assessment Benefits: Digital format stores real-time student responses, reducing manual entry and errors, _allowing for efficient, reliable, and comparable automated scoring of many items._

TIMSS 2023 Automated Scoring

- Rising Trend in Machine-Supported Scoring
- Crucial Field Test Data For Training
- Validating Human Scoring by Experts and Machines
- Enhancing Scoring Efficiency
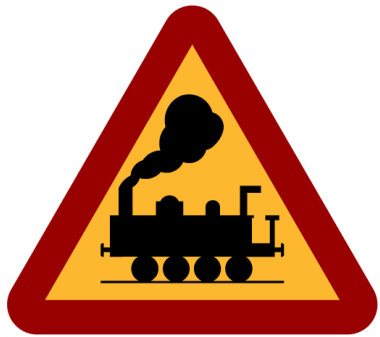
ON TRACK TO SUPPORT CONTINUOUS IMPROVEMENT
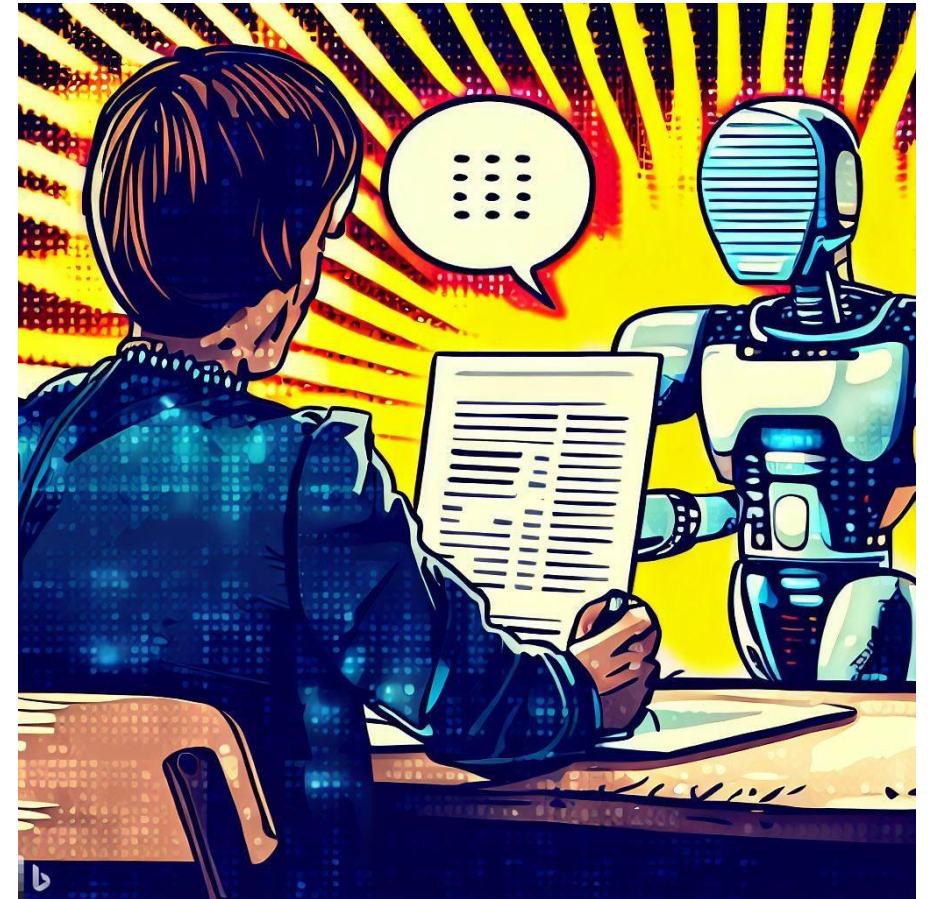
# TIMSS 2023: Engaging & Interactive Problem Solving and Inquiry Tasks
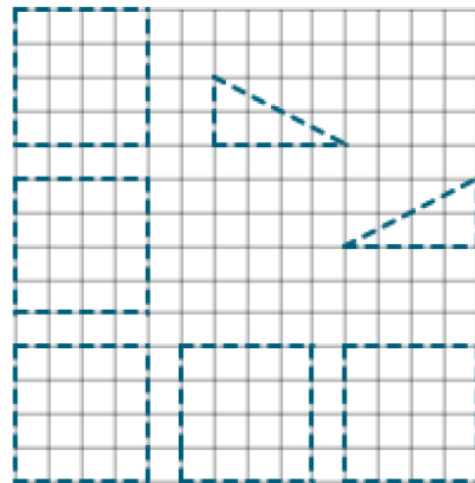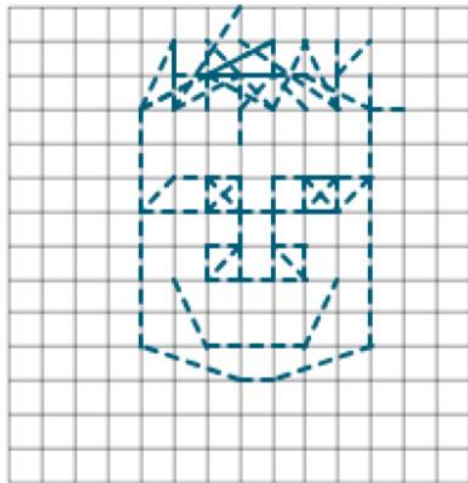

- The 'building' is an example of engaging, multi-step, interactive tasks

- This TIMSS 2019 task was released and data will be made available for research

- TIMSS 2023 will contain the next generation of interactive tasks

TIMSS 2023: AI Supported Scoring Research

Automated Scoring of **Graphical Open Responses**

Incorrect Responses   Correct Responses
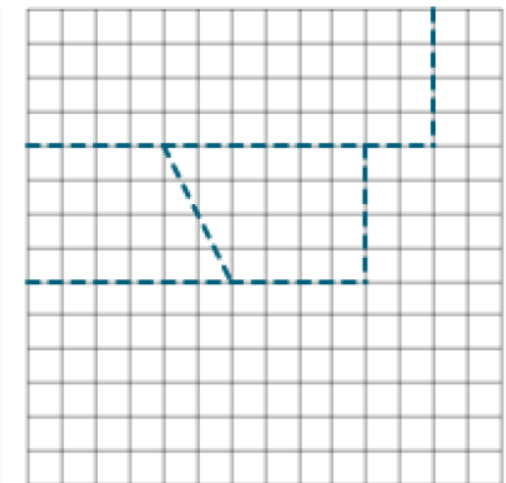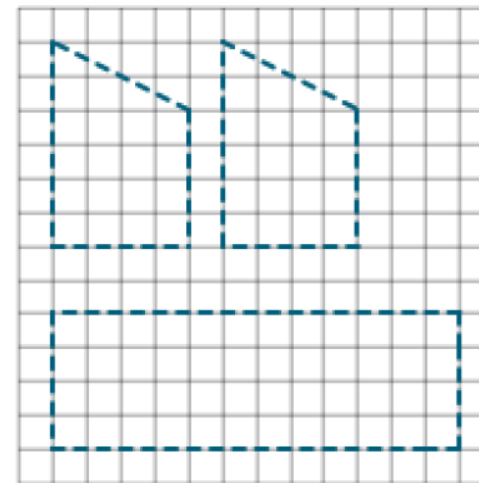
Machine scoring improves processes and data quality

– In 4th-grade mathematics, very few human-scored items remain. Most are machine-scored

– In science, we were able to switch several items from human to (more objective, reliable, and comparable) machine scoring

– AI-based machine scoring will be used to QC scoring variability across countries for selected human-scored items

- The goal is to implement a score discrepancy resolution system

- Experts will review scoring disagreement between human and AI

TIMSS 2023 Automated Scoring

Number of Items Validated Using AI or Rule Based Automated Scoring

Primary Scoring Method	Validation Method	Trend	New
Human – Written	Artificial neural networks	8	7
Human – Graphical	Artificial neural networks	0	3
Machine – Graphical	Artificial neural networks	9	2
Machine – Graphical	Rule-based pixel matrix correlation	0	4
Total		17	16

TIMSS 2023 Analysis and Reporting

- Scale Specifications and Context Scaling
- Achievement Scaling and Linking to TIMSS 2019
- International Results Report
- Methods and Procedures Report
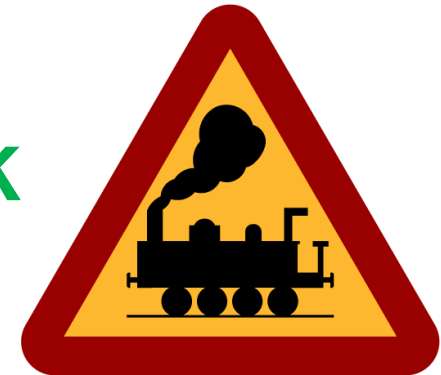
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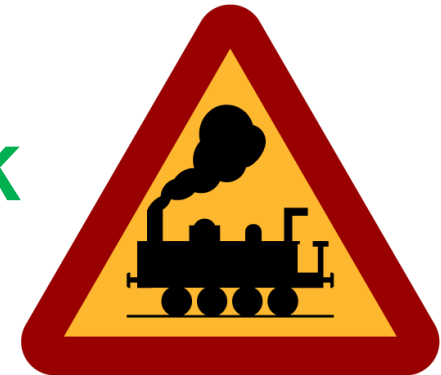
TIMSS 2023 Analysis and Reporting

- Multiple Secondary Reports in Planning
- Curriculum Questionnaires and Encyclopedia
- Enhancing Data Visualization and Web Presence

IN PREPARATION AND ON TRACK

TIMSS 2023

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TIMSS 2023 Activities, Meetings, and Milestones since September 2022

- Survey Operations Procedures Units 4–7; Oct 2022-Mar 2023
- Environmental Attitudes and Behaviors Framework; Nov 3, 2022
- Project Management Team meeting (online); Nov 10-11, 2022
- Context Questionnaires and OSS; Sep 29, 2022
- IQCM Training hosted by IEA (virtual); Jan 23-24, 2023
- 6th NRC Meeting in Prague - scoring training; Feb 27, 2023-Mar 02, 2023
- Northern Hemisphere countries conduct data collection; Feb-Jun, 2023
- Curriculum Questionnaires, Encyclopedia outline, and Test Curriculum Matching Analysis spreadsheets posted to countries; Apr 13, 2023
- Southern Hemisphere countries begin data collection; Aug 2023
- Translation & layout verification complete for all countries; Sep 2023

Upcoming Activities and Meetings for TIMSS 2023

- Project Management Team meeting; October 17-18,2023
- Posting unweighted data almanacs and IEA Hamburg posts national Version 1.0 data for Northern Hemisphere countries; November 22, 2023
- Data collection to be complete; December 2023
- Human-scoring to be complete in Southern Hemisphere countries; January 2024
- 7th NRC meeting to review draft report outline & exhibits; March 17-22, 2024
- Project Management Team meeting; March/April 2024
- 4th Science and Mathematics Item Review Committee meeting; June 12-14, 2024
- 8th NRC meeting (virtual) to review draft text and exhibits for the international report; July 28-August 02, 2024
- Project Management Team meeting; September 2024

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