TIMSS and PIRLS in 2011
Development Completed – Into the Field!

Ina V.S. Mullis and Michael O. Martin
51st IEA General Assembly
Gaborone, 4-7 October, 2010
Report in 3 Parts
Completing the Development of:

• TIMSS 2011 mathematics and science assessments
• PIRLS 2011 reading assessment
• TIMSS and PIRLS 2011 questionnaires
  – Parent, Student, Teacher, School, Curriculum
TIMSS 2011

- Mathematics and Science
- Grades 4 and 8
- Baseline for new countries

63 countries, 14 benchmarking participants!
Planning to Participate

Armenia, Australia, Austria, Azerbaijan, Bahrain, Belgium Fl., Botswana, Chile, Chinese Taipei, Czech Republic, Denmark, England, Finland, Georgia, Germany, Ghana, Honduras, Hong Kong SAR, Hungary, Indonesia, Iran, Islamic Rep. of, Ireland, Israel, Italy, Japan, Jordan, Kazakhstan, Korea, Rep. of, Kuwait, Lebanon, Libya, Lithuania, Malaysia, Malta, Mongolia, Morocco, Netherlands, New Zealand, Northern Ireland, Norway, Oman, Palestinian Nat’l Auth., Poland, Portugal, Qatar, Romania, Russian Federation, Saudi Arabia, Serbia, Singapore, Slovak Republic, Slovenia, South Africa, Spain, Sweden, Syrian Arab Republic, Thailand, Tunisia, Turkey, Ukraine, United Arab Emirates, United States, Yemen.

Benchmarking Participants

63 countries, 14 benchmarking participants!
Overview of TIMSS 2011 Schedule

2009 - Year of Instrument Development
2010 - Year of Field Test and Finalizing Instruments – Southern Hemisphere
2011 - Year of Data Collection and Processing
2012 - Year of Data Analysis and Reporting
2013 - Month of the International Database
TIMSS 2011 Assessment Frameworks

Published, September 2009
<table>
<thead>
<tr>
<th>Math Blocks</th>
<th>Source of Items</th>
<th>Science Blocks</th>
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<tr>
<td>M01</td>
<td>Trend Block from 2007</td>
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<td>M14</td>
<td>New Items for 2011</td>
<td>S14</td>
<td>New Items for 2011</td>
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</tbody>
</table>
TIMSS 2011 SMIRC

Mathematics Experts

• Kiril Bankov, Bulgaria
• Karen Priscilla Manriquez Riveros, Chile
• Christoph Selter, Germany
• Khattab Mohammad Ahmad Abu Libdeh, Jordan
• Bob Garden, New Zealand
• Liv Sissel Gronmo, Norway
• Fou-Lai Lin, Taiwan
• Mary Lindquist, United States
• Hung-Hsi Wu, United States
TIMSS 2011 SMIRC
Science Experts

- Martina Kekule, Czech Republic
- Jouni Viiri, Finland
- Saule Vingeliene, Lithuania
- Berenice Michels, Netherlands
- Mariam Mohammad Abdallah Ahmad, Qatar
- Gabriela Noveanu, Romania
- Galina Kovaleva, Russian Federation
- Maria Pilar Jimenez-Aleixandre, Spain
- Wolfgang Dietrich, Sweden
- Gerry Wheeler, United States
Preparing for the Field Test

Initial development steps:

• Updated Framework for 2011
  – NRC Sharm El-Sheikh, Feb 2009

• Reviewed and developed prototype items
  – SMIRC London, March 2009

• Developed field test items
  – NRC Washington, May 2009

• Reviewed field test items
  – SMIRC Amsterdam, August 2009
Preparing for the Field Test

Since last General Assembly:

• Finalized field test instruments
  – NRC Istanbul, November 2009

• Scoring training for field test
  – NRC Melbourne, March 2010

• Conducted field test to determine best items for each topic
  – NRCs, March - April 2010
Overview of TIMSS 2011 Field Test

Ambitious Field test

• Approximately 640 items - twice as many as needed
  – Grade 4: 283; Grade 8: 355

• Approximately 55 countries in field test
  – Grade 4: 46 + 5; Grade 8: 43 + 5

• Approximately 10,000 responses to each item

*Solid basis for decision making!*
Field-test Achievement Data Review Process

1. TIMSS & PIRLS International Study Center with Mathematics and Science Coordinators conducted initial review item statistics – June

2. SMIRC reviewed items and made recommendation for data collection - June

3. National Research Coordinators reviewed items recommended by SMIRC and approved final selection - August
TIMSS & PIRLS International Study Center Initial Review Field Test Data

• Focused on items that met the framework and performed well – the majority of the items

• Items not meeting measurement standards were eliminated (e.g., too difficult, discrimination too low)

• Some suggestions for slight revisions to items and scoring guides were made

• Assembled 24 blocks of items for SMIRC review
Considerations for Assembling Item Blocks

Balanced each block by:

• Content Domain
• Cognitive Domain
• Item Format (Constructed Response/Multiple Choice)
• Item Difficulty - Reference Group
• Coverage with trend item blocks
IEA 4th International Research Conference - Gothenburg

- PIRLS Equity Index
- Linking error in measuring trends
- Limits of measurement with low performing countries
- Curriculum coverage in TIMSS Advanced 2008
- Impact of home on gender differences in reading
- Factors influencing reading achievement in Latvia
- Global indicators of effective learning environments
- Measuring trends in TIMSS and PIRLS
SMIRC Meeting
Gothenburg – June 28-30, 2010
Reviewed item blocks and made recommendations for TIMSS 2011 mathematics and science assessments

NRC Meeting
Prague – August 8-13, 2010
Reviewed recommended item blocks and endorsed them with minor amendments
Finalized Assessment Materials

Aug 26  TIMSS 2011 achievement booklets and questionnaires posted

Sep 15  Translation and layout verification began

Sep 21-24  IEA DPC conducted TIMSS & PIRLS Data Management training seminar - Hamburg

Sep 23-24  Southern Hemisphere - International Quality Control Monitor training seminar for TIMSS and PIRLS - Amsterdam
Upcoming Schedule Highlights

2010

October-December

Southern Hemisphere

*** Data Collection ***
Upcoming Schedule Highlights

2010

Nov 8-11  Southern Hemisphere – training for constructed response scoring – Wellington, New Zealand (after PIRLS)

2011

Jan 20-21 & 24-25 Northern Hemisphere Quality Control Monitor training – Amsterdam
Upcoming Schedule Highlights

2011
March-June

Northern Hemisphere

*** Data Collection ***
Upcoming Schedule Highlights

2011

Mar 6-11  6th NRC meeting to conduct training for constructed response scoring (NH) – Bangkok

Apr-Nov  Prepare draft exhibits for TIMSS 2011 International Reports

- International Mathematics Report
- International Science Report
- TIMSS and PIRLS International Report
Upcoming Schedule Highlights

2011

Dec 4-9  7th NRC meeting to review individual country data and draft background data tables for International Reports – Vienna

- joint meeting with PIRLS NRCs
PIRLS 2011

• Assessment of reading comprehension
• Grade 4
  – 3rd PIRLS cycle; trends for 2006 and 2001 participants
  – Baseline data for new countries
• prePIRLS – less difficult version of PIRLS
  – To align with curricula and involve more countries
### Countries Planning to Participate

<table>
<thead>
<tr>
<th>Australia</th>
<th>Indonesia</th>
<th>Russian Federation</th>
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<tbody>
<tr>
<td>Austria</td>
<td>Iran</td>
<td>Saudi Arabia</td>
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<td>Azerbaijan</td>
<td>Ireland</td>
<td>Singapore</td>
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<td>Belgium (French)</td>
<td>Israel</td>
<td>Slovak Republic</td>
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<td>Botswana</td>
<td>Italy</td>
<td>Slovenia</td>
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<td>Canada</td>
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<td>Colombia</td>
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<td>Portugal</td>
<td>Abu Dhabi, UAE</td>
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<td>Hong Kong SAR</td>
<td>Qatar</td>
<td>Dubai, UAE</td>
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<td>Hungary</td>
<td>Romania</td>
<td>Florida, US</td>
</tr>
</tbody>
</table>

53 countries, 6 benchmarking participants!
Overview of PIRLS 2011 Schedule

2008 - Year of Identifying Passages
2009 - Year of Instrument Development
2010 - Year of Field Test and Finalizing Instruments – Southern Hemisphere
2011 - Year of Data Collection and Processing
2012 - Year of Data Analysis and Reporting
2013 - Month of the International Database
PIRLS 2011 Assessment Framework

Published, August 2009
## PIRLS 2011 Assessment

<table>
<thead>
<tr>
<th>Literary Passages</th>
<th>Informational Passages</th>
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<tbody>
<tr>
<td>Trend Passage from 2001</td>
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<td>New Passage for 2011</td>
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</tbody>
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**prePIRLS 2011 Assessment**

<table>
<thead>
<tr>
<th>Literary Passages</th>
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<tbody>
<tr>
<td>New Passage for 2011</td>
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</tbody>
</table>
RDG (Reading Development Group)

Jan Mejding (Denmark)
Sue Horner (England)
Elinor Saigh-Haddad (Israel)
Pierre Reding (Luxembourg)
Galina Zuckerman (Russian Federation)
Elizabeth Pang (Singapore)
Caroline Liberg (Sweden)
Elois Scott (United States)
Fatma Noorani (Oman)
Preparing for the Field Test

Initial development steps

- Updated Framework for 2011
  - NRC, Madrid, Feb 2008

- Reviewed framework and passages
  - RDG meeting, Amsterdam, Jul 2008

- Selected field-test passages; developed items
  - NRC meeting, Amsterdam, Nov 2008

- Reviewed field test items
  - RDG meeting, Singapore, Mar 2009
Preparing for the Field Test

• Finalized field test instruments
  – NRC Vilnius, Jun 2009

Since last General Assembly:

• Scoring training for field test
  – NRC London, Feb 2010

• Conducted field test to determine best passages for 2011
  – NRCs, Mar–Apr 2010
Field Test – March-April 2010

- 46 countries, 4 benchmarking participants
- Achievement data from 51,000 students
  - 125 PIRLS reading items; 8 reading passages
  - 152 prePIRLS reading items; 10 reading passages
- $\approx 10,000$ student responses to each item

*Firm foundation for decision making!*
Field-test Achievement Data Review Process

1. TIMSS & PIRLS International Study Center conducted initial review of item statistics

2. RDG reviewed and made recommendations for data collection

3. National Research Coordinators reviewed assessment blocks recommended by RDG and made final selection
Based on available data
- 40 PIRLS countries
- 2 prePIRLS countries (Botswana and Colombia)

Focused on passages and items with good psychometric properties

Two passages eliminated from further review - not meeting measurement standards (e.g., too difficult, too few high quality items)
RDG Meeting
Moscow – June 23-25, 2010

Reviewed PIRLS and prePIRLS passages and items and made recommendations for the 2011 reading assessments

NRC Meeting
Zagreb – July 18-23, 2010

Reviewed recommended passages and items and endorsed them with minor amendments
Finalized Assessment Materials

Aug 12  PIRLS and prePIRLS 2011 achievement booklets posted

Sep 15  Translation and layout verification began

Sep 21-24  IEA DPC conducted TIMSS & PIRLS Data Management training seminar - Hamburg

Sep 23-24  Southern Hemisphere - International Quality Control Monitor training seminar for TIMSS and PIRLS - Amsterdam
Upcoming Schedule Highlights

2010

October-December

Southern Hemisphere

*** Data Collection ***
Upcoming Schedule Highlights

2010
Nov 3-5  Southern Hemisphere training for constructed response scoring – Wellington, New Zealand (PIRLS - then TIMSS)

2011
Jan 20-21 & 24-25 Northern Hemisphere Quality Control Monitor training – Amsterdam
Feb 13-18  6th NRC meeting to conduct training for constructed response scoring (NH) – Rome
Upcoming Schedule Highlights

2011
March-June

Northern Hemisphere

*** Data Collection ***
Upcoming Schedule Highlights

2011

Apr-Nov
Prepare draft exhibits for PIRLS 2011 International Reports
- *PIRLS 2011 International Report*
- *TIMSS and PIRLS International Report*

Dec 4-9
7th NRC meeting to review individual country data and draft background data tables for International Report – Vienna
- joint meeting with TIMSS NRCs
TIMSS and PIRLS 2011
Questionnaires
<table>
<thead>
<tr>
<th>TIMSS and PIRLS Participation – Grade 4</th>
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<td>Australia</td>
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<td>Austria</td>
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<td>Lithuania</td>
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40 countries, 6 benchmarking participants!
Approach for 2011

• Central organizing strategy: joint effort at fourth grade

• Same students for TIMSS and PIRLS in most countries

• Also need to address
  – PIRLS/prePIRLS only
  – TIMSS only
  – TIMSS eighth grade
Historical Perspective - Same Overarching Contextual Framework

TIMSS 2011
- National and Community Contexts
- School Contexts
- Classroom Contexts
- Student Characteristics and Attitudes

PIRLS 2011
- National and Community Contexts
- Home Contexts
- School Contexts
- Classroom Contexts
- Student Behaviors and Attitudes
Questionnaire Item Review Committee (QIRC)

Sue Thomson, Australia
Josef Basl, Czech Republic
Naima Hassan, Egypt
Linda Sturman, England
Wilfried Bos, Germany
Clara Anumel, Ghana
Frederick Leung, Hong Kong SAR
Martina Meelissen, Netherlands
Barbara Japelj, Slovenia
Peter Nystrom, Sweden
Patrick Gonzales, United States
Questionnaire Development Group (QDG)

Hwawei Ko (Chinese Taipei)
Jasminka Buljan Culej (Croatia)
Marc Colmant (France)
Knut Schwippert (Germany)
Megan Chamberlain (New Zealand)
Ragnar Solheim (Norway)
Abdessalem Bouslama (Qatar)
Sarah Howie (South Africa)
Valena Plisko (United States)
Enormous Effort to Improve Background Data

First QIRC/QDG joint meeting - Munich April 2009

Focused on **effective** contexts for teaching and learning

- Home and school factors related to achievement
- Concentrated on developing new scales
  - e.g., home numeracy activities, student engagement, principal leadership style, teacher career satisfaction

- NRCs reviewed at TIMSS and PIRLS meetings
The Field Test Instruments

Fourth grade – TIMSS and PIRLS

- Home questionnaire - same
- Student questionnaire
  - General, reading, mathematics, science
- School questionnaire - same
- Teacher questionnaire
  - General, reading, mathematics, science

Eighth grade - TIMSS

- Same as previous assessments
Field Test Data - Countries

Fourth grade
- TIMSS and PIRLS: 30 countries + 2 benchmarkers
- TIMSS: 46 countries + 5 benchmarkers
- PIRLS/prePIRLS: 46 countries + 5 benchmarkers

Eighth grade
- TIMSS: 43 countries + 5 benchmarkers
Data for Review

All questionnaire items individually:

- Country-by-country almanacs

*New for 2011!

Data on scales for reporting questionnaire data:

- Properties of each proposed scale
  - Factor structure
  - Reliability
  - Relationship with achievement (R, M, S)
Process for Creating Scales

• Iterative process of analysis:
  – Factor analyses and reliability estimates for these scales
  – Distribution of scale values
  – Relationship with achievement

• Initial review by TIMSS & PIRLS International Study Center
Criteria for Evaluating Scales

• At least six items per scale
• Unidimensional (about 50% shared variance)
• Good reliability (0.7 Cronbach’s Alpha)
• Strong item-scale correlation (0.5 factor loading)
• Positive relationship with achievement (achievement difference between quartiles)
• Consideration for TIMSS/PIRLS report
2011 Questionnaire Review

July 14-16, 2010

Joint QIRC/QDG meeting, Dubrovnik

July 18-23, 2010

PIRLS NRC meeting, Zagreb

August 8-13, 2010

TIMSS NRC meeting, Prague

Aug 26, 2010

Posted questionnaires for data collection
Background Questionnaire Scales

4th grade
- Home Questionnaire – 8
- Student Questionnaire – 11
- School Questionnaire – 8
- Teacher Questionnaire – 10

8th grade
- Student Questionnaire – 9
- School Questionnaire – 6
- Teacher Questionnaire – 18 (Math/Science)
Factors addressed by Background Questionnaire Scales

- Home environment supportive of learning
- Principals’ reports of school climate and resources
- Teachers’ reports of school working and learning environment
- Teachers’ efforts to motivate students
- Teachers’ coverage of the curriculum
- Students’ motivation to learn
  - Self-confidence, engagement, attitudes
TIMSS and PIRLS - Issues and Analyses

- Relative effectiveness of countries’ schooling policies and practices in reading, mathematics, and science
- Impact of reading proficiency on achievement in mathematics and science
- Profiles of high achieving students in reading, mathematics, and science
- Relative equity issues in reading, mathematics, and science – gender, language, social background
TIMSS and PIRLS
in 2011
Development Completed
– Into the Field!

Ina V.S. Mullis and Michael O. Martin
51st IEA General Assembly
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