

# **The Third International Mathematics and Science Study: A South African perspective**

**Invited address:  
International Workshop on Learning Assessment  
New Delhi, India  
28 November 2006**

**Anil Kanjee  
National Education Quality Initiative  
South Africa**



# General Science Questions

What do we get from cows?

**Calves**

What is  $H_2O$  and  $CO_2$  ?

**Hot water and Cold Water**

Why do mushrooms grow in damp places ?

**Look like umbrellas**

Define germination?

**Process of becoming German**

# The brief

- To talk about the TIMSS experience
  - ◆ the concept,
  - ◆ the players,
  - ◆ the evaluation procedures,
  - ◆ the question framing,
  - ◆ methods of communicating the results and
  - ◆ the outcomes.
- Purpose – briefly describe TIMSS from South African perspective as a participant

# Outline

- **Overview of the IEA**
- **Overview of TIMSS**
- **Management and Support Structure**
- **Instrument Development**
- **Sampling**
- **Administration**
- **Data entry**
- **Data cleaning**
- **Data Analysis**
- **Reporting**
- **Additional Support**
- **South African challenges (time permitting)**

# Outline

- Overview of the IEA
- Overview of TIMSS
- Management and Support Structure
- Instrument Development
- Sampling
- Administration
- Data entry
- Data cleaning
- Data Analysis
- Reporting
- Additional Support
- South African challenges (time permitting)

# What is the IEA?

The **International Association for the Evaluation of Educational Achievement** (IEA) is an independent, international cooperative of national research institutions and governmental research agencies.

IEA aims to:

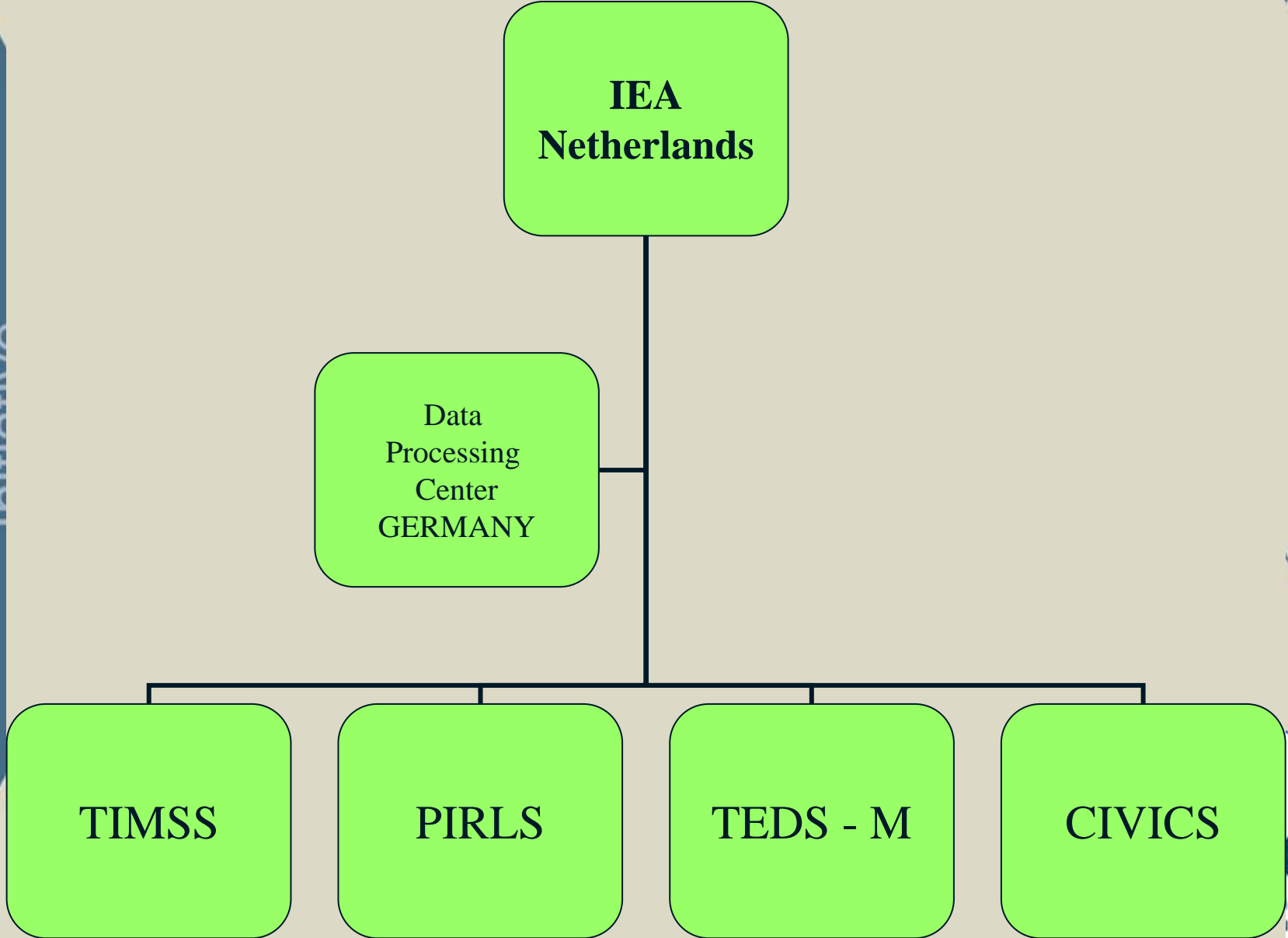
- Provide **international benchmarks** that may assist policy-makers in identifying the comparative strength and weaknesses of their educational systems
- Provide **high-quality data** that will:
  - ◆ **increase policy-makers' understanding** of key school- and non-school-based factors that influence teaching and learning
  - ◆ serve as a **resource for identifying areas of concern and action**, and for preparing and evaluating educational reforms
- **Develop and improve** educational systems' **capacity** to engage in national strategies for educational monitoring and improvement
- Contribute to **development** of the world-wide community of **researchers** in educational evaluation

# International Studies

Sponsor	Description	Countries	Year(s) Conducted
IEA	First International Mathematics Study (FIMS)	12 countries	1964
IEA	Six Subjects Study: Science Reading Literature French as a foreign language English as a foreign language Civic education	19 (systems) 15 countries 10 countries 8 countries 10 countries 10 countries	1970–1971
IEA	First International Science Study (FISS) (part of Six Subjects Study)	19 systems	1970–1971
IEA	Second International Mathematics Study (SIMS)	10 countries	1982
IEA	Second International Science Study (SISS)	19 systems	1983–1984
ETS	First International Assessment of Educational Progress (IAEP-I, Mathematics and Science)	6 countries (12 systems)	1988
ETS	Second International Assessment of Educational Progress (IAEP-II, Mathematics and Science)	20 countries	1991
IEA	Reading Literacy (RL)	32 countries	1990–1991
IEA	Computers in Education	22 countries	1988–1989
	Statistics International Adult Literacy Survey (IALS) Canada	12 countries	1991–1992
		7 countries	1994
IEA	Preprimary Project: Phase I Phase II Phase III (longitudinal followup of Phase II sample)	11 countries 15 countries 15 countries	1989–1991 1991–1993 1994–1996
IEA	Language Education Study	25 interested countries	1997
IEA	Third International Mathematics and Science Study (TIMSS): Phase I Phase II (TIMSS-R)	45 countries About 40	1994–1995 1997–1998
IEA	Civic Education Study	28 countries	1999
OECD	Program for International Student Assessment	32 countries	2000 (reading) 2003 (math) 2006 (science)

Source: Chromy (2002).

# IEA Studies





# Outline

- Overview of the IEA
- Overview of TIMSS
- Management and Support Structure
- Instrument Development
- Sampling
- Administration
- Data entry
- Data cleaning
- Data Analysis
- Reporting
- Additional Support
- South African challenges (time permitting)

# What is TIMSS?

- TIMSS = Third International Maths and Science Study - 1995
  - ◆ TIMSS – R (Repeat- 1999)
  - ◆ TIMSS 2003: **Trends** in International Maths & Science Studies
  - ◆ TIMSS 2007: **Trends** in International Maths & Science Studies
- To **compare and analyze** curricula, teacher practices and student achievement in mathematics and science
- To enable countries to determine whether they are internationally competitive
- To **examine** the variety of “**best practices**” in successful schools
- To **establish world-wide benchmarks** for setting and evaluating educational goals in mathematics and science

# Purpose of TIMSS 2003 & 2007

## Help Countries Answer Questions:

- How well are our students doing in mathematics and science?
- Are things getting better over time?
- How can we improve? What are other countries doing to foster achievement?

# Participation

- **Any country eligible to participate**
- **Fee of \$60 000 p/a – for four years (\$240 K)**
- **An average of 2 international meetings p/a**
- **Each country to nominate a National Research Coordinator (NRC)**
- **In country costs include**
  - ◆ **Item development – voluntary**
  - ◆ **Data collection, entry, cleaning and analysis**
  - ◆ **Reporting and dissemination**

# TIMSS 2007 Participating Countries

Algeria, Armenia, Australia, Austria, Bahrain, Bosnia and Herzegovina, Botswana, Bulgaria, Canada (Alberta, British Columbia, Ontario and Québec), Chinese Taipei, Colombia, Cyprus, Czech Republic, Denmark, Djibouti, Egypt, El Salvador, England, Georgia, Germany, Ghana, Hong Kong (SAR), Hungary, Indonesia, Iran, Israel, Italy, Japan, Jordan, Kazakhstan, Korea, Kuwait, Latvia, Lebanon, Lithuania, Malaysia, Malta, Moldova, Mongolia, Morocco, The Netherlands, New Zealand, Norway, Oman, Palestinian National Authority, Qatar, Romania, Russian Federation, Saudi Arabia, Scotland, Serbia, Singapore, Slovak Republic, Slovenia, Spain (Basque Country), Sweden, Syria, Thailand, Tunisia, Turkey, Ukraine, United States, Yemen.

# Outline

- Overview of the IEA
- Overview of TIMSS
- Management and Support Structure
- Instrument Development
- Sampling
- Administration
- Data entry
- Data cleaning
- Data Analysis
- Reporting
- Additional Support
- South African challenges (time permitting)

# TIMSS Structure

National Education Quality Initiative

International Study Center (ISC)  
Boston College

Data Processing Center (DPC)  
GERMANY

NRC - Country

NRC - Country

Statistics Canada  
Sampling

IRT Analysis  
ISC + E T S (Princeton)

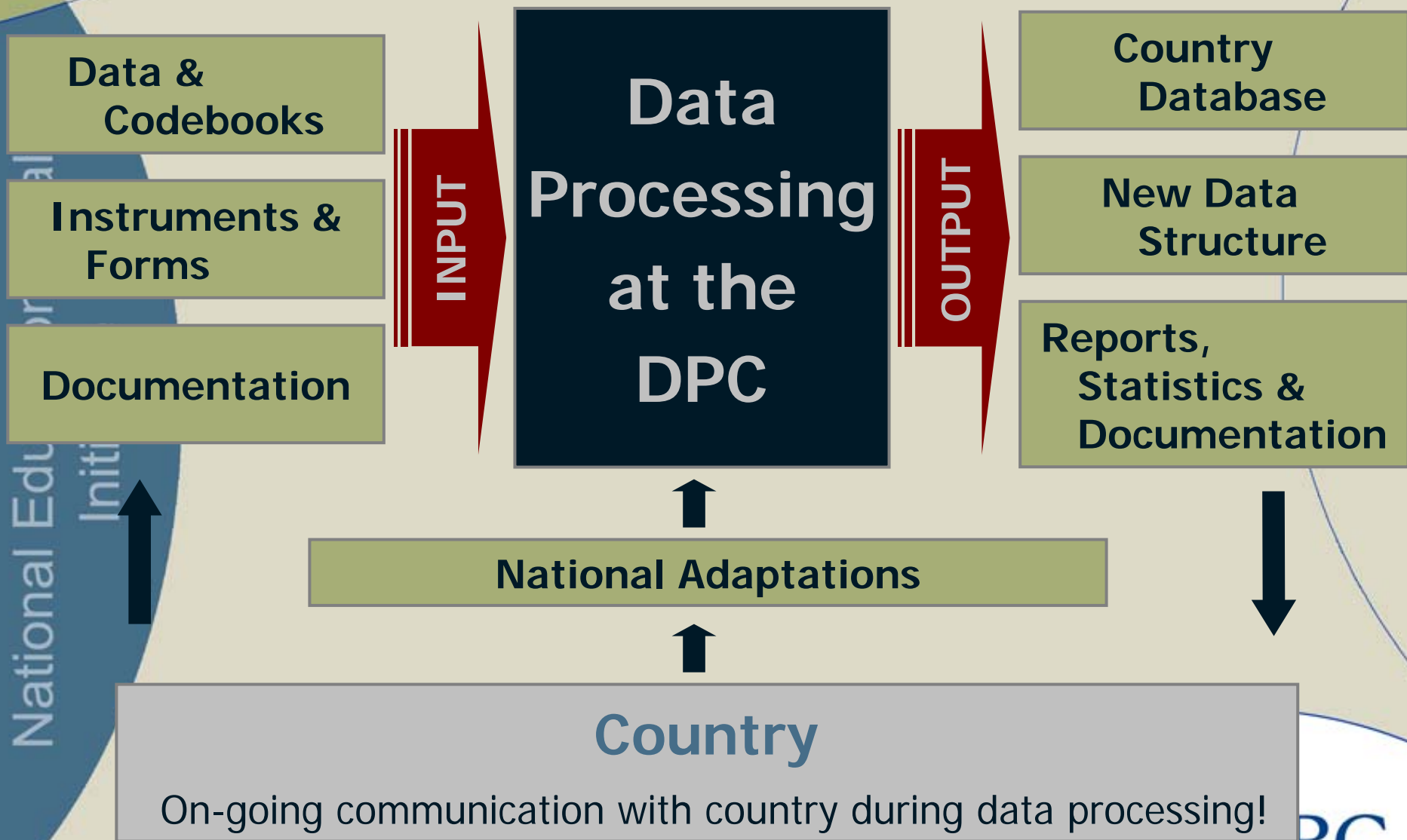
SMIRC Subject Matter Item Review Committee  
Maths & Science

QIRC  
Questionnaire Item Review Committee

Quality Assurance

- 
- 
- 
- 
-

# Data Processing (Hamburg)



Social science that makes a difference



# Outline

- Overview of the IEA
- Overview of TIMSS
- Management and Support Structure
- Instrument Development
- Sampling
- Administration
- Data entry
- Data cleaning
- Data Analysis
- Reporting
- Additional Support
- South African challenges (time permitting)

# Instruments

- **Student performance in Mathematics**
  - ◆ **Number, Algebra, Measurement, Geometry, Data**
- **Student performance in Science**
  - ◆ **Life Science, Chemistry, Physics, Earth Science, Environmental Science**
- **Context for student achievement**
  - ◆ **System, School, Classroom, Student background**
- **Trends – 1995, 1999, 2003, 2007...**

# Instrument development process

- Frameworks based on “common curriculum
- Developed by SMIRCs - Maths & Science
  - ◆ Subject Matter Item Review Committee:
  - ◆ Questionnaire Item Review committee - QIRC
- Items developed by countries and submitted to SMIRCs
- Multiple choice, Free response (Open + one “word”)
- Draft instruments reviewed by all NRCs
- Items translated into required languages
  - ◆ IEA manages translation process using local translators
- Items piloted in all countries
- Pilot data analysed for final instruments
- **Opportunity for country specific items also**

# TIMSS 2007 Framework

Fourth-Grade Content Domains		Percentages
Number		50%
Geometric Shapes and Measures		35%
Data Display		15%
Eighth-Grade Content Domains		Percentages
Number		30%
Algebra		30%
Geometry		20%
Data and Chance		20%
Cognitive Domains		
	Fourth Grade	Eighth Grade
Knowing	40%	35%
Applying	40%	40%
Reasoning	20%	25%

# Content Framework

- Ambitious assessment framework
  - ◆ Specifies content and cognitive domains in mathematics and science at two grade levels
- Resulting in wide-ranging assessment

<b>Items</b>	<b>Grade 4</b>	<b>Grade 8</b>
<b>Mathematics</b>	<b>161</b>	<b>194</b>
<b>Science</b>	<b>152</b>	<b>189</b>
<b>Total</b>	<b>313</b>	<b>383</b>

# Harsh Realities!

- **Assessment is too long for one student in one sitting**
  - ◆ 7 hours at grade 8
  - ◆ 5½ hours at grade 4
- **Can't keep reusing the test**
  - ◆ Gets out of date, needs updating
  - ◆ Need to publish items to illustrate results
  - ◆ Security issues

# So, What Is the Answer?

**Divide the assessment into smaller pieces, so that:**

- **Each student responds to a manageable piece**
- **Some pieces can be published and used for illustrative purposes**
- **The new pieces developed to replace the published pieces can help keep up to date**
- **Matrix sampling/rotated designs**

# The Test Design in 2003

Book	Block 1	Block 2	Block 3	Block 4	Block 5	Block 6
1	M01	M02			M05	M07
2	M02	M03			M06	M08
3	M03	M04			M13	M11
4	M04	M05			M14	M12
5	M05	M06			M09	M13
6	M06	M01			M10	M14
7			M01	M12		
8			M02	M11		
9			M03	M10		
10			M04	M09		
11			M05	M08		
12			M06	M07		



# What are the 2003 tests like – Grade 8

Subject	Reporting Category	1995 Items	1999 Items	2003 Items	Total
Mathematics	Algebra	6	10	31	47
	Data	3	7	18	28
	Geometry	4	8	19	31
	Measurement	4	12	15	31
	Number	6	19	32	57
	<b>Total</b>	<b>23</b>	<b>56</b>	<b>115</b>	<b>194</b>
Science	Chemistry	4	10	17	31
	Earth Science	6	6	19	31
	Env. Science	3	6	18	27
	Life Science	6	11	37	54
	Physics	5	17	24	46
	<b>Total</b>	<b>24</b>	<b>50</b>	<b>115</b>	<b>189</b>

# Outline

- Overview of the IEA
- Overview of TIMSS
- Management and Support Structure
- Instrument Development
- Sampling
- Administration
- Data entry
- Data cleaning
- Data scaling and Analysis
- Reporting
- Additional Support
- South African challenges (time permitting)

# Sampling

- Based on country needs – e.g. subgroups, regions, etc.
- Conducted by TIMSS center in collaboration with NRC
- Assistance from Statistics Canada
- **Strict** criteria applied (**Comparability + SE**)
  - ◆ Missing data acceptable
  - ◆ Omissions allowed – e.g. special schools,
- Sample weighted to country school population
- Sampling weights critical to accurate analysis

# Outline

- Overview of the IEA
- Overview of TIMSS
- Management and Support Structure
- Instrument Development
- Sampling
- Administration
- Data entry
- Data cleaning
- Data scaling and Analysis
- Reporting
- Additional Support
- South African challenges (time permitting)

# Administration

- Instruments administered by NRC + team
- Training and support provided by IEA
  - ◆ Appropriate manuals
  - ◆ Training sessions
- Processes monitored by IEA
  - ◆ Locals hired & reports directly by IEA
- Scores of monitored vs non-monitored schools compared

# Outline

- Overview of the IEA
- Overview of TIMSS
- Management and Support Structure
- Instrument Development
- Sampling
- Administration
- Data entry
- Data cleaning
- Data scaling and Analysis
- Reporting
- Additional Support
- South African challenges (time permitting)

# Data Entry & Cleaning

- Data entered in country
- Specially designed software developed by IEA
- Double entry to eliminate errors
- Cleaning done in country
- Data checked by DPC before analysis

# Outline

- Overview of the IEA
- Overview of TIMSS
- Management and Support Structure
- Instrument Development
- Sampling
- Administration
- Data entry
- Data cleaning
- Data scaling and Analysis
- Reporting
- Additional Support
- South African challenges (time permitting)



# Calibrating the Items

**Item Response Theory applied to analyse scores to ensure comparability:**

- **Between booklets**
- **Between years**
- **Set scores on same scale for reporting**
  
- When calibrating overall mathematics and science
  - ◆ Select 1000 students from each trend country/year
  - ◆ Selection of students is done PPW (probability proportional to weight)
  - ◆ Each trend country/year contributes in the same amount to estimates (1000 students each per year)
- When calibrating subscales
  - ◆ Select 1000 students from each 2003 country
  - ◆ Selection of students is done PPW (probability proportional to weight)
  - ◆ Each country contributes in the same amount to estimates (1000 students each)

# Test Curriculum Matching Analysis

- **NRC reports on which items are included/excluded in country curriculum**
- **Comparisons of learner performance, in each country, - included vs excluded items**
- **In 2003 - differences less than 5% - indicating minimum impact of curriculum on performance**

# International Benchmarking

- i. Select Benchmarks on the TIMSS achievement scale to be described in terms of performance
- ii. Analyze data to identify items that students at the Benchmarks answered correctly
- iii. Group items by Benchmarks for review by panels of mathematics and science specialists - SMIRC members
- iv. **Panelists scrutinize each item and describe student knowledge and understanding represented by correct answer**
- v. Work with panelists to summarize and interpret findings for the items at each Benchmark
  - i. Content referenced interpretation

# Cut-off scores – Maths 2003

<b>International Benchmark</b>	<b>Percentile</b>	<b>Scale Score**</b>
<b>Top 10% Benchmark</b>	<b>90<sup>th</sup></b>	<b>625</b>
<b>Upper Quarter Benchmark</b>	<b>75<sup>th</sup></b>	<b>550</b>
<b>Median Benchmark</b>	<b>50<sup>th</sup></b>	<b>475</b>
<b>Lower Quarter Benchmark</b>	<b>25<sup>th</sup></b>	<b>400</b>



## Intermediate International Benchmark – 475 TIMSS 2003 Maths

*Students can apply basic mathematical knowledge in straightforward situations. They can read, interpret, and use different representations of numbers. They can perform operations with three and four-digit numbers and decimals. They can extend simple patterns. They are familiar with a range of two-dimensional shapes and read and interpret different representations of the same data.*

# Example of Benchmark table

Countries	Percentages of Students Reaching International Benchmarks	Advanced International Benchmark (625)	High International Benchmark (550)	Intermediate International Benchmark (475)	Low International Benchmark (400)
Singapore		44 (2.0)	77 (2.0)	93 (1.0)	99 (0.2)
Chinese Taipei		38 (2.0)	66 (1.8)	85 (1.2)	96 (0.6)
** Korea, Rep. of		35 (1.3)	70 (1.0)	90 (0.5)	98 (0.3)
† Hong Kong, SAR		31 (1.6)	73 (1.8)	93 (1.3)	98 (0.6)
Japan		24 (1.0)	62 (1.2)	88 (0.6)	98 (0.2)
Hungary		11 (1.0)	41 (1.9)	75 (1.6)	95 (0.8)
† Netherlands		10 (1.5)	44 (2.5)	80 (2.0)	97 (0.8)
Belgium (Flemish)		9 (0.9)	47 (1.9)	82 (1.2)	95 (0.9)
Estonia		9 (0.8)	39 (1.9)	79 (1.4)	97 (0.5)
Slovak Republic		8 (0.8)	31 (1.7)	66 (1.7)	90 (1.1)
Australia		7 (1.1)	29 (2.4)	65 (2.3)	90 (1.4)
‡ United States		7 (0.7)	29 (1.6)	64 (1.6)	90 (1.0)
<b>International Avg.</b>		<b>7 (0.1)</b>	<b>23 (0.2)</b>	<b>49 (0.2)</b>	<b>74 (0.2)</b>
Malaysia		6 (1.0)	30 (2.4)	66 (2.1)	93 (0.9)

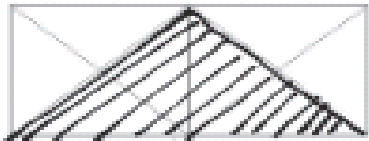
# Grade 4 high benchmark level

## Content Area: Geometry

Description: Part B—Makes and draws one square from four triangle tiles (square tiles divided diagonally into one white and one black triangle).

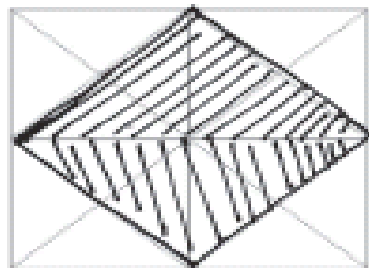
- A. Use 2 of the triangle tiles to make one large black triangle. Then show what you did with your tiles by shading in your triangle below.

**Shade in Your Triangle Here**



- B. Use all 4 triangle tiles to make a black square. Then show what you did with your tiles by shading in your square below.

**Shade in Your Square Here**



- C. What fraction of the figure is shaded in part B above?

Answer:            $\frac{1}{2}$           

Country	Percent Full Cred
Japan	71 (2.0)
† Netherlands	60 (3.2)
Russian Federation	57 (2.3)
† Lithuania	57 (2.3)
Belgium (Flemish)	55 (2.0)
Chinese Taipei	54 (1.5)
† England	54 (2.4)
† Australia	52 (3.0)
New Zealand	52 (2.3)
Italy	51 (2.9)
† Scotland	48 (2.9)
Norway	47 (3.1)
Cyprus	47 (2.3)
† Hong Kong, SAR	46 (2.0)
Singapore	45 (2.3)
Hungary	45 (2.1)
Slovenia	44 (2.6)
† United States	42 (1.7)
<b>International Avg.</b>	<b>42 (2.5)</b>
Moldova, Rep. of	37 (2.9)
Latvia	33 (2.2)
Tunisia	15 (1.5)
Iran, Islamic Rep. of	13 (2.0)
Armenia	10 (1.3)
Philippines	7 (1.0)
Morocco	5 (1.7)
<b>Benchmarking Participants</b>	
Indiana State, US	42 (3.4)
Ontario Province, Can.	49 (2.4)
Quebec Province, Can.	49 (2.9)

Country average significantly higher than International average

Country average significantly lower than International average

# Grade 8 Advance Level Item

Betty, Frank, and Darlene have just moved to Zedland. They each need to get phone service. They received the following information from the telephone company about the two different phone plans it offers.

They must pay a set fee each month and there are different rates for each minute they talk. These rates depend on the time of the day or night they use the phone, and on which payment plan they choose. Both plans include time for which phone calls are free. Details of the two plans are shown in the table below.

Plan	Monthly Fee	Rate per minute		Free minutes per month
		Day (8 am – 6 pm)	Night (6 pm – 8 am)	
Plan A	20 zeds	3 zeds	1 zed	180
Plan B	15 zeds	2 zeds	2 zeds	120

Betty talks for less than 2 hours per month. Which plan would be less expensive for her?

Less expensive plan Plan B

Explain your answer in terms of both the monthly fee and free minutes.

she talks for less than 2 hours  
and Plan B has less monthly fees

Japan	49 (2.2)
Australia	44 (2.2)
Estonia	44 (2.1)
<sup>H</sup> Korea, Rep. of	40 (1.7)
Singapore	40 (1.7)
Hungary	39 (2.2)
Belgium (Flemish)	38 (1.9)
<sup>I</sup> Lithuania	37 (1.7)
<sup>‡</sup> United States	37 (1.7)
<sup>†</sup> Scotland	36 (2.7)
<sup>2</sup> Israel	33 (2.1)
New Zealand	30 (2.4)
<sup>†</sup> Netherlands	28 (2.5)
<sup>†</sup> Hong Kong, SAR	28 (2.0)
Slovenia	27 (2.2)
Sweden	27 (1.9)
Malaysia	27 (1.7)
Chinese Taipei	27 (1.8)
Slovak Republic	26 (2.0)
Italy	23 (1.8)
Latvia	22 (1.8)
<b>International Avg.</b>	<b>21 (0.3)</b>
Jordan	20 (1.8)
Bahrain	18 (1.4)
Norway	18 (1.4)
Romania	16 (1.8)
Russian Federation	15 (2.0)
Egypt	14 (1.2)
Cyprus	13 (1.4)
<sup>1</sup> Indonesia	12 (1.4)
<sup>1</sup> Serbia	12 (1.3)
Chile	12 (1.1)
Bulgaria	12 (1.7)
Lebanon	11 (1.4)
Philippines	11 (1.2)
<sup>2</sup> Macedonia, Rep. of	10 (1.5)
Saudi Arabia	8 (1.8)



# Outline

- Overview of the IEA
- Overview of TIMSS
- Management and Support Structure
- Instrument Development
- Sampling
- Administration
- Data entry
- Data cleaning
- Data scaling and Analysis
- Reporting
- Additional Support
- South African challenges (time permitting)

# Reporting

- **Report student's overall performance on the assessment**
- **Report trends over time**
- **Analyze relationships between student performance and background variables (home, school, classroom, etc)**
- **International report – by ISC (Boston)**
- **Country reports – by NRC**

# Reporting Scales used in TIMSS

- **Scales for mathematics, science, and content areas**
- **Scale range: 0 – 1000**
  - ◆ **Most scores between 200 and 800**
  - ◆ **(Mean: 500, SD 100)**
- **Scores from 1995, 1999, and 2003 are on the same scale**

# Reporting - Benchmarks

- Percentages of students in each country reaching each Benchmark, with trends if available
- Example items for each Benchmark
  - ◆ Showing overall percent correct for each country, indicating if statistically different from international average

# Maths Achievement 2003

Countries	Mathematics Achievement Distribution	Average Scale Score
Singapore		905
Korea, Rep. of		589
Hong Kong, SAR		586
Chinese Taipei		585
Japan		570
Belgium (Flemish)		537
Netherlands		536
Estonia		531
Hungary		529
Malaysia		508
Latvia		508
Russian Federation		508
Slovak Republic		508
Australia		505
United States		504
Lithuania		502
Sweden		499
Scotland		498
Israel		496
New Zealand		494
Slovenia		493
Italy		484
Armenia		478
Serbia		477
Bulgaria		476
Romania		475
<b>International Avg.</b>		<b>457</b>
Norway		451
Moldova, Rep. of		450
Cyprus		459
Macedonia, Rep. of		435
Lebanon		433
Jordan		424
Iran, Islamic Rep. of		411
Indonesia		411
Tunisia		410
Egypt		406
Bahrain		401
Palestinian Nat'l Auth.		390
Chile		387
Morocco		387
Philippines		378
Botswana		366
Saudi Arabia		332
Ghana		276
South Africa		264
England		498
<b>Benchmarking Participants</b>		
Basque Country, Spain		487
Indiana State, US		508
Ontario Province, Can.		521
Quebec Province, Can.		543

National Education Quality Initiative

# Science performance – Grade 4

Countries	Science Achievement Distribution	Average Scale Score
Singapore		565
Chinese Taipei		551
Japan		543
Hong Kong, SAR		542
England		540
United States		536
Latvia		532
Hungary		530
Russian Federation		526
Netherlands		525
Australia		521
New Zealand		520
Belgium (Flemish)		518
Italy		516
Lithuania		512
Scotland		502
Moldova, Rep. of		496
Slovenia		490
<b>International Avg.</b>		<b>489</b>
Cyprus		480
Norway		466
Armenia		437
Iran, Islamic Rep. of		414
Philippines		332
Tunisia		314
Morocco		304
<b>Benchmarking Participants</b>		
Indiana State, US		553
Ontario Province, Can.		540
Quebec Province, Can.		500

# Contextual information

## % & time spent on various activities in the maths class

Countries	Reviewing Homework	Listening to Lecture-Style Presentations	Working Problems with Teacher's Guidance	Working Problems on Their Own Without Teacher's Guidance
Armenia	s 10 (0.5)	s 12 (0.7)	s 24 (1.1)	s 20 (0.8)
Australia	6 (0.4)	12 (0.8)	27 (1.1)	25 (1.0)
Belgium (Flemish)	6 (0.4)	18 (0.6)	19 (0.6)	32 (1.1)
Chinese Taipei	10 (0.4)	33 (1.3)	16 (0.6)	11 (0.7)
Cyprus	14 (0.5)	12 (0.5)	22 (0.6)	21 (0.7)
England	r 6 (0.4)	r 18 (1.2)	r 24 (1.2)	r 27 (1.1)
Hong Kong, SAR	7 (0.4)	37 (1.3)	17 (0.7)	15 (0.8)
Hungary	r 8 (0.4)	r 12 (0.8)	r 27 (0.8)	r 27 (0.8)
Iran, Islamic Rep. of	13 (0.6)	13 (0.6)	17 (0.7)	14 (0.7)
Italy	11 (0.4)	24 (0.6)	13 (0.4)	14 (0.4)
Japan	5 (0.3)	19 (0.9)	32 (1.1)	16 (1.0)
Latvia	7 (0.5)	10 (0.7)	22 (0.8)	27 (0.9)
Lithuania	8 (0.3)	6 (0.4)	24 (0.8)	33 (1.0)
Moldova, Rep. of	r 10 (0.5)	r 12 (0.6)	r 20 (1.0)	r 18 (0.8)
Morocco	x x	x x	x x	x x
Netherlands	r 3 (0.3)	r 14 (0.9)	r 20 (1.2)	r 37 (1.4)
New Zealand	4 (0.3)	10 (0.5)	28 (1.1)	27 (0.9)
Norway	7 (0.4)	15 (0.5)	23 (1.3)	35 (1.6)
Philippines	9 (0.4)	18 (0.8)	17 (0.7)	17 (0.8)
Russian Federation	9 (0.3)	14 (0.6)	21 (0.7)	23 (0.6)
Scotland	s 6 (0.4)	s 21 (0.9)	s 20 (1.4)	s 31 (1.8)
Singapore	14 (0.6)	21 (1.0)	17 (0.8)	17 (0.7)
Slovenia	r 9 (0.4)	r 14 (0.8)	r 23 (1.0)	r 29 (1.2)
Tunisia	r 14 (1.0)	r 9 (1.0)	r 25 (1.6)	s 18 (1.1)
United States	10 (0.4)	16 (0.4)	23 (0.7)	22 (0.7)
International Avg.	8 (0.1)	16 (0.2)	22 (0.2)	23 (0.2)

# Class sizes and maths scores

Countries	Overall Average Class Size	1 - 19 Students		20 - 26 Students		27 - 32 Students		33 or More Students	
		Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Armenia	29 (1.5)	22 (4.1)	467 (8.6)	33 (4.2)	462 (7.6)	19 (4.3)	456 (9.6)	26 (4.8)	457 (8.2)
Australia	26 (0.6)	16 (3.0)	495 (9.6)	29 (3.8)	503 (6.7)	53 (4.3)	504 (5.6)	2 (1.5)	--
Belgium (Flemish)	20 (0.4)	43 (3.4)	550 (3.6)	50 (3.6)	551 (2.3)	6 (2.0)	549 (4.9)	1 (0.0)	--
Chinese Taipei	32 (0.3)	2 (0.7)	--	7 (2.0)	546 (14.2)	37 (4.0)	565 (3.2)	54 (3.7)	567 (2.0)
Cyprus	23 (0.3)	18 (2.2)	502 (4.0)	56 (4.0)	513 (3.9)	25 (4.2)	508 (4.7)	0 (0.0)	--
England	28 (0.8)	11 (2.7)	514 (16.4)	29 (4.7)	528 (7.5)	40 (4.1)	534 (6.3)	20 (4.4)	539 (13.1)
Hong Kong, SAR	34 (0.4)	2 (0.9)	--	4 (1.7)	544 (14.8)	30 (4.0)	566 (4.5)	64 (4.3)	584 (4.3)
Hungary	24 (0.4)	19 (3.0)	506 (6.3)	54 (4.1)	523 (4.5)	26 (4.0)	550 (7.4)	1 (0.9)	--
Iran, Islamic Rep. of	27 (0.6)	16 (2.7)	368 (9.8)	28 (3.6)	390 (6.4)	26 (4.1)	383 (10.4)	30 (4.0)	404 (6.7)
Italy	20 (0.3)	45 (3.4)	508 (4.8)	53 (3.4)	499 (5.2)	1 (0.7)	--	0 (0.0)	--
Japan	32 (0.3)	4 (0.9)	572 (7.2)	13 (2.3)	560 (4.6)	28 (3.0)	566 (3.0)	55 (2.9)	564 (2.4)
Latvia	23 (0.4)	31 (3.1)	521 (6.2)	38 (3.8)	529 (5.2)	27 (2.9)	561 (4.5)	5 (1.9)	561 (10.2)
Lithuania	21 (0.4)	30 (3.0)	506 (6.6)	59 (3.5)	544 (3.3)	11 (2.5)	548 (7.6)	0 (0.3)	--
Moldova, Rep. of	25 (0.5)	16 (3.1)	491 (9.6)	49 (4.7)	503 (8.0)	30 (3.8)	520 (8.9)	5 (1.8)	506 (25.6)
Morocco	x x	x x	x x	x x	x x	x x	x x	x x	x x
Netherlands	23 (0.4)	24 (3.4)	544 (3.5)	41 (4.6)	540 (4.3)	33 (4.2)	542 (3.6)	2 (1.5)	--
New Zealand	27 (0.3)	10 (1.6)	474 (8.9)	24 (2.7)	487 (5.4)	56 (3.0)	501 (3.2)	9 (2.2)	482 (9.6)
Norway	21 (0.4)	38 (3.2)	446 (4.8)	47 (3.5)	451 (3.3)	13 (3.2)	464 (4.8)	2 (1.3)	--
Philippines	40 (1.0)	3 (1.0)	336 (28.7)	7 (2.4)	350 (20.2)	16 (3.8)	388 (34.2)	75 (4.2)	353 (6.9)
Russian Federation	21 (0.3)	33 (3.2)	524 (6.5)	45 (3.6)	539 (7.7)	20 (2.5)	523 (8.2)	1 (0.9)	--
Scotland	26 (0.5)	18 (3.5)	482 (8.3)	27 (4.5)	489 (6.2)	48 (4.5)	486 (4.4)	7 (2.5)	505 (13.0)
Singapore	38 (0.2)	0 (0.1)	--	2 (0.8)	--	3 (1.0)	506 (39.2)	96 (1.2)	598 (5.4)
Slovenia	20 (0.4)	45 (4.1)	477 (4.7)	49 (4.4)	480 (4.0)	6 (2.2)	477 (7.8)	0 (0.0)	--
Tunisia	31 (0.4)	5 (1.5)	319 (25.3)	15 (2.9)	331 (14.6)	41 (4.2)	341 (7.7)	38 (4.3)	344 (9.0)
United States	23 (0.3)	23 (2.5)	519 (5.7)	56 (3.0)	523 (3.2)	18 (2.3)	509 (6.1)	3 (1.1)	513 (13.7)
<b>International Avg.</b>	<b>26 (0.1)</b>	<b>20 (0.6)</b>	<b>482 (2.5)</b>	<b>34 (0.7)</b>	<b>495 (1.8)</b>	<b>26 (0.7)</b>	<b>503 (2.6)</b>	<b>21 (0.5)</b>	<b>499 (3.0)</b>



# Outline

- Overview of the IEA
- Overview of TIMSS
- Management and Support Structure
- Instrument Development
- Sampling
- Administration
- Data entry
- Data cleaning
- Data scaling and Analysis
- Reporting
- Additional Support
- South African challenges (time permitting)

# Additional Support

- **Basic and Advance analysis**
- **Secondary Analysis**
- **International Data base – all data**
- **SPSS and SAS Programs to conduct analysis**
- **Conference – Every two years 2004, 2006, 2008?**

# Reports

TIMSS 2003 Technical Report



TIMSS 2003 International Science Report



TIMSS 2003 International Mathematics Report



Social science that makes a difference

# User Guide Supplements 1 and 2

## *Supplement 1*



International Version of the TIMSS 2003  
Background Questionnaires

## *Supplement 2*



National Adaptations of International  
Background Questionnaire Items

Social science that makes a difference

# Outline

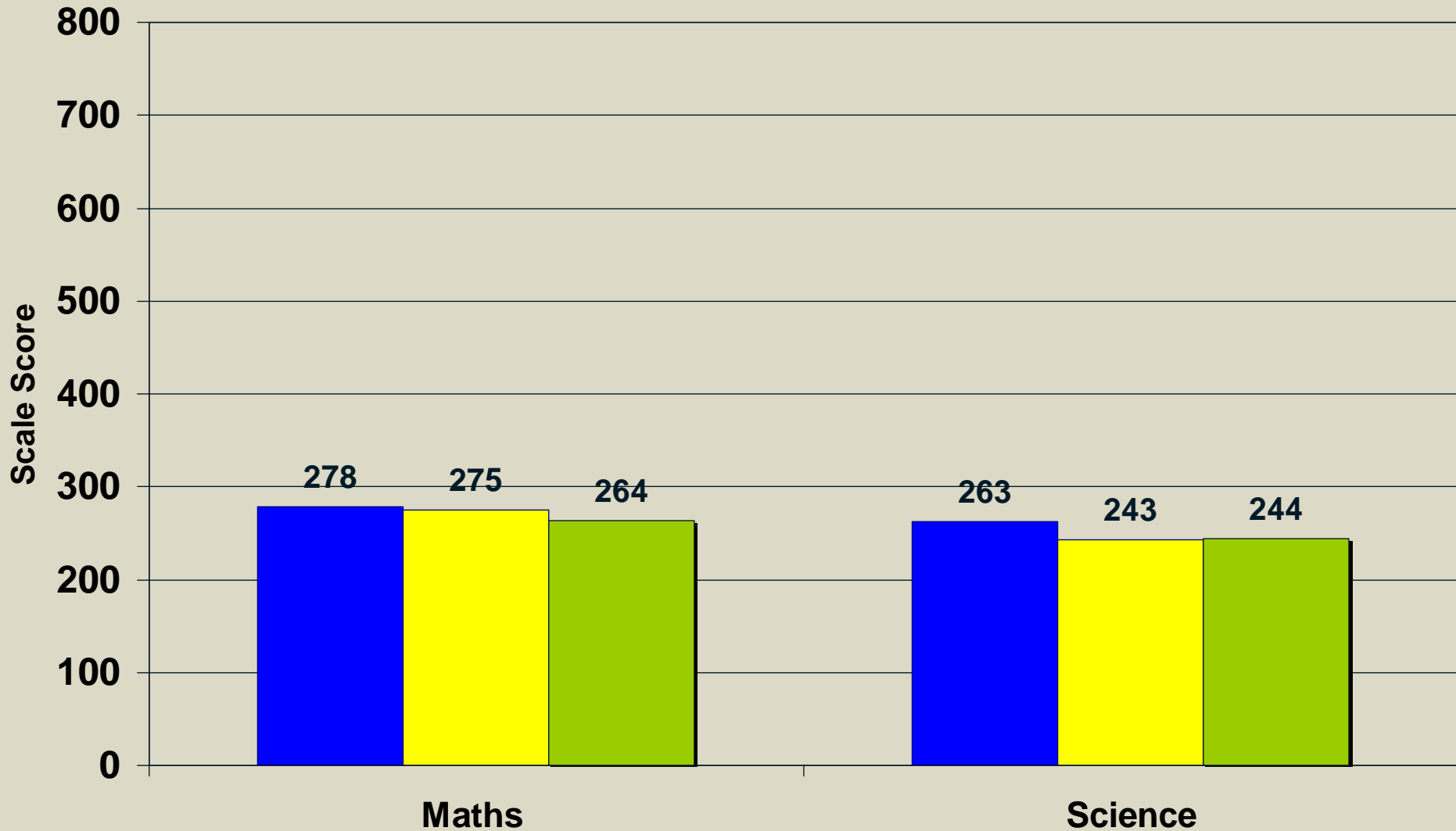
- Overview of the IEA
- Overview of TIMSS
- Management and Support Structure
- Instrument Development
- Sampling
- Administration
- Data entry
- Data cleaning
- Data scaling and Analysis
- Reporting
- Additional Support
- South African challenges (time permitting)

# S A challenges

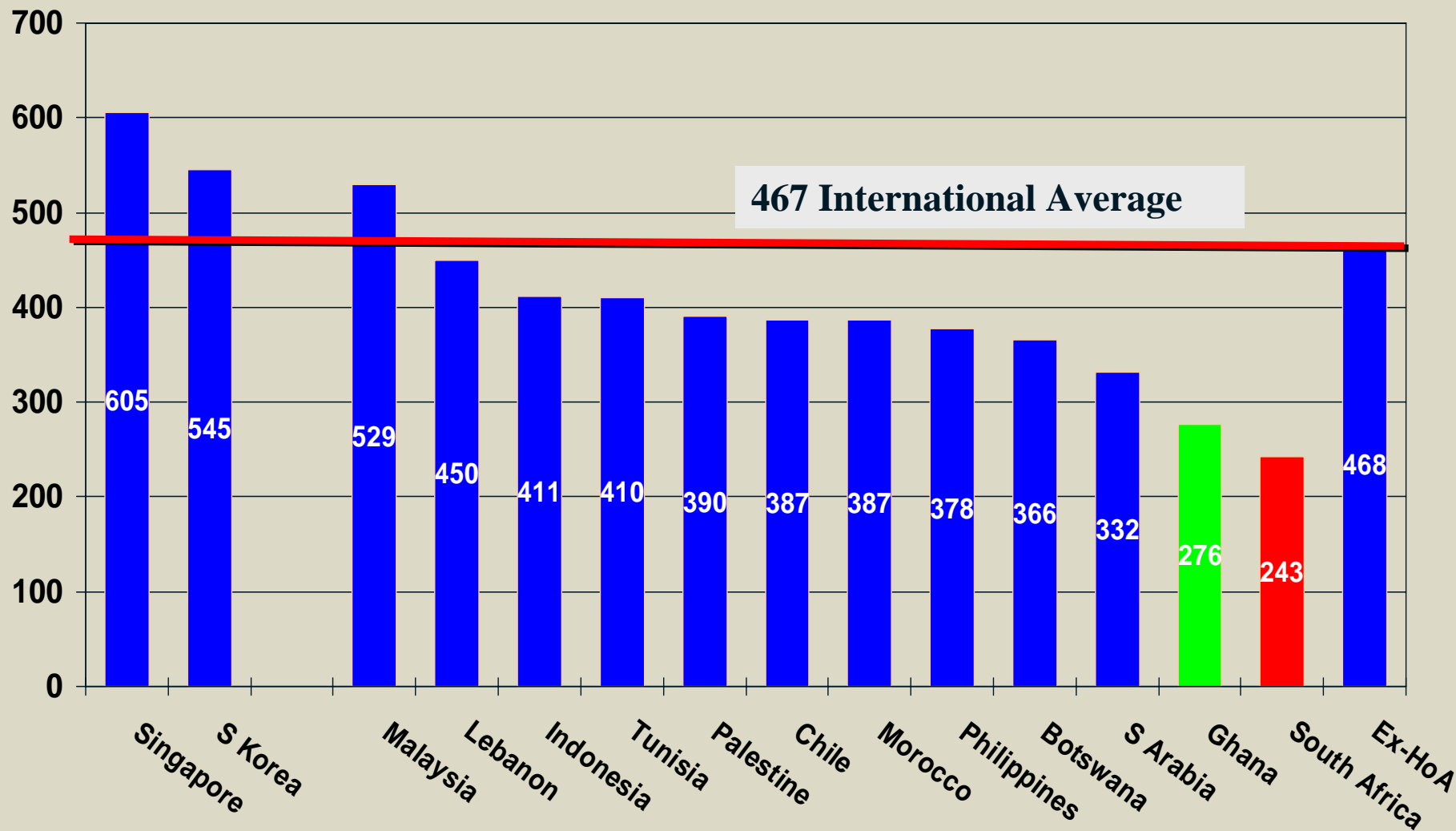
- Participated in 1995 (poor data), 1999, 2003
- Poor results – pressure on MoE
- **Not** participating in 2007
  - ◆ No change expected in scores
  - ◆ High enrollment and in-country costs
- Review of Assessment practices / policies?

# Trends in Maths & Science performance

■ 1995 ■ 1999 ■ 2003



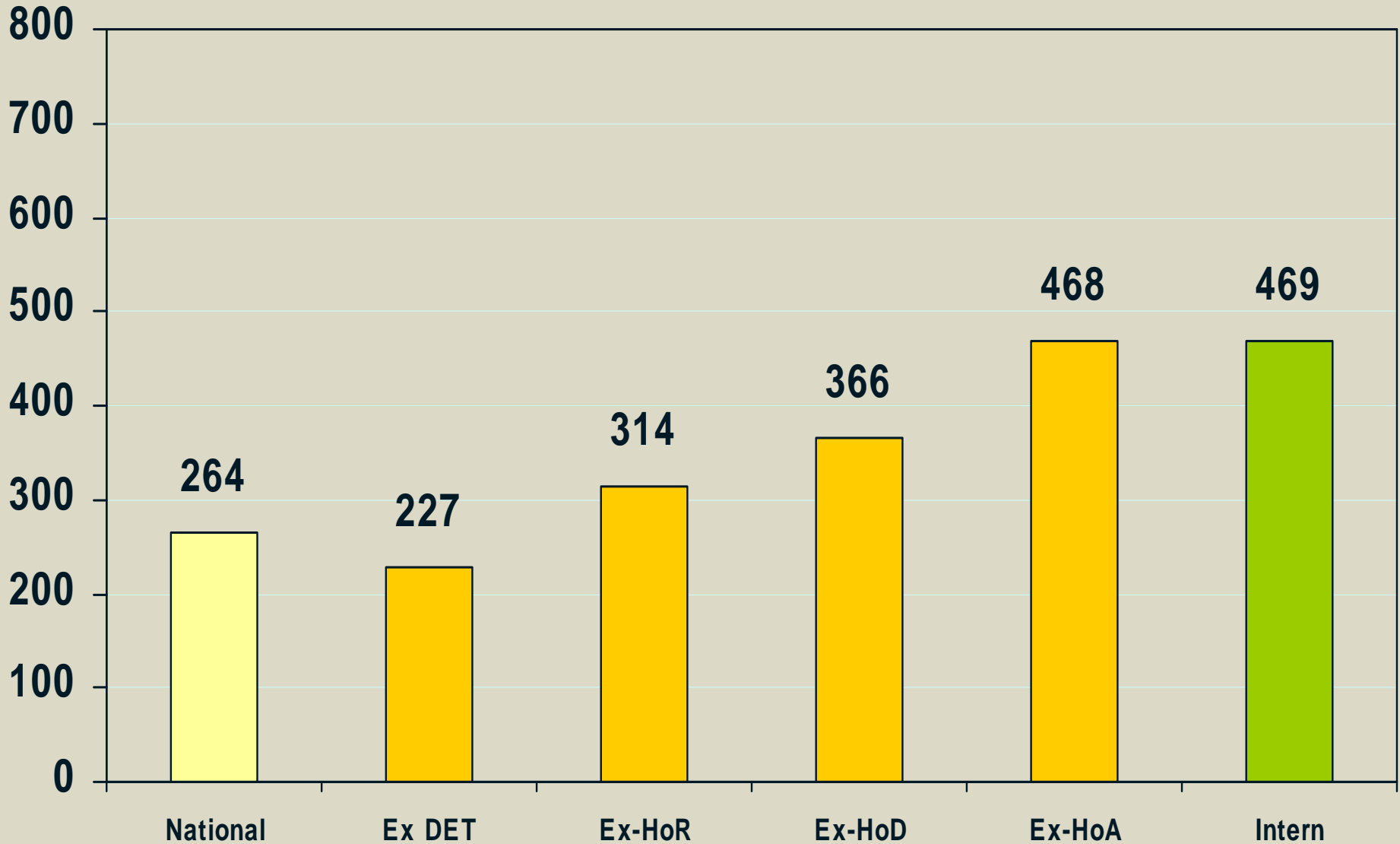
# SA vs other nations - 2003 TIMSS Maths



Maths and science performance low compared to Botswana, Morocco, Malaysia, Indonesia - even **Palestine**



# TIMSS Grade 8 Maths Performance by ex-dept



**Thank you for your attention**

Social science that makes a difference



**HSRC**  
Human Sciences  
Research Council